Integrating Interprofessional Learning into Health Professions Curricula

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Statement of originality

This thesis is submitted to The University of Sydney, Australia, in fulfillment of the requirement of Doctor of Philosophy. I certify that the intellectual content of this thesis is the product of my own work and that all the assistance I have received in preparing this thesis and sources have been acknowledged.

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Authorship attribution statement

Chapters published as papers:

Chapter 3 of this thesis is published as van Diggele, C., Roberts, C., & Haq, I. (2021). Optimising student-led interprofessional learning across eleven health disciplines. *BMC Medical Education*, 21(1), 157. https://doi.org/10.1186/s12909-021-02527-9

I designed the study, was responsible for data collection, analysed the data and wrote the draft manuscript. The co-authors provided methodological expertise, contributed to the interpretation of findings and review of the manuscript.

Chapter 4 of this thesis is published as van Diggele, C., Roberts, C., & Lane, S. (2022). Leadership behaviours in interprofessional student teamwork. *BMC Medical Education*, *22*(1), 834–834. https://doi.org/10.1186/s12909-022-03923-5

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I designed the study, was responsible for data collection, analysed the data and wrote the draft manuscript. The co-authors contributed to the interpretation of findings and review of the manuscript.

Chapter 6 of this thesis is published as van Diggele, C., Roberts, C., Bloomfield, J., & Lane, S. (2024). Interprofessional Learning: building social capital among faculty, are we there yet? *Focus on Health Professional Education*, 25(1). https://doi.org/10.11157/fohpe.v25i1.716

I designed the study, was responsible for data collection, analysed the data and wrote the draft manuscript. The co-authors contributed to the interpretation of findings and review of the manuscript.

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As supervisor for the candidature upon which this thesis is based, I can confirm that the authorship attribution statements above are correct.

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ABSTRACT

Background

Interprofessional Education (IPE) is increasingly recognised as essential to health professions education prior to entering the workforce. Yet integrating interprofessional activities within health professional degree programs remains challenging. Interprofessional activities offer students opportunities to develop knowledge and practice skills in interprofessional collaboration. Both student and faculty engagement are crucial to effective curriculum delivery and outcomes.

The study was undertaken at the Faculty of Medicine and Health, The University of Sydney. There are approximately 10,000 health professional students enrolled in undergraduate and postgraduate degrees within the Faculty each year. The disciplines that form the basis of this study include medicine, pharmacy, nursing, dentistry, occupational therapy, medical sciences, speech and language pathology, nutrition and dietetics, physiotherapy, health sciences, diagnostic radiography and medical imaging, oral health, and exercise physiology. The new IPE curriculum was introduced across a five year period, between 2017 and 2021. Key activities for early year students include the IPE introductory workshop, Interprofessional Communication Education workshop and Health Collaboration Challenge (HCC). Key activities for senior students include the Medication Safety workshop, Patient Safety workshop, Peer Teacher Training (PTT) program and Student Interprofessional Facilitator Training (SIFT) program.

The aim of the research reported in this thesis was to investigate health professional students' experience and engagement in interprofessional activities and faculty perception of a new IPE curriculum. The studies carried out aimed to answer the following research questions:

1) What are the disciplinary similarities and differences in student experience and perceived value of early participation in interprofessional learning activities?
2) What are the leadership qualities identified by students during interprofessional teamwork?
3) How do students perceive leadership roles as peer teachers?
4) As peer teachers, how competent are students in facilitating small group interprofessional activities?
5) What are faculty perceptions of a newly established IPE curriculum, and the enablers and barriers to successful implementation?

Methods

First, a literature review of interprofessional education within university health professional curricula was undertaken. The studies that followed included quantitative and qualitative methods of data collection and analysis. Data collection included student questionnaires, student interviews, student formative assessment results and faculty interviews. Quantitative data were analysed using descriptive statistics. Qualitative data were analysed using either thematic analysis or framework analysis. Conceptual frameworks used include Communities of Practice, Situational Leadership Theory and Social Capital Theory.

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Results

The key findings for each paper are outlined as follows:

Submitted publication 1: van Diggele, C., Roberts, C., & Haq, I. (2021). Optimising student-led interprofessional learning across eleven health disciplines. *BMC Medical Education*, *21*(1), 157. https://doi.org/10.1186/s12909-021-02527-9

Students from 11 health disciplines participated in the Health Collaboration Challenge, a large-scale interprofessional education activity in which students worked in small teams to complete a series of assessment tasks on a complex patient case. In 2018, 584/1674 (35%) students completed a post-activity questionnaire regarding their experiences and learning outcomes. Our results indicate that the interprofessional activity was perceived as beneficial to students' learning and professional development. It provided opportunities to develop skills in teamwork and communication. Students reported an increased understanding of the roles and responsibilities of other disciplines. However, students reported concerns regarding inequity in assessment task weighting between disciplines and the value placed on the activity.

Submitted publication 2: van Diggele, C., Roberts, C., Lane, S. (2022). Leadership behaviours in interprofessional student teamwork. *BMC Medical Education*. Dec 2;22(1):834. https://doi.org/10.1186/s12909-022-03923-5

On completion of the Health Collaboration Challenge (HCC) activity tasks, students provided their team members with constructive written feedback. Using the conceptual

framework of Situational Leadership Theory, we analysed 1282/1674 (77%) peer review comments to explore the leadership qualities identified by students of their team members. Data were then quantified within each theme. Findings revealed that most students demonstrated a reasonable ability to display leadership behaviours appropriate to teamwork. Findings suggest further training in leadership skills is needed. The most frequent comments provided by students related to a 'delegating' (456/1282, 36%) or 'supporting' (402/1282, 31%) leadership style. Notably, a large proportion of comments were unconstructive, demonstrating a need to teach students how to provide effective feedback.

Submitted publication 3: van Diggele, C., Lane, S. & Roberts, C. (2022) Student Interprofessional Facilitator Training (SIFT) program: building capacity in clinical education leadership. *BMC Medical Education,* 22, 665. https://doi.org/10.1186/s12909-022-03725-9

In 2021, the Student Interprofessional Facilitator Training (SIFT) program was developed for health professional students experienced in peer teaching, to further develop their skills in leadership and interprofessional education. Using Communities of Practice as a theoretical lens, we explored students' experience of the SIFT program, and their performance as peer facilitators. Twelve students from six disciplines participated in the study. Our findings indicate that the SIFT program provided a sustainable framework for health professional students to develop evidence of their teaching and leadership skills in an interprofessional context. Students valued the formal nature of the SIFT program and recognition of teaching as a learned skill. They reported an

increased awareness of the roles of other health professions and an increased understanding of leadership. The use of Entrustable Professional Activities (EPAs) provided a suitable method to document and record students' level of competency attainment during interprofessional observational teaching task.

Submitted publication 4: van Diggele, C., Roberts, C., Bloomfield, J., & Lane, S. (2024). Interprofessional Learning: building social capital among faculty, are we there yet? *Focus on Health Professional Education*, 25(1).

https://doi.org/10.11157/fohpe.v25i1.716

Using Social Capital Theory as a theoretical lens, 11/24 (46%) of invited faculty members from various health disciplines within the University were interviewed to understand the enablers and barriers of the newly implemented interprofessional education curriculum. Framework analysis was used to categories themes in the data. Results indicate that faculty were generally positive about the new curriculum, with an increased feeling of connectedness and appreciation for the scaffolded approach to interprofessional learning. However, faculty perceived inequities in workload distribution. Some misconceptions regarding the integrated approach to curriculum design were highlighted, identifying the need for increased faculty training and broader engagement in the development of IPE curricula.

Conclusions

A significant contribution to IPE literature is demonstrated through the work in this thesis. This body of work builds on current literature and offers insights into IPE implementation activities to reach the following conclusions:

- Inequality in assessment tasks during large-scale IPE activities across disciplines and programs may foster student dissatisfaction, and negatively impact individual contributions to teamwork.
- Our findings highlight the need for consistency in the management and alignment of assessment tasks in large-scale activities involving multiple disciplines, to ensure fairness and transparency for students.
- Our results support wider literature that training in leadership skill development, as well as training in the provision of constructive feedback should be integrated within an IPE curriculum.
- Our results indicate that student engagement with interprofessional teamwork may be improved by reducing the number of disciplines involved, ensuring better alignment and relevance of the patient case.
- The provision of leadership theory within a Student Interprofessional Facilitator Training program, with opportunities to practice may help students to identify characteristics of leaders they would like to emulate in the workplace as health professionals.
- Participation in a Student Interprofessional Facilitator Training program may help to strengthen students' intentions to participate as peer teachers in interprofessional activities, and contribute to teaching, education and faculty development in the workplace as health professionals.

- The use of Entrustable Professional Activities (EPAs) in teacher training programs helps to clearly define requirements, and provides a suitable method to document students' levels of competency attainment during observational teaching tasks, and inform feedback.
- Our results indicate that key barriers to IPE implementation include inequity in faculty workload distribution, and a lack of understanding and engagement in all phases of implementation.
- When a centralised IPE curriculum is implemented, a formal strategy to inform the wider education community and build social capital and engagement across all career levels and disciplines is required.

Preface

While working as a Kindergarten teacher in a primary school, I was invited to join a group of teachers exploring educational practice and action research through play using the 'Early Learning Framework'. This was my first exposure to educational research. Some of my Kindergarten students didn't enjoy writing, and I wanted to find a way to make writing fun and engaging for them through play, comics and drama. I designed, implemented and evaluated a new program that students engaged with and loved. I then had 34 six-year-olds willing and wanting to write about anything and everything. It made a real difference to their educational lives and to my career. This informal exposure to research sparked my interest in educational research and initiated my endeavor to make a difference in educational practices.

At the time of enrolling in my PhD in 2018, I had spent a year working on the development of Interprofessional Education (IPE) activities for health professional students within higher education. When tasked with logistical coordination of programs, my initial intention was to optimise efficiencies and engagement of students in activities in a scalable and sustainable way. The development and roll out of a faculty-wide curriculum for IPE was needed for the Faculty of Medicine and Health. After much stakeholder engagement across the faculty, a three phased, scaffolded and integrated pedagogy was agreed and endorsed.

Throughout the writing of this thesis, I was heavily influenced by international best practice in designing and implementing a context specific, sustainable IPE curriculum

model for The University of Sydney. Employed as the interprofessional learning lead for the Faculty of Medicine and Health, it was my role to successfully plan, implement and evaluate our IPE activities.

Tasked with planning one of our large-scale IPE activities for over 1,800 students, we sought to evaluate the effectiveness of IPE activities, and explore the differences in learning experiences of the 11 health disciplines. This was the first study of this nature for such a large number of disciplines and students. It was during the data analysis phase that we noticed a trend of leadership identification within team feedback. It was noted that while many students displayed natural leadership qualities in an interprofessional team setting, there was still a great need for a dedicated leadership program. This led me to design and develop the Student Interprofessional Facilitator Training (SIFT) program focusing specifically on IPE and leadership skill development for senior health professional students.

Literature stresses the importance of faculty engagement in IPE design and implementation, and while there was much consultation at the initial phases of the new curriculum roll out, there were limited opportunities for discussion with faculty to understand their views on the progress being made in IPE. This sparked the idea of interviewing faculty on their perceptions of the IPE implementation model, in order to dig deeper in exploring what had been working well to date and what challenges were being encountered.

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For each of the studies presented in this thesis, I was involved in the conception of the study, responsible for the study design, data collection, data analysis, interpretation of findings and writing of the manuscripts. My supervisor and co-supervisors were responsible for assisting with the original study concepts, and the co-authors provided methodological expertise and contributed to the interpretation of findings and review of manuscripts.

Acknowledgements

I would like to acknowledge my supervisor, Associate Professor Stuart Lane, Director MD program, Sydney Medical School, for his guidance, encouragement and enthusiasm in the development and presentation of this thesis.

Thank you also to my associate supervisors, Professor Chris Roberts and Professor Emeritus Craig Mellis for their support and advice throughout the preparation of this thesis.

I would like to thank the students and staff from the Faculty of Medicine and Health who participated in the studies and gave their valuable time to share their experiences of interprofessional education, making this thesis possible.

I would also like to thank my sons, Leo and Hunter, and my husband for their support and encouragement during my studies.

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Publications arising from this thesis

This thesis is presented for examination as a thesis containing published work. The four manuscripts presented in this thesis have been published in peer-reviewed journals. The candidate is the principal author of each of these manuscripts.

1. van Diggele, C., Roberts, C. & Haq, I. (2021). Optimising student-led interprofessional learning across eleven health disciplines. *BMC Medical Education*, 21(1), 157. https://doi.org/10.1186/s12909-021-02527-9

2. van Diggele, C., Roberts, C. & Lane, S. (2022). Leadership behaviours in interprofessional student teamwork. *BMC Medical Education*. Dec 2;22(1):834. https://doi.org/10.1186/s12909-022-03923-5

3. van Diggele, C., Lane, S. & Roberts, C. (2022). Student Interprofessional Facilitator Training (SIFT) program: building capacity in clinical education leadership. *BMC Medical Education* 22, 665. https://doi.org/10.1186/s12909-022-03725-9

4. van Diggele, C., Roberts, C., Bloomfield, J., & Lane, S. (2024). Interprofessional Learning: building social capital among faculty, are we there yet? *Focus on Health Professional Education,* 25(1). https://doi.org/10.11157/fohpe.v25i1.716

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Conference presentations undertaken as the studies progressed

2023

van Diggele, C., Lane, S., Roberts, C. (2023). Student Interprofessional Facilitator Training (SIFT) program: linking theory to practice. 9th International Clinical Skills Conference, Prato, Italy, 21-24 May 2023.

van Diggele, C., Lane, S., Roberts, C. (2023). Interprofessional Learning: building social capital among faculty, are we there yet? 9th International Clinical Skills Conference, Prato, Italy, 21-24 May 2023.

2022

van Diggele C, Lane S, Roberts C. (2022). Student Interprofessional Facilitator Training (SIFT) program: linking theory to practice. Australia New Zealand Association of Health Professional Education (ANZAHPE) Conference, virtual, July 2022.

2021

van Diggele C. (2021). Interprofessional undergraduate simulation (at scale) in health professions. Australasian Simulation Congress, virtual, 9-11 November 2021.

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Lane S, Frotjold A, Schneider C, Bloomfield J, van Diggele C, Barrett E, Roberts C, Lane K, Barrett E, Munro G. Fringe Session: Developing an IPE curriculum framework, utilising Lencioni and Tuckman's team function and formation models: Basing IPE around principles, not random chance. The International Association for Health Professions Education (AMEE) Conference, virtual, August 2021.

2019

van Diggele C, Roberts C, Schneider C, Nisbet N, Werner J, Haq I. The Health Collaboration Challenge: a large-scale video based interprofessional assessment. Australia New Zealand Association of Health Professional Education (ANZAHPE) Conference, Canberra, Australia, 1-4 July 2019.

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Diggele, C., Burgess, A., & Mellis, C. (2019). Journal clubs in health professional practice. *The Clinical Teacher,* 16(1), 13–18. https://doi.org/10.1111/tct.12759

Clarke, A. J., Burgess, A., Diggele, C. van, & Mellis, C. (2019). The role of reverse mentoring in medical education: current insights. *Advances in Medical Education and Practice*, 10, 693–701. https://doi.org/10.2147/AMEP.S179303

van Diggele, C., Roberts, C., Burgess, A., & Mellis, C. (2020). Interprofessional education: tips for design and implementation. *BMC Medical Education*, *20*(Suppl 2), 455–455. https://doi.org/10.1186/s12909-020-02286-z

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GLOSSARY

Competencies: Competencies are performance indicators used to assess an individual or group performance of attributes, knowledge or skills within the health professions (McLaney et al., 2022).

Interdisciplinary learning: Learning that takes places across traditional disciplinary boundaries. This term is inclusive of all disciplines beyond health professions, and is often used interchangeably with interprofessional learning (Oudenampsen et al., 2023)

Interprofessional collaboration: A process that occurs when developing or maintaining an effective working relationship across disciplinary boundaries. Individuals work collectively as a team when caring for a patient (Bridges et al., 2011; Canadian Interprofessional Health Collaborative, 2010; Mahler et al., 2014).

Interprofessional education (IPE): Refers to occasions when two or more health professions learn with, from and about each other with the aim of improving collaboration, teamwork and patient care. This includes interactions between students, educators and health practitioners. (Barr, 2002; WHO, 2010; Reeves et al., 2016).

Interprofessional learning (IPL): The learning that arises from interaction between two or more health professional groups. It may be a product of interprofessional education or informal interactions. (Freeth et al., 2005.)

Leadership: An influential process through which individuals work towards a shared goal (Northouse, 2011).

Teamwork: A group of people working together on a shared task, while understanding each other's roles and scope of practice (McLaney et al., 2022).

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ABBREVIATIONS

EPAs: Entrustable Professional Activities

HCC: Health Collaboration Challenge

FMH: Faculty of Medicine and Health

IPE: Interprofessional Education

IPL: Interprofessional Learning

LMS: Learning Management System

PTT: Peer Teacher Training

SIFT: Student Interprofessional Facilitator Training

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CHAPTER 1:

Introduction

1.1. Purpose of the study

The purpose of the study reported in this thesis was to investigate health professional students' experiences and engagement in interprofessional activities and faculty perception of a new interprofessional education (IPE) curriculum at the Faculty of Medicine and Health, The University of Sydney.

Interprofessional learning is defined as "when students from two or more professions learn about, from, and with each other" (WHO, 2010, p.7). With origins dating back to the 1960s (Barr, 2015), IPE is now internationally acknowledged as a key contributor to improved patient safety and health outcomes (Reeves et al., 2016). In 2010, Rodger and colleagues reported minimal levels of IPE programs internationally, with most being in the form of lectures and small group discussions. Very few institutions reported the use of simulated IPE activities and there was limited training for facilitators (Rodger et al., 2010). More recently, there has a been significant increase in the uptake of IPE within health professional programs in preparing workforce ready graduates (Khalili et al., 2022).

There continues to be great variability in how IPE programs are delivered, with some higher education institutions introducing a voluntary singular activity approach, through to others that provide an integrated IPE program embedded within healthcare degrees. Notably, faculty development has been identified as crucial to the success of IPE, providing a key driver for cultural change (Christian et al., 2019; Lawlis et al., 2014;

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Khalili et al., 2022). The preferred and recommended approach to IPE is still debated. However, there is a trend towards an integrated curriculum, where the IPE curriculum is embedded across health professional programs and students have multiple opportunities for interprofessional engagement (Tegzes et al., 2023). In recent years, a range of aspects of IPE have been studied within various contexts, and literature continues to expand.

This thesis investigates the implementation of an IPE curriculum in four areas: 1) A large -scale IPE activity, 2) Student Interprofessional Facilitator Training (SIFT) program, 3) Leadership and teamwork, and 4) Faculty perception of implementing the new IPE curriculum.

1.2 Overarching Research Questions

There were five overarching research questions that were addressed throughout the research:

1. What are the disciplinary similarities and differences in student experience and perceived value of early participation in interprofessional learning activities?
2. What are the leadership qualities identified by students during interprofessional teamwork?
3. How do students perceive leadership roles as peer teachers?
4. As peer teachers, how competent are students in facilitating small group interprofessional activities?
5. What are faculty perceptions of a newly established IPE curriculum, and the enablers and barriers to successful implementation?

1.3 Study Context

The study was undertaken at the Faculty of Medicine and Health, The University of Sydney. The University was seeking to design and implement a new curriculum in which we would embed IPE within existing health professional degrees. There are approximately 10,000 health professional students enrolled in undergraduate and postgraduate degrees within the Faculty each year. The 13 disciplines that form the basis of this study include medicine, pharmacy, nursing, dentistry, occupational therapy, medical sciences, speech and language pathology, nutrition and dietetics, physiotherapy, health sciences, diagnostic radiography and medical imaging, oral health, and exercise physiology (see figure 1).

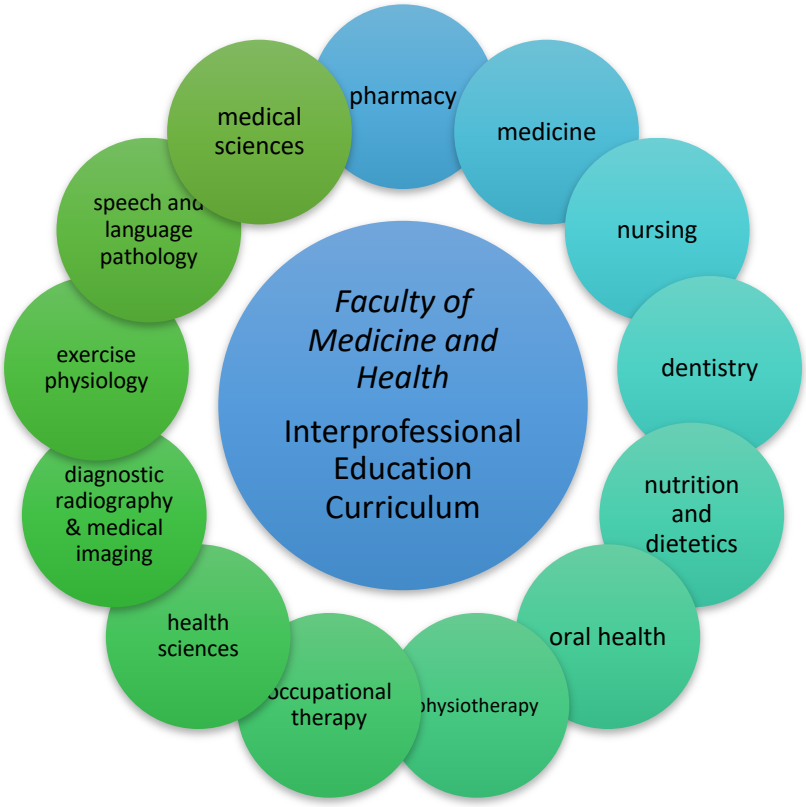

Figure 1: Overview of disciplines included within the Faculty of Medicine and Health IPE curriculum

IPE activities range from small boutique activities that are voluntary in nature, consisting of approximately 15 students from three health disciplines, through to large-scale mandatory assessment activities that consist of approximately 2,500 students from 13 health disciplines. The IPE curriculum renewal took place over a five year period, commencing with a series of faculty workshops to develop and reach consensus on the strategic approach, learning outcomes and goals of the new curriculum. These activities have grown in disciplinary inclusion, student numbers, and faculty engagement with an increasing number of interprofessional activities being embedded in curricula for most health degree programs involved. This is particularly the case as degree programs undergo curriculum renewal and accreditation processes. An overview of the core interprofessional activities are listed in table 1.

Faculty representatives from each school are involved in IPE committees and working groups, and where possible, representatives are from each health discipline. Unit coordinators also play an active role in IPE activities as IPE assessment tasks are embedded within their degrees. Clinicians from the local health districts also teach into the IPE curricula. The program is coordinated by an administrative officer, with some casual support from a project officer. This is overseen by an academic lead.

Table 1: Overview of interprofessional activities in 2021

Name of activity	Year of students	Disciplines involved	Number of students	Short description of activity
IPE Introductory Workshop	Year 1	Diagnostic radiography, occupational therapy, physiotherapy, speech pathology, exercise physiology, pharmacy, medicine, dentistry, oral health, dietetics, health sciences	2,547	Students work in small teams online on three station activities to develop students' understanding of role identification, effective communication and teamwork.
Interprofessional communication education workshop	Year 1	Medicine, nursing, pharmacy	736	A two-part workshop focusing on communication and the development of a joint transition of care plan.
Health Collaboration Challenge (HCC)	Years 2 & 3	Nursing, medicine, pharmacy, diagnostic radiography, dietetics, occupational therapy, speech pathology, physiotherapy, exercise physiology, dentistry, oral health, medical sciences	1,697	Students work in small teams to develop a short video and written patient management plan for a complex patient case. They individual peer review two video submissions and complete an intra-team peer review.
Medication Safety Workshop	Year 2 (medicine and nursing), year 4 (pharmacy)	Medicine, nursing, pharmacy	654	Delivered asynchronously, students work through the steps of the medication management cycle when prescribing medicine to patients.
Patient safety workshop	Senior students	Medicine, nursing, pharmacy, oral health, dentistry	751	Using a team-based learning format, students' complete activities centred on the World Health Organisation's patient safety guidelines.
Peer Teacher Training (PTT) program	Senior students	All health disciplines	116	A modular program with theoretical and practical components designed to develop skills in teaching, assessment and feedback.
Student Interprofessional Facilitator Training (SIFT) program	Senior students	All health disciplines	13	An extension of the PTT program focused on leadership and interprofessional education.

1.4 Research methodology and educational paradigm

This thesis included quantitative and qualitative methods of data collection and analysis. Data collection included student questionnaires, student interviews, student formative assessment results and faculty interviews. Quantitative data were analysed using descriptive statistics. Qualitative data were analysed using either thematic analysis or framework analysis. Conceptual frameworks used include Communities of Practice, Situational Leadership Theory and Social Capital Theory.

My research presented in this thesis relies on both socio-cultural and constructivist theories in learning. My ontological position as a non-positivist is reflected in my chosen research methods, requiring interpretation of qualitative data. Students' individual learning and the way in which they construct their knowledge is impacted by the practical activities undertaken within a social context. Through engagement in the interprofessional activities, including the Health Collaboration Challenge and Student Interprofessional Facilitator Training program, guided participation affords social context for students to learn.

The constructivist perspective of my research provided a structural view, assisting in the understanding of what students gain from these activities. It considered how they are building on and organising their existing knowledge, in order to learn and recall new information and skills. For example, perhaps the production of a video on how to manage a complex patient within an interprofessional team provides understanding and clarity on the role of interprofessional teamwork that was not previously present. Additionally, my research considered the faculty's perspective in curriculum

implementation. For example, the building of social capital not only across disciplines but also between faculty at different career levels.

The socio-cultural perspective provides a functional view to help understand the interactions during learning activities and beyond. As part of social practice, experiences of learning change, involving the transformation of the person and their knowledge, their own view of the world, and how they fit within it.

Reflectivity in writing is a metacognitive process that helps to create meaning and understanding of both ones' self and the situation. In turn, this helps to inform further actions. Both self-regulated and lifelong learning incorporates reflection as an essential aspect in developing professional expertise (Sanders, 2009).

To meet 21st century IPE graduate competency requirements, there has been a shift in the health professions education paradigm. A vertically integrated curriculum has replaced the old education model of pre-clinical education, followed by a clinical apprenticeship. Implementing a new vertically integrated curriculum across Schools and disciplines has been challenging, with limited academic, clinical and administrative staff, as well as limited resources. The IPE curriculum provides a framework to help address these needs, affording student centred, active learning experiences for the students.

In 2018 we implemented the first iteration of IPL described in this thesis, the Health Collaboration Challenge. Since then, there has been a shift to a large portfolio of

interprofessional activities delivered to students commencing in their first year of study and spanning to their graduate year. We found that as the students engaged in, and built on each IPL activity, they became part of a growing social learning network. For example, some students went on to become facilitators in key IPL activities, helping others, while at the same time extending their own knowledge and skills as facilitators and leaders. Chapter 5, describes the Student Interprofessional Facilitator Training (SIFT) program, providing an example of students forming a 'community of practice,' providing a nurturing and prosperous environment of knowledge acquisition. This has also been evident with faculty forming stronger connections across traditional disciplinary boundaries due to their involvement and delivery of the IPE curriculum.

The establishment of authentic learning settings to mirror real situations, such as the use of complex patient cases in the HCC, provides students with multiple opportunities to construct their own knowledge within relevant contexts (Lave & Wenger, 1991). By participating in interprofessional activities which rely on teamwork, knowledge was constructed socially, rather than individually. This hinges on the concept of "distributed cognition" (Bleakley, 2006; Swanwick, 2005). The IPL community of practice developed through the IPL curriculum was characterised by students' joint engagement, which has contributed to a cultural change for both students and staff across the health professions.

The formation of a community of practice in IPE at the Faculty of Medicine and Health has positively influenced its culture for both students and staff. The social context of the interprofessional activities encouraged social engagement, providing an inclusive

environment for learning to take place, even when some activities needed to be online. The interactions of clinicians sharing their experiences and expertise with students within the IPE curriculum, prompted collaborative learning and development of students' professional identity as future healthcare professionals. Learning activities centred on active team participation and the joint construction of knowledge have provided students with opportunities to further develop skills needed for the health workforce. Similarly, the new IPE curriculum has brought with it an increased feeling of connection, collaboration and community for faculty across the health disciplines.

1.5 Conceptual framework of the undertaken research

IPE is a student centred pedagogical approach focused on developing collaborative team environments for patient care (Thistlethwaite, 2012). The IPE activities for students involved active engagement, and provided inclusive environments where students learnt through participation (Handley et al., 2006; Hean et al., 2003). The educational models for the studies undertaken for the student activities were based on sociocultural learning theories. Sociocultural learning theories view learning as a social activity, with social interactions being considered key to learning (Hean et al., 2003). Throughout these IPE activities, health professional students with various disciplinary knowledge and skills were presented with opportunities to share information, knowledge, skills, values and experience to create meaningful learning opportunities (Hean et al., 2003; Lave & Wenger, 1991).

Over a four-year period, from 2018 to 2021, this research involved the investigation of students' participation in IPE activities, and faculty perception of implementation of the

new IPE curriculum. The studies undertaken are outlined below and displayed in the 'conceptual framework and research approach' in figure 2:

- Implementation of a large-scale IPE activity
- Investigation of leadership and teamwork skills in IPE
- Implementation of a Student Interprofessional Facilitator Training (SIFT) program
- Faculty perception of the implementation of an IPE curriculum.

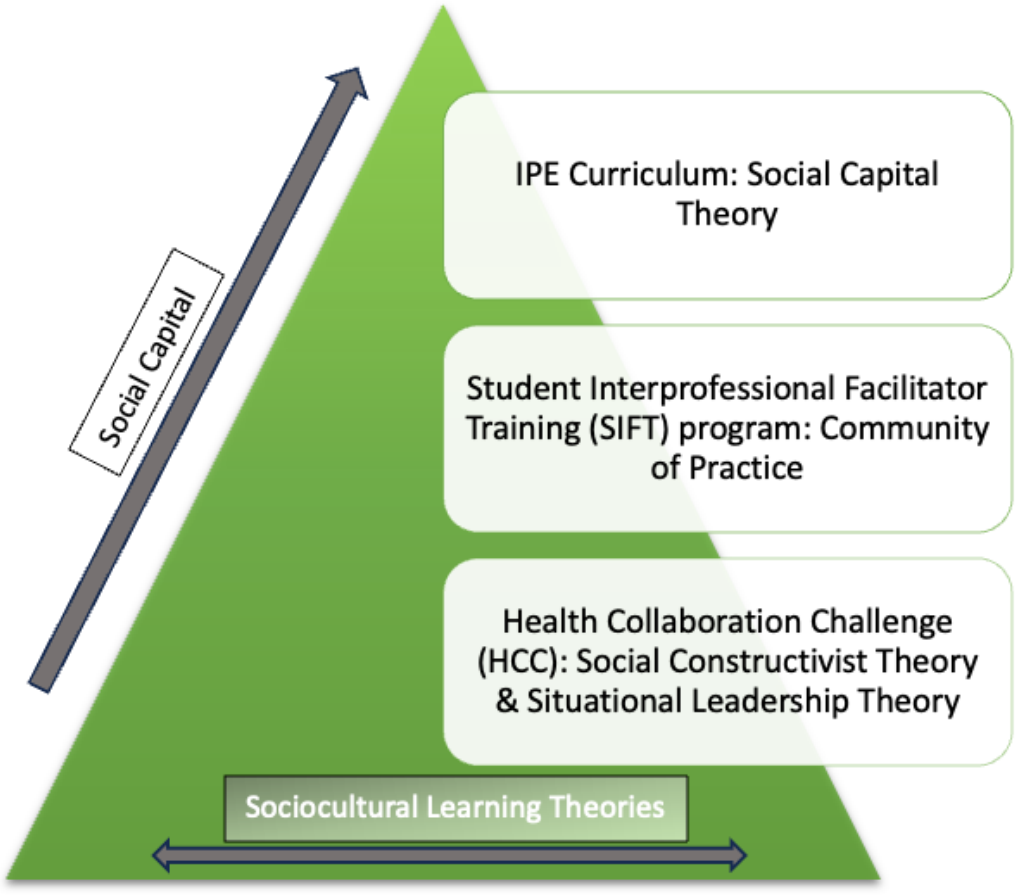

Figure 2: Conceptual framework and research approach

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Implementation of a large-scale IPE activity

The design of the initial large-scale IPE activity, the Health Collaboration Challenge (HCC) was based on social constructivist theory. This originates from the work of Vygotsky (1978) and is based on the understanding that learning is constructed and mediated by the environment through joint social construction, rather than being individually constructed (Hean et al., 2009). As the HCC was social in nature and featured interprofessional teamwork, social constructivist theory was used as a lens to explore the three learning domains of IPE as identified by Burr (2003): the acquisition of knowledge, skills and behaviours.

Investigation of leadership and teamwork skills in IPE

Organisational theories allow us to understand the team and leadership functions within educational settings (Swanwick & McKimm, 2011). Situational Leadership Theory, developed by Hersey and Blanchard (1993) posits that leaders need to identify the needs of the team according to the context and situation, and act accordingly. The four categories of this model: 1) directing, 2) coaching, 3) supporting, and 4) delegating were used to better understand the leadership dynamics within teams.

Implementation of a Student Interprofessional Facilitator Training (SIFT) program

The Student Interprofessional Facilitator Training (SIFT) program, was a small-scale activity study based on Communities of Practice, another one of many sociocultural learning theories. First recognised by Lave and Wenger (1991), Communities of Practice

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posits that the nature of learning and social interactions enable engagement and learning. The three key elements of this learning theory provided useful themes of 1) Joint enterprise, 2) Mutual engagement, and 3) Shared repertoire (Lave & Wenger, 1991).

Faculty perception of the implementation of IPE

One of the many sociocultural theories that allows us to look beyond the educational aspects of IPE, and draws attention to greater organisational level aspects of IPE is Social Capital Theory. This theory provided a useful lens to analyse the shared norms, beliefs, values, and social relationships (Bandari & Yasunobu, 2009) of the university to gain insight into the implementation of the IPE curriculum from a faculty perspective. Lee and colleagues' (2019), three key dimensions 1) structural, 2) cognitive and 3) relational, were drawn upon as an instrument to identify and understand the challenges of IPE.

1.6 Outline of the study and research approach

The research methods I employed required collection, analysis and interpretation of qualitative and quantitative data. This reflects my ontological perspective as non-positivist. Within a social context, practical activities impact students' individual learning, and how they construct their own knowledge. A variety of theories were used to analyse the research undertaken.

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Interprofessional education (IPE) literature review. Chapter 2

An overview of literature on the topic of Interprofessional Education in curricula in relation to this thesis is provided in Chapter 2. It describes the development and implementation of interprofessional learning within university settings. It focuses on how IPE curricula is being implemented within university health professional curricula, how leadership and teamwork skills are being developed in IPE and what faculty perceive as the key barriers and enablers to successful implementation of IPE.

Implementation of a large-scale IPE activity. Chapter 3

Chapter 3 consists of one published paper detailing and evaluating student experiences of participating in a large-scale interprofessional learning activity (van Diggele et al., 2021). The Health Collaboration Challenge (HCC) places students from various disciplines into small teams of 5-6 students, with the task of contributing to a joint written and video assignment about the management of a complex patient case. One of the main learning outcomes of this activity, is to work collaboratively in interprofessional student groups to contribute to teamwork. Students are required to share their discipline specific knowledge and skills, and negotiate and prioritise health interventions to assist their 'patient' in the short, medium and long term. Social Constructivist Theory was used as a conceptual lens to assist in interpreting the learning experiences of this large-scale IPE activity, while also factoring in how students' professional discipline impacted their learning (Vygotsky, 1978). The specific aims of this research were to see how early participation in an interprofessional activity would assist in the development of interprofessional knowledge, skills, attitudes and

behaviours; and explore the similarities and differences in the perceived value of interprofessional (social) learning for each discipline.

This study was published in BMC Medical Education, and has been presented at three conferences:

- Australia New Zealand Association of Health Professional Education (ANZAHPE) Conference, Canberra, Australia, 1-4 July 2019.
- Australasian Simulation Congress, virtual, 9-11 November 2021.
- Australian Society for Simulation in Healthcare Symposium, virtual, 28 October 2021.

Leadership and teamwork. Chapter 4

Chapter 4 consists of one published paper focused on leadership qualities displayed in interprofessional student teamwork (van Diggele et al., 2022b). As part of the Health Collaboration Challenge assessment task, students are required to peer review their team members. Each team member provides ratings on nine statements and constructive written feedback to a minimum of two team members. The specific aim of this study was to examine the leadership qualities identified and valued by students when working in interprofessional student teams on a shared task.

This study was published in BMC Medical Education and was presented at two conferences:

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- Australia New Zealand Association of Health Professional Education (ANZAHPE) Conference, virtual, July 2021.
- The International Association for Health Professions Education (AMEE) Conference, virtual, August 2021.

Student Interprofessional Facilitator Training (SIFT) program. Chapter 5

Chapter 5 consists of one published paper exploring student perceptions and performance in the Student Interprofessional Facilitator Training (SIFT) program (van Diggele et al., 2022a). This program was developed for senior health professional students already trained in peer teaching, providing them with further education and training on interprofessional education and leadership, with opportunities to practice. The program incorporated the use of Entrustable Professional Activities (EPAs) for the practical component. To the best of our knowledge at the time, EPAs had not previously been used to demonstrate interprofessional teaching and facilitation abilities. Communities of practice was used as a conceptual lens. This study sought to pilot the new SIFT program, and explore student perceptions and performance, as well as contextual factors influencing student outcomes. The aims of this research were to explore how students perceived their experience of SIFT, and its influence on their future clinical teaching and leadership roles; and examine how competent senior students were in facilitating and teaching peers in interprofessional groups.

This study was published in BMC Medical Education, and has been presented at two conferences:

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- 9th International Clinical Skills Conference, Prato, Italy, 21-24 May 2023.
- Australia New Zealand Association of Health Professional Education (ANZAHPE) Conference, virtual, July 2022.

Faculty perception of IPE. Chapter 6

Chapter 6 consists of one paper currently relating to faculty perception of the implementation of the IPE curriculum (van Diggele et al., 2024). Although many universities have implemented scaffolded IPE curricular models across multiple disciplines, few have reported on them. Using the theoretical lens of Social Capital Theory, this study sought to explore faculty perception in response to the new IPE curriculum model.

This study is in the Focus on Health Professions Education journal, and has been presented at one international conference:

- 9th International Clinical Skills Conference, Prato, Italy, 21-24 May 2023.

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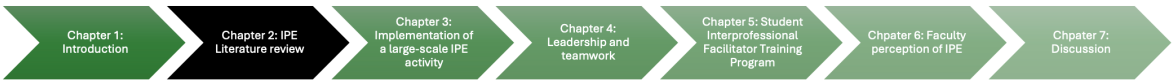
CHAPTER 2:

Interprofessional education (IPE) literature review



2.1 Background

Interprofessional Education (IPE) is increasingly recognised as essential within health professions curricula (Bogossian & Craven, 2021; Hean et al, 2012). Interprofessional learning has been defined as occurring "when students from two or more professions learn about, from, and with each other" (WHO, 2010, p.7). As a pedagogy, it is important in the preparation of health professional students in graduating ready for the workplace, and is ideally integrated throughout the curriculum (Buring et al., 2009). A key aim of IPE is to teach students how to function in an interprofessional team, with the ability to share their skills, knowledge and abilities in a collaborative manner for optimal patient care (Brock et al., 2013; Buring et al., 2009; Hean et al., 2012; Reeves et al., 2013; Reeves et al., 2017). This collaboration has been noted as critical to the effective management of complex patient cases and linked to improved patient safety (Berridge et al., 2010; Reeves et al., 2010; Reeves et al., 2013).

There are many benefits of IPE described in the literature, such as improved team function and role clarification, team leadership development, and improved communication skills which fosters collaboration (Bogossian & Craven, 2021; Hean et al., 2012; Zechariah, et al., 2019). Interprofessional collaboration has been identified as decreasing the length of stay for hospital patients, reducing health care expenses, and resulting in fewer medical errors (Institute of Medicine (US) Committee on the Health Professions Education Summit, 2003; Rogers, et al., 2017). However, many studies have identified challenges at the organisational, national and global levels associated

with the effective delivery of IPE (Bogossian et al., 2023; Ezzeddine & Price, 2021; O'Keefe & Ward, 2018; Thistlethwaite et al., 2019; van Diggele et al., 2020). The absence of a national approach and inconsistencies in governance of IPE curriculum requirements contribute to difficulties encountered by educational institutions (Steketee & O'Keefe, 2020).

The facilitation of a coherent, coordinated national approach to IPE in health professions education would assist in mobilising a sustainable curriculum (Thistlethwaite et al., 2019). Without a consistent approach, the choice of participation in interprofessional activities is often at the discretion of program directors and unit of study coordinators. This issue has been overcome internationally by countries such as Canada through the introduction of *'A national interprofessional competency framework'* (CHIC, 2010). Increasingly, there has been the requirement to demonstrate interprofessional competencies within curriculum accreditation for many health professional programs, shining a positive light on the future of IPE integration within health degree programs.

Within Australia, there is a lack of national standards in relation to IPE in accreditation frameworks. In 2017, an accreditation system review recommended *"...a common, cross-professional approach to the inclusion of interprofessional education as a mandatory requirement in all accreditation standards"* (COAG Health Council, 2017, p.3). While there is commonality in that many accreditation bodies agree that IPE should form part of curricula, there is great variation in what these requirements entail. A study conducted by Bogossian and Craven (2021) analysed the accreditation

standards of IPE in relation to 29 health professions within Australia. They reported that 22 of the 29 health professions analysed had some form of accreditation standards, of which five made no reference to IPE, and 17 made only some reference to IPE. Only one profession, optometry, was found to specify a set of IPE competency standards (Bogossian & Craven, 2021).

History of IPE

Origins of IPE date back to Denmark in the 1960s, with interprofessional collaboration and teamwork featuring in regulations for health and social professions (Barr, 2015). In 1969, Szasz published a paper entitled 'Interprofessional education in the health sciences' describing the formation of an IPE committee in recognition of the need to promote education and research in IPE, and providing recommendations on how IPE should take place in an educational setting (Szasz, 1969). The establishment of the Journal of Interprofessional Care soon followed in 1986, and in 1987 the Centre for Advancement of Interprofessional Education (CAIPE) was formed in the United Kingdom (Buring et al., 2009). Many recommendations for IPE design and implementation have since been published, with the IPE movement being re-energized in the 1980s and again in the early 2000s (Gilbert, 2010). With the launch of the World Health Organization's (WHO) 'Framework for action of interprofessional education and collaborative practice', came the urgency in strengthened health systems, and government innovation due to the shortage of health care workers, increasing complexity in patient cases and an aging population (WHO, 2010). This provided the momentum needed for some countries to rethink their health professions curricula, and to advance national IPE frameworks, policies and regulations.

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Today, approximately two thirds of academic institutions internationally have a centralised IPE model, showing significant progress in acceptance and implementation of IPE programs (Khalili, et al., 2022). However, with many of the reported programs and activities being small scale and voluntary, more work is needed (Khalili, et al., 2022). Within the Australian context, Steketee & O'Keefe (2020) describe the lack of cross disciplinary governance of IPE as a major challenge to implementation and standardisation of IPE delivery and evaluation.

2.2 Review objectives

This narrative review aimed to provide an overview of the literature on how IPE curricula is being implemented within universities, how leadership and teamwork skills are being developed within IPE, and what faculty perceive as the key barriers and enablers to successful implementation of IPE.

Search strategy

A search of Medline (Ovid), ERIC (Ovid), and Scopus databases was performed with the key concepts of 1) 'interprofessional education', 2) 'curriculum' and 3) 'university'. Titles and abstracts were screened for relevance to the review objectives using Covidence (2024). Covidence is a web-based collaboration software platform to assist with management of literature reviews.

2.3 Implementation of IPE curricula within universities

Organisational structures associated with the implementation and governance of IPE can be classified under three categories, 1) centralised, 2) decentralised or 3) stand-alone models (Steketee & O'Keefe, 2020). Steketee & O'Keefe (2020) report the centralised model as being the most common in educational institutions within Australia, whereby a central entity or team within the institution is responsible and accountable for the implementation and evaluation of IPE to assist with standardisation across health disciplines. This is said to contribute to the sustainability of IPE as it is usually supported by leadership executives, offers a form of resourcing, with learning taking place in a shared space (Mladenovic & Tilden, 2017; Steketee & O'Keefe, 2020). However, Bandali et al (2011) argue that while this approach can encourage centralised ownership of IPE, it often results in hierarchical structures that can negatively impact the relationships of various stakeholders, such as administration, faculty and students. Decentralised IPE models offer IPE activities that are small-scale, extra-curricula activities, implemented with little institutional support, led by individual champions, with limited structure and co-ordination across disciplines (Reeves, et al., 2016). This most often involves only a small portion of student cohorts from a limited number of disciplines, and is resource intensive to implement (Jorm et al., 2016).

IPE curricula should be well planned, well organised and developed in a collaborative manner (Anderson et al., 2016; Freeth et al., 2008). The complexities of delivering IPE are aplenty, including logistical and timetabling issues (Curran et al., 2015; Evans et al., 2019), and a common preference for faculty to work within their established silos

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(Horsburgh et al., 2001; Keshtkaran et al., 2014; Salamonson et al., 2009). However, a longitudinal approach, standardised across and embedded within health professions curricula helps to build capacity and sustainability (Jorm et al., 2016). This approach also enables activities to remain an integral part of the curriculum, rather than stand-alone items which can be removed (Nisbet et al., 2011).

Large-scale IPE activities

Planning is an essential component to implementing any large-scale IPE activity. Careful consideration needs to be given to competency selection, timetabling, faculty development and facilitation, logistical and coordination support and evaluation (Shrader et al., 2016). Logistical issues associated with implementing IPE activities of any size are widely reported and often result in pragmatic approaches to design and implementation, rather than pedagogic reasoning. Student numbers, timetabling, location, room size, and the availability of facilitators all impact decision making. As reported by both Chan et al (2017) and Wheeler (2019), finding the right type of space to promote student engagement in small-group work during interprofessional classroom activities is important. Additionally, learning management systems (LMS) used by different disciplines can vary. Both Chan et al (2017) and Wheeler et al (2019) reported the inability to utilise the same LMS for students from different disciplines (Chan et al., 2017; Wheeler et al., 2019). Given these additional challenges, student engagement and learning outcomes of IPE activities should predominantly include those that cannot be achieved through unidisciplinary activities.

Recent literature has described a growing number of examples of large-scale IPE activities, which have reported associated benefits. Chan et al (2017) reported on the use of large-scale IPE for 801 health professional students from six disciplines, across seven programs at two Hong Kong universities. Evaluation using the Readiness for Interprofessional Learning Scale (RIPLS) pre and post session, showed improvements in student attitudes towards, and readiness to engage in IPL (Chan et al., 2017). The use of RIPLS is not uncommon, with many universities opting to use the questionnaire as a means of evaluating students' readiness for IPL (Huyen et al., 2023; Katoue et al, 2022).

An interprofessional activity described by Wheeler et al (2019) on health professional roles and responsibilities involving 327 first year and second year pharmacy and medicine students reported positive outcomes. Findings indicated better preparedness for future workplace collaboration, with an increase in students' perceived ability to understand the skills and knowledge of other health professionals, and the intersection of roles (Wheeler et al., 2019). Similarly, Burgess et al (2020) reported on the benefits of an IPE activity with 89 physiotherapy and 222 medical students on the topic of back pain. Students appreciated the opportunity to learn about another healthcare curriculum, the scope of practice of another discipline, and gain their perspectives when working together on a patient case (Burgess et al., 2020). Van Diggele et al (2021) describes the delivery of a large-scale 'Health Collaboration Challenge', with 1674 students from across 11 disciplines (dentistry, oral health nursing, pharmacy, medicine, occupational therapy, speech pathology, physiotherapy, dietetics, diagnostic radiography and exercise physiology). Students generally found their experience to be beneficial and valued opportunities to collaborate, network, and

understand the roles and responsibilities of other health professions (van Diggele et al., 2021).

Online IPE delivery through the use of video conferencing breakout rooms offers a format to cater to large student numbers, and has only recently been explored as a suitable educational intervention due to the Covid 19 epidemic. A cross-sectional study conducted by researchers in Oslo, found students were supportive of the use of breakout rooms for IPE, with students feeling more comfortable in discussing sensitive topics in small groups (Almendingen et al., 2022). A possible hinderance to student experience was the inclusion of more than five disciplines within groups, as this was seen to reduce student engagement (Almendingen et al., 2022). This was a similar finding to van Diggele and colleagues who reported that case relevance, case difficulty and the interprofessional mix of students in teams impacted the student experience of a large-scale IPE activity (van Diggele et al., 2021).

Equal distribution of students to small groups

Ensuring an equal distribution of interprofessional student groups is reported as challenging. This is particularly the case as student numbers increase for large-scale activities, with indications that a mismatch in the student cohort numbers may compromise the outcomes of IPE. Chan et al (2017) reported difficulty in managing individual classes of up to 170 students. They also had difficulty in allocating students to small groups from six disciplines, including Chinese medicine, pharmacy, social work, nursing, medicine, and biomedical sciences (Chan et al., 2017). Similarly, van Diggele et al (2021) reported allocating 288 teams of five to six health professional

students challenging, with students dissatisfied with the discipline mix for small-group work. Even though only two disciplines were involved in the study described by Burgess and colleagues (2020), some student dissatisfaction was reported because of an uneven ratio of medical and physiotherapy students for small groupwork. Due to there being fewer physiotherapy students in each group, medical students felt they needed to be mindful of inclusiveness, and physiotherapy students felt a greater need to explain the rationale for their decisions (Burgess et al., 2020).

Relevance of patient cases across disciplines

An important consideration in designing IPE is ensuring the activities are conducive to teamwork (Jorm et al., 2016; Thistlethwaite et al., 2019). Lochner et al (2018) reported on IPE sessions on the topic of patient safety delivered across three days, including 39 health professions students from across five disciplines (nursing, dietetics, nutrition, occupational therapy, radiology and laboratory technicians). Although the topic was important and relevant to all disciplines, difficulties were reported in writing patient cases that were specifically applicable to each discipline (Lochner et al., 2018). Buhse & Della Ratta (2017) also reported difficulties in writing patient cases that were applicable across three disciplines for an IPE activity involving 120 students (30 nursing, 44 physicians assistants and 46 public health). Similarly, van Diggele et al, 2021 reported a lack of case relevance across five of the 11 disciplines involved (van Diggele et al, 2021). Notably, dentistry students found the patient cases to be simplistic, and lacking relevance to their discipline (van Diggele et al., 2021). These findings indicate the importance of curriculum alignment when writing patient cases for

IPE activities, and suggests that student engagement may be hindered by having a large number of disciplines collaborating on one patient case.

Assessment of IPE

Mixing 'mandatory' and 'voluntary' participation methods in the one IPE activity brings additional logistical complications, such fluctuations in attendance. However, one of the key problems is often inequity in assessment weighting across disciplines, as mandated by the individual disciplines or programs involved (van Diggele et al., 2021). Different educational cultures and variations between academic and professional requirements may hamper the development of feasible assessments in IPE (Dunworth, 2007). For example, Chan et al (2017) reported a mix of voluntary and mandatory participation across the six included disciplines and seven programs. While the performance of students who had voluntarily participated did not contribute towards grading, the performance of students who were required to attend contributed towards grading (Chan et al, 2017). This was reported as impacting student motivation (Chan et al, 2017). Similarly, Pogge (2016) reported that variations in grading methods used for an IPE activity involving a mix of osteopathic medicine and pharmacy students may have decreased student motivation. Although a mandatory requirement for all 11 disciplines, van Diggele et al (2021) reported a large proportion of students involved in their IPE activity indicated dissatisfaction with the "inequity across disciplines in the weighting of assessments on grades'' (van Diggele et al., 2021, p.15). This is also in line with evidence suggesting that students' intrinsic motivation for groupwork and enjoyment may be negatively impacted when their performance is graded (Schinske & Tanner, 2014).

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2.4 Leadership and Teamwork skill development within IPE

Within the interprofessional health professions context, where individual team members from various disciplines are working towards the achievement of shared goals, leadership is challenging and complex (Reeves et al., 2010; van Diggele et al., 2020). Team dynamics have been reported as one of the most challenging aspects for students in IPE. Communicating across disciplinary boundaries and working with people they had just met were considered difficult aspects for students participating in a workshop with pharmacy, medicine and nursing students (Bloomfield et al., 2021). Solanki and colleagues (2019) completed a study in the United Kingdom, involving 11 medical, five nursing and five physician associate university students in high-fidelity simulations, aiming to improve teamwork, communication and leadership skills. They noted there were perceived hierarchies that existed among the student teams during simulation exercises, and felt the IPE simulation highlighted the importance of listening to other health professions (Solanki et al. 2019).

Healthcare professionals need to excel in teamwork, patient-centred care, clinical skills and balance accountability with autonomy (McKimm & Swanwick, 2013). Recently, there has been a shift towards “team leadership”, with distributed leadership most prevalent within healthcare education, and different health professions sharing influence (McKimm & Swanwick, 2013; Levi, 2011). Responsibilities are allocated to match the abilities of team members, so that there is a collaborative role to meet the shared goals of the organisation, and no one role is more important than the other (Burgess et al., 2014; Pearce et al., 2009).

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Although health professional degrees cover aspects of leadership and teamwork principles, graduates often feel unprepared for this workplace dynamic (McKimm & Swanwick, 2011). A scoping review designed to identify the most effective teaching methods used in teaching interprofessional teamwork skills found that very few studies teach the functionality of a team prior to students participating in interprofessional activities (Fox et al., 2018). Where the teaching method was specified, training consisted of individual online learning material or individual instructions for the activity, rather than in a team setting (Fox et al., 2018). Clarke and colleagues (2023) conducted a pilot study that involved 11 pharmacy, eight nursing and eight medical students in a patient safety workshop, based on the "World Health Organisation Patient Safety Curriculum Guide: Multiprofessional Edition, Understanding and learning from errors" (WHO, 2011). Findings suggested that interprofessional training during university education may help improve patient safety, promote interprofessional collaboration improving teamwork and increase student understanding of the roles, practices and biases of other disciplines (Clarke et al., 2023).

As graduates, health professional students are expected to demonstrate these qualities, however, little attention has been paid to preparing students as leaders within the IPE context (Matthews et al., 2018; Oates, 2012; Swanwick & McKimm, 2012; Till et al., 2020). A study conducted at the University of Southern Carolina examined the changed perceptions of students after taking part in an interprofessional elective course with an embedded collaborative leadership model (Iachini et al., 2019). They reported students shifting their understanding of leadership as being less of an individual approach and instead being collaborative with team members having an

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active role to play (Ianchini et al., 2019). It is suggested that early leadership development for health professional students may help to maintain and improve patient care, with associated benefits for the healthcare system (McKimm & Swanwick, 2011; Till et al., 2020). There are inconsistencies in student leadership training and programs across health professions education, with potential for this to be covered within IPE curricula (Hardy & Neve, 2019; Winters et al., 2022).

The importance of leadership roles of students in helping to prepare their peers as future health professionals is seldom prioritised in health professional curricula. Hoffman et al (2008) note that interprofessional student leadership training will have a direct influence on sustainability and future cultural change in the health workforce by positively impacting attitudes towards other health professions and collaborative practice. Although skills in teaching, facilitation, assessment and feedback across health professions are graduate attributes, such training programs are rarely embedded as requirements within health professions curricula (Burgess & McGregor, 2018).

2.5 Faculty perception of barriers and enablers to IPE implementation

The effective implementation of IPE curricula is largely reliant on faculty engagement. In comparison to uniprofessional learning activities for students, greater preparation is generally required when planning interprofessional activities (Ruiz et al., 2013; van Diggele et al., 2020). As summarised by van Diggele et al (2020), there are a number of factors to consider, including the environment for delivery; team dynamics, including any potential hierarchical issues; communication, such as the use of different terminology among disciplines; student grouping needing to be pre-determined and

mixed; facilitators from disciplines representative of the student class mix; and activity design being group-based to suit all disciplines (van Diggele et al., 2020). The role of the IPE facilitator is central to guiding student learning to engage the different professions involved. Equal consideration and respect for the roles of all health professions needs to be demonstrated by the facilitator, and group dynamics carefully mediated (Evans et al., 2019; Hall & Zierler, 2015; Ruiz et al, 2013).

Common barriers identified in recent literature are associated with timetabling difficulties, the equal distribution of student numbers from disciplines, alignment of students' training experience, added cost burdens, excessive administrative workload, lack of operational support, and suitability of patient cases for engaged disciplines (Chan et al., 2017; Khalili et al., 2022; Coyle et al., 2013; van Diggele et al., 2024; Wong et al., 2021). Beck Dallaghan and colleagues (2016) published a paper titled 'Faculty attitudes about interprofessional education', highlighting faculty's preference to move from large campus wide events to small longitudinal activities to increase the authenticity of IPE experiences (Beck Dallaghan et al., 2016). The article describes the use of a questionnaire called the Nebraska Interprofessional Education Attitudes Scale, used to assess attitudes related to interprofessional collaboration. Their findings indicate that faculty had a positive attitude towards IPE, but were encountering barriers to participation, such as scheduling conflicts, lack of department support and a lack of awareness of events (Beck Dallaghan et al., 2016).

A study by El-Awaisi and colleagues in Qatar reported on faculty perceptions of IPE in the pharmacy curriculum (2019). They found faculty had positive perceptions towards

IPE and felt they had ample opportunity to drive the curriculum forward. However, they also identified a number of challenges such as integrating the curriculum to enhance IPE and collaborative practice (El-Awaisi et al., 2019). A similar study was conducted with occupational therapy faculty across various institutions in the United States of America, finding once again that faculty supported IPE but were limited due to time constraints, limited resources, and a lack of faculty development and training (Hughes et al, 2019). Encouragingly, Hughes et al (2019) suggested that engagement in IPE promoted enthusiasm and job interest, potentially reducing burnout (Hughes et al., 2019). Both of these studies were conducted with uniprofessional faculty groups, highlighting the gap in studies where representatives from all health professional faculty are presented.

Faculty development supports and enhances interprofessional facilitation skills. Hall and Zierler (2015) recommend faculty development that is context specific to the educational institution, encouraging faculty to design activities specific to IPE competencies, role model interprofessional leadership, and learn from the challenges and enablers experienced by others when implementing IPE. It is important to consider the varying levels of experience, confidence and enthusiasm faculty bring to the IPE setting (Dean et al., 2014). A study conducted in a Saudi Arabian university found that students stressed the importance of having faculty trained and skilled in interprofessional teaching (Makeen et al., 2023). Arshad-Snyder and Flanagan (2023) detailed a five module course their faculty complete to build a shared culture and consistent experience for students and faculty. Given the importance placed on facilitation of interprofessional activities, more attention should be paid to faculty

perceptions of facilitation and the curriculum (Evans et al., 2018). Van der Merwe and van Vuuren (2024) propose a shared narrative between faculty members in curriculum design and implementation as essential in the provision of diverse and valuable input. Faculty involvement in the development and facilitation of IPE curricula is often poorly reported in research articles (Grimes & Guinan, 2022). Given the number of articles stating the need for faculty engagement in IPE design and delivery, there remains an overwhelming gap in published research in this area.

2.6 Conclusion

To prepare health professional students for their graduate roles as members of interprofessional teams, universities and faculty have a responsibility to effectively plan and implement IPE curricula. There is increasing uptake internationally of centralised IPE models, demonstrating greater acceptance of IPE curricula. However, further research is needed to inform best practice for optimising IPE activities, particularly those that are large-scale. Additionally, the strengthening of learning and teaching approaches to improve teamwork, collaborative practice and leadership development will enhance students' professionalism skills while at the same time supporting sustainability. Expanding our understanding of what faculty perceive as the barriers and enablers to successful implementation of IPE will assist in shaping engagement and culture in health professions education, and help inform faculty development requirements.

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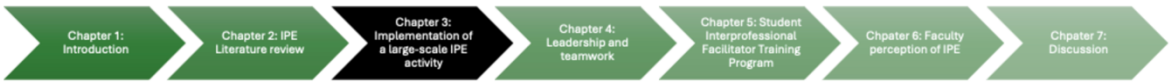
CHAPTER 3:

Implementation of a large-scale IPE activity



3.1. Introduction

The first large-scale interprofessional activity forming the basis of the new IPE curriculum was the Health Collaboration Challenge (HCC). I was responsible for leading the delivery of this FMH flagship activity to 1674 students in 2018. Limited research exists on the implementation of large-scale interprofessional activities. With increasing student numbers (more than 10,000 FMH students annually), it was important for us to have a greater understanding of the effectiveness of interprofessional activities. Due to the large number of disciplines involved, we also wanted to determine the perceived disciplinary similarities and differences in the value of this interprofessional activity. Interprofessional activities are social in nature, requiring joint collaboration to achieve shared goals (Thistlethwaite, 2012). Social constructivist theory centres on the belief that learning is a joint social construction and not individually constructed (Hean et al., 2009).

We sought to explore the impact of the student-led learning activity and tasks on student knowledge, skills, attitudes and behaviours, and to also identify any disciplinary similarities and differences in the social value of IPE. Our overarching research question was:

> '*What are the disciplinary similarities and differences in student experience and perceived value of early participation in interprofessional learning activities?*'

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3.2. Summary

This interprofessional activity involved 11 health disciplines (dentistry, diagnostic radiography, dietetics, exercise physiology, medicine, nursing, occupational therapy, oral health, pharmacy, physiotherapy, and speech pathology) working in small interprofessional teams of five to six students to complete a series of assessment tasks on a complex patient case. In 2018, 584/1674 (35%) students completed a post-activity questionnaire regarding their experiences and perceived learning outcomes. Qualitative data were coded and categorised into themes related to social constructivist theory (Vygotsky, 1978). Thematic analysis focused on socio-cultural influences of the student experiences, interactions and beliefs impacting their interprofessional learning. Identified themes were then applied and quantified at a disciplinary level to determine their prevalence within each discipline using a sequential design methodology as outlined by Miles and Huberman (1994).

The interprofessional activity was perceived as largely beneficial to students' learning and professional skill development. Students felt it provided further opportunities to develop skills in teamwork, communication, and increased their understanding of the roles and responsibilities of other disciplines. Student dissatisfaction was most prevalent in relation to inequity in assessment task weighting between disciplines and the video task component of the activity. Disciplinary differences were noted, with some appreciating the social nature of the activity, while others felt the patient case had little relevance to their discipline.

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The findings from this study resulted in the following publication which forms the content of this chapter:

> *van Diggele, C., Roberts, C., & Haq, I. (2021). Optimising student-led interprofessional learning across eleven health disciplines. BMC Medical Education, 21(1), 157. https://doi.org/10.1186/s12909-021-02527-9*

3.3. Linkage to the next chapter

When analysing student data from the peer assessment task, there was a noticeable element of team leadership being displayed and commented on by student team members. Since the nature of IPE is based on collaboration, teamwork and leadership, the research team agreed to explore this data further. This led to our exploration of the leadership qualities identified by student team members when providing peer feedback.

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RESEARCH ARTICLE Open Access

Optimising student-led interprofessional learning across eleven health disciplines

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Abstract

Background: Provision of effective Interprofessional learning (IPL) opportunities plays a vital role in preparing healthcare students for future collaborative practice. There is an identified need for universities to better prepare students for interprofessional teamwork, however, few large-scale IPL activities have been reported. Additionally, little has been reported on disciplinary differences in student learning experience. The Health Collaboration Challenge (HCC) is a large-scale IPL activity held annually at the University of Sydney. This study sought to explore students' experience of early participation in an interprofessional case-based learning activity, and the similarities and differences in the perceived value of interprofessional (social) learning for each discipline.

Methods: In 2018, 1674 students from 11 disciplines (dentistry, oral health, nursing, pharmacy, medicine, occupational therapy, speech pathology, physiotherapy, dietetics, diagnostic radiography, exercise physiology) participated in the HCC. Students worked in teams to produce a video and patient management plan based on a patient case. Participants completed a questionnaire, including closed and open-ended items. Quantitative data were analysed using descriptive statistics. Thematic analysis was used to code and categorise qualitative data into themes. These themes were then applied and quantified at a disciplinary level to measure prevalence.

Results: In total, 584/1674 (35%) of participants responded to the questionnaire. Overall, students perceived their experience to be largely beneficial to their learning and interprofessional skill development. Positive aspects included opportunities for peer learning, collaboration, networking, and understanding the different roles and responsibilities of other health professions. Negative aspects included the video form of assessment, inequity in assessment weighting across disciplines, the discipline mix within teams and lack of case relevance.

Conclusion: The learning activity provided a framework for students to practice and develop their skills in interprofessional teamwork, as they prepare for increased clinical placements. Overall, students perceived their experience as beneficial to their learning and professional development early in their degree. However, they expressed dissatisfaction with the inequity of assessment weighting across the disciplines; lack of relevance of the case across disciplines; and the activity of producing a video. Further research is needed regarding the ideal number of disciplines to include in teamwork specific to a patient case.

Keywords: Interprofessional learning, Interdisciplinary, Health, Large-scale, Assessment, Education

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Background

Provision of effective Interprofessional learning (IPL) opportunities plays a vital role in preparing health professional students for future collaborative healthcare practice. Described as occurring "*when two or more professionals learn about, from and with each other to enable effective collaboration and improve health outcomes*" [1], IPL is widely acknowledged as essential to improving the quality of patient care, patient safety and service delivery [2]. Internationally, growing evidence reinforces the positive outcomes associated with IPL, with policy makers supporting the call to better prepare health professional students for collaborative future practice [3–5]. There is broad agreement that universities need to better prepare healthcare students for further professional practice, which will involve teamwork between disciplines. Compared to uni-disciplinary healthcare teams, multidisciplinary healthcare teams are better equipped to improve patient outcomes, with input from each profession contributing to a better quality of life and improved patient safety [6]. With the aim of enhancing the knowledge, attitudes, values, skills and behaviours of collaborative health teams, universities worldwide seek to provide students with interprofessional learning (IPL) opportunities [3]. The Health Professions Accreditors Collaborative (HPAC) endorses the deliberate design of IPL activities supporting the mastery of IPL competencies through activities that are integrated into existing curriculum and are longitudinal in nature [7].

Limited research has been conducted on large-scale interprofessional learning and its impact on foundational learner outcomes [8]. Chan and colleagues (2017) reported logistical difficulties implementing a large-scale interprofessional activity involving 801 healthcare students from seven undergraduate-entry healthcare programs, and six disciplines across two Hong Kong universities [9]. A similar study by Black et al. (2016), reported on approximately 600 students from 10 disciplines involved in IPL activities based on patient safety [10]. Although evidence suggests overall, an improvement in students' readiness to engage in interprofessional learning, it is unclear whether differences existed between disciplines in large-scale settings [9]. In addition, debate is ongoing as to the best time to facilitate interprofessional activities during a student's degree, with research not yet convincingly displaying a negative or positive impact on the timing of introduction of interprofessional learning exposure [11].

One of the problems in design and implementation of large-scale IPL activities, is that few institutions have been able to embed a longitudinal approach that is standardised across student cohorts [12]. However, the University of Toronto has been successful in implementing a standardised approach to IPL by ensuring their IPL policy is aligned and supported by government policy. The provision of a core competency framework and necessary university, research and hospital structures have also contributed to their success [13]. However, IPL activities are often small-scale, extra-curricula activities, facilitated by individual champions with little co-ordinated, institutional support. In preparing students for the workforce, universities have struggled to create and maintain authentic IPL activities that are inclusive of entire health professional student groups. The structure of separate faculties and schools often makes shared work difficult, with IPL activities commonly presented as extra-curricular activities involving a small portion of student cohorts, that are resource intensive to implement [12]. Reeves et al. (2016) noted that a 'bottom up' approach fuelled purely by educators is not likely to succeed, but with the commitment from the leadership team and at a faculty level there is a much greater chance of success and sustainability of IPL initiatives [3]. It has been suggested that the responsibility of the creation of sustainable IPL initiatives lies with institutional leaders that are able to support, endorse and negotiate such activities both within and outside of the individual department [7]. However, there is a significant gap in research reporting empirical outcomes for large-scale IPL activities as part of institutional change that can inform the debate about when and where in the curriculum IPL activities are best embedded. Additionally, there is a gap in literature reporting on the differences where multiple disciplines are involved.

An opportunity to investigate these gaps in research arose within a higher education context, where a large, research intensive university in Australia has been committed to a strategy aimed at ensuring all graduating healthcare students have exposure to assessable IPL activities. The Health Collaboration Challenge (HCC) was first implemented in 2015 and included 1220 students from eight health disciplines, steadily growing to encompass larger numbers of students, and further disciplines. The HCC has been previously described [12]. The HCC is a mandatory component of the curricula for all students. In 2018, 11 healthcare disciplines participated in the HCC, developed as part of a University wide approach to deliver IPL to all health professional students. The principal features of the HCC are small IPL student teams working on a complex patient case scenario. Students collaborate to provide a patient management plan and create a short video to communicate some of their teamwork strategies. Using the conceptual framework of social constructivist theory, we sought to explore specific students' experience of participating in the 2018 large-scale interprofessional activity.

Theoretical framework

Theories supporting learning and teaching practices offer lenses that are helpful when considering educational methods [14]. Social constructivist theory is based on the work of Vygotsky (1978), and is centred on the understanding that learning is not individually constructed, instead mediated by the environment through joint social construction [15, 16]. The key features include:

1) Students' knowledge transfer is facilitated by authentic tasks
2) Knowledge is continuously constructed and specific to context
3) Personal meaning is created
4) Social interaction occurs amongst learners, teachers and the environment

This theory applies to the three learning domains of IPL as outlined by Burr (2003) as the acquisition of knowledge, skills and behaviours [17]. It accentuates that when students are learning in 'interprofessional' teams, they are learning actively through their interactions to achieve a shared understanding of clinical practice and common goals [5]. We applied social constructivist theory to assist in interpreting the learning experiences for student interprofessional groups participating in large-scale HCC interprofessional activities, with a focus on the ways in which their professional discipline impacted their learning.

Our specific research questions were:

- How does early participation in an interprofessional case-based learning activity assist students in the development of interprofessional knowledge, skills, attitudes and behaviours?
- What are the similarities and differences in the perceived value of interprofessional (social) learning for each discipline?

Methods

Research context and participants

In 2018, 1674 students from 11 health disciplines [Dentistry (year 3 postgraduate), Diagnostic radiography (year 2 undergraduate, year 2 postgraduate), Dietetics (year 2 postgraduate), Exercise physiology (year 4 undergraduate, year 1 postgraduate), Medicine (year 2 postgraduate), Nursing (year 2 postgraduate), Occupational therapy (year 4 undergraduate, year 2 postgraduate), Oral health (year 3 undergraduate), Pharmacy (year 4 undergraduate, year 2 postgraduate), Physiotherapy (year 3 undergraduate, year 2 postgraduate), and Speech pathology (year 3 undergraduate, year 2 postgraduate)] took part in the HCC. Students had varying degrees of experience in interprofessional learning prior to participation.

Learning outcomes of the HCC activity

The student learning outcomes were to:

- Understand the contribution of a range of different health professions to meet complex patient care needs
- Integrate and prioritise key contributions from different health professions into a patient management plan
- Apply a collaborative approach to problem solving with different health professions for a challenging creative task

Team formation The HCC activities required students to work in teams of five or six students, with a minimum of four different disciplines per team. Teams were allocated by faculty to ensure a mix of five to six disciplines per team. In total, 288 teams of five or six health professional students were formed.

HCC activity design The HCC activity required students to work in their small interprofessional teams. Student teams received one of fifteen patient cases that were refined by an interprofessional academic team to ensure their suitability for the disciplines involved. There were five components as outlined in Fig. 1. Students were required to: 1) review a complex patient case, 2) produce a 5-min video on their case management, 3) develop a one-page management plan, 4) peer review two other team videos, and 5) peer review their team members' contribution.

A blended approach was used to deliver the HCC, via the University's learning management system, Canvas and one face-to-face session. As the activity was student-led, students were required to complete a pre-module online before meeting their team members in order to understand how to complete the assessment tasks of a patient management plan and team video addressing the complex patient case. Students then had five days to peer review two team videos produced by other teams, and peer review their team members' contribution.

Assessment and feedback Student teams submitted two assessable components online. This included the five-minute video worth 60% and a one-page abstract worth 40% of their overall HCC assessment grade. The video submission of each team ($n = 288$) was peer assessed and the abstracts were marked by academics ($n = 15$). Rubrics were provided for each component to support consistency in marking. Written feedback was also provided to students for both components. There were differences between each unit of study regarding how the grade from this interprofessional activity

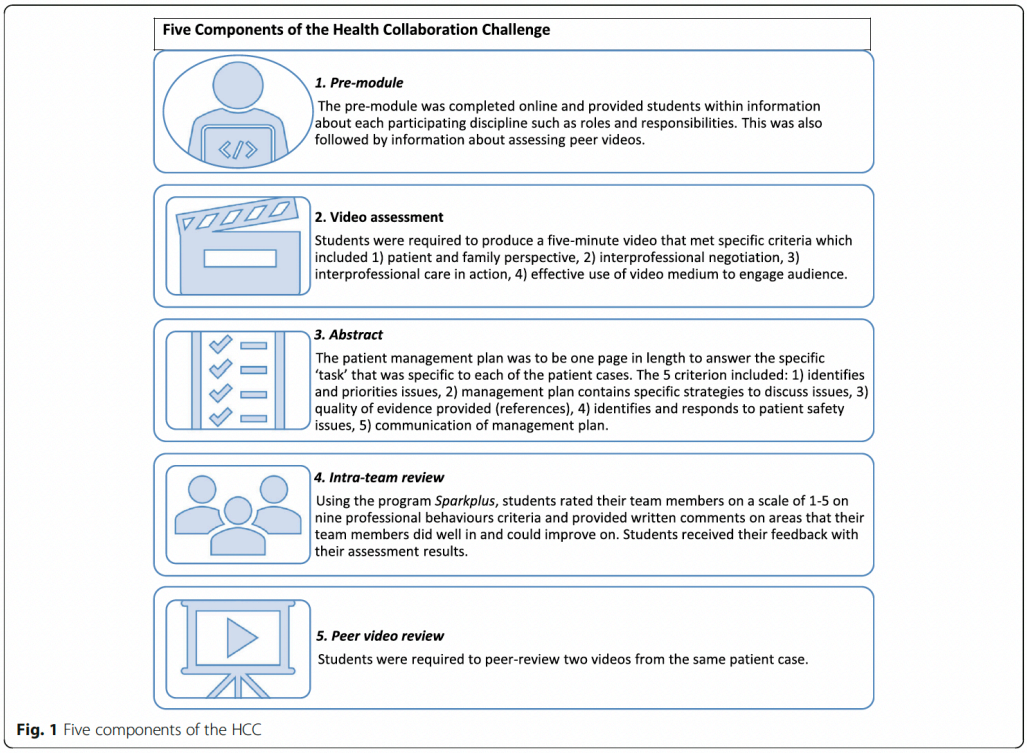

Fig. 1 Five components of the HCC

contributed to students' summative assessment. This was set by unit of study coordinators. For example, in medicine, although the HCC was a required activity, a grade did not contribute to students' summative assessment. However, for most other disciplines the grade contributed between 5 and 20% of students' summative assessment.

Data collection and analysis

Student questionnaire

Following completion of all HCC activities, participants were invited to complete a validated online anonymous questionnaire regarding their experiences with and outcomes of the program [12]. For closed items 1 to 9, we used a five-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). Additionally, students were asked to rate the difficulty of the patient case, using a Likert scale of 1 to 5, with (1) being 'very easy', (2) 'easy', (3) 'neither easy nor difficult', (4) 'difficult', and (5) 'very difficult'. The questionnaire also included demographic questions. Quantitative data were analysed using descriptive statistics in SPSS (version 24) [18].

To gain a greater understanding of students' experience, we used two open ended questions: 1) 'What was most beneficial for your learning?' and 2) 'How might the HCC be improved for interprofessional learning next year?' Each response (R) was assigned an anonymous identifier (1–381) for question 1, and (1–374) for question 2. This study used a sequential design following the methodology of Miles and Huberman [19]. A thematic analysis of a sample of the qualitative data was performed within each category by two authors (CvD and CR). The coding throughout focused on the sociocultural influences of the student experiences, interactions, and beliefs that impacted on their interprofessional learning. Codes and categories were identified inductively and translated into a coding structure. The remaining data were coded and categorised into themes by one author (CvD) which was then quantified to measure thematic prevalence [20]. These themes were then applied and quantified at a disciplinary level to determine their prevalence within each discipline (i.e. specific to dentistry, diagnostic radiography, dietetics, exercise physiology, medicine, nursing, occupational therapy, oral health, pharmacy, physiotherapy, and speech pathology).

Table 1 Participants' ($N = 519$) median responses to their perception of the HCC activity by discipline

Discipline	N	Item 1 The patient case study was relevant to my profession	Item 2 The HCC Developed my problem-solving skills	Item 3 The HCC sharpened my analytic skills	Item 4 The HCC helped me develop my ability to work as a team member	Item 5 Collaborating on the production of a video develops teamwork skills	Item 6 Assessing the videos produced by other teams helped me gain a different perspective on case management for my scenario	Item 7 I feel confident about working with other health professions	Item 8 I will be able to use the skills and knowledge gained in my future placements	Item 9 Overall, the HCC was a worthwhile learning activity for me
Nursing	71	4	4	4	4	4	4	4	4	4
Speech Pathology	45	4	4	4	4	4	4	4	4	4
Occupational Therapy	66	4	4	3	4	4	4	3	3	4
Physiotherapy	52	4	4	3.5	4	4	4	4	4	4
Exercise Physiology	18	4	4	4	4	4	4	4	4.5	4
Pharmacy	62	4	4	4	4	4	4	4	4	4
Medicine	71	4	4	3	4	3	3	3	3	3
Diagnostic Radiography	60	2	4	4	4	4	4	4	4	3
Dentistry	30	2	3	2.5	3	2.5	2	3	2	2
Oral Health	12	3	4	3.5	4	2	4	3.5	3.5	3
Dietetics	32	4	4	4	4	3.5	3	4	4	4

(1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly Agree)

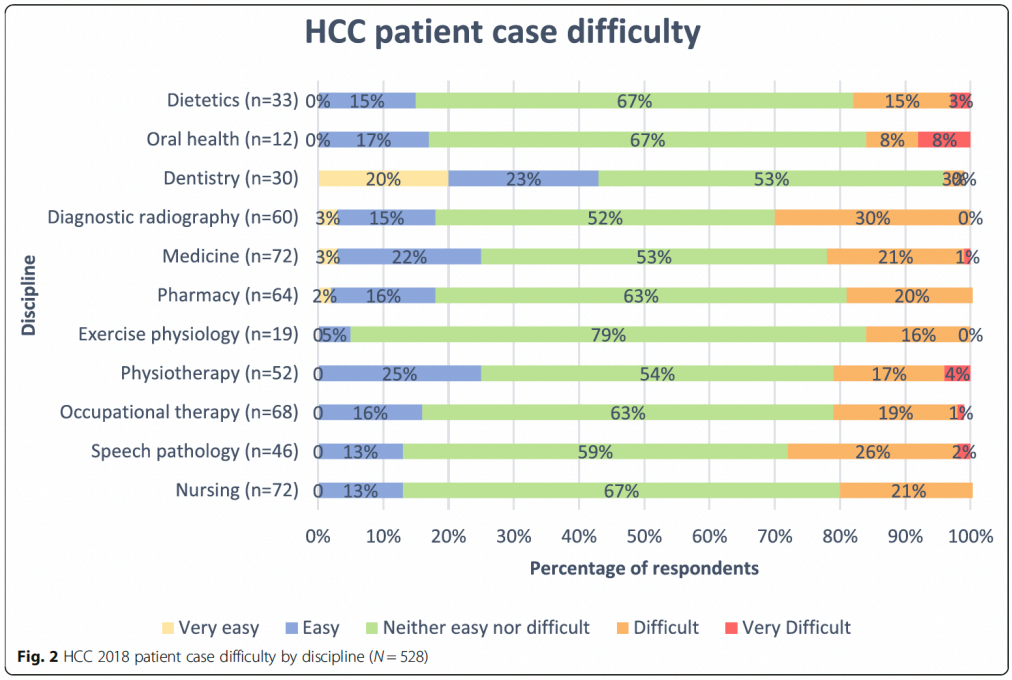

Fig. 2 HCC 2018 patient case difficulty by discipline ($N = 528$)

Table 2 Most prevalent themes in response to the question "What was most beneficial to your learning?" ($N = 381$)

Most prevalent themes across all disciplines	Explanation of each theme	Overall theme occurrence in all disciplines (N=281)
Theme 1: Opportunity to practice working in an interprofessional team	Students appreciated the opportunity to practice working in an interprofessional team with students of other disciplines, with limited opportunity otherwise in the curriculum.	103 (27%)
Theme 2: Peer Learning and collaboration	Students valued the experience of learning from peers and collaborating with each other in their small teams.	93 (24%)
Theme 3: Role clarification	Students gained a better understanding of the roles and responsibilities of other health professions by taking part in the activity.	71 (19%)
Theme 4: Networking and socialising with other health professional students	Socialising and networking with students from other health professions was beneficial to student learning.	66 (17%)
Theme 5: The task itself was beneficial to student learning and provided opportunity for communication and interaction	The activity was a valuable learning experience, including comments related to the video assessment task. Students found the opportunity to further develop their communication skills and interact with others as beneficial to their learning.	63 (17%)
Theme 6: Perspectives of other disciplines in patient management	Students were able to see the perspectives of other health professions in the overall care of their patient	45 (12%)

Ethical considerations

The University of Sydney Human Research Ethics Committee approved the study (Project number: 2015/556).

Results

Questionnaire response rate

In total, 584/1674 (35%) of HCC participants responded to the questionnaire. Of these respondents 405/584 (69%) were female, 149/584 (26%) were male, and 30/584 (5%) did not state their gender.

Responses to closed items

A total of 519/584 (89%) students responded to all closed items 1–9. Of these respondents, 71/519 (14%) were nursing students, 45/519 (9%) speech pathology, 66/519 (13%) occupational therapy, 52/519 (10%) physiotherapy, 18/519 (3%) exercise physiology, 62/519 (12%) pharmacy, 71/519 (14%) medicine, 60/519 (12%) diagnostic radiography, 30/519 (6%) dentistry, 12/519 (2%) oral health, and 32/519 (6%) dietetics.

Student median responses to closed items

Students' median responses are shown in Table 1. Median outcomes ≤3 (Neither Agree nor Disagree) to show where there are clear differences in responses across disciplines. Overall, students' perception of their experience was positive with a median response of 4 for most items. Notably, nursing, speech pathology, exercise physiology and pharmacy rated the HCC activities the most highly (median score of 4 or higher for each item 1–9); while dentistry placed least value on the activities (median score 3 or less for each item 1–9). Diagnostic radiography, dentistry and oral health poorly rated the relevance of the patient case to their profession (median score 3 or less for item 1). Medicine, dentistry and oral health placed least value on the video collaboration task in comparison with all other disciplines (median score 3 or less for item 5).

Students' perception of the difficulty of the cases based on discipline

Figure 2 presents students' perception of the difficulty of the cases based on discipline. A total of 528/584 (90%) students responded to this question. Of these respondents, 72/528 (14%) were nursing students, 46/528 (9%) speech pathology, 68/528 (13%) occupational therapy, 52/528 (10%) physiotherapy, 19/528 (4%) exercise physiology, 64/528 (12%) pharmacy, 72/528 (14%) medicine, 60/528 (11%) diagnostic radiography, 30/528 (6%) dentistry, 12/528 (2%) oral health, and 33/528 (6%) dietetics. The majority of students from each discipline reported the cases as being 'neither easy nor difficult'. However, 43% of dentistry students reported finding the case to be 'very easy' or 'easy'. Notably, 28% of speech pathology students, and 30% of diagnostic radiography students found the patient case to be 'difficult' or 'very difficult'.

Responses to open-ended questions

Student responses: perceived benefits to learning

In total, 381/584 (66%) of respondents commented on *'What was most beneficial to your learning?'* Of these respondents, 58/381 (15%) were nursing students, 56/381 (15%) were medical students, 40/381 (10%) were pharmacy students, 20/381 (5%) were dentistry students, 8/381 (2%) were oral health students, 32/381 (8%) were physiotherapy students, 28/381 (7%) were speech pathology students, 49/381 (13%) were occupational therapy students, 41/381 (11%) were diagnostic radiography students, 14/381 (4%) were exercise physiology students, and 25/381 (7%) were dietetic students.

Responses were categorised into six themes (Themes 1 to 6) as presented and explained in Table 2. The themes identified were:

1) Opportunity to practice working in an interprofessional team

For example, '*The teamwork component was a good opportunity to find out the scope of practice of other disciplines and to learn to interact and collaborate on a case for people who do not have previous interdisciplinary experience this would be a good learning opportunity..*' (Nursing student, R18)

2) Peer learning and collaboration

For example, '*The best aspect was meeting people from other professions and talking to them about their point of view about things. Really good to collaborate.*' (Dentistry student, R3)

3) Role clarification

For example, '*It allowed me to learn from other disciplines and the roles of other health professionals.*' (Oral health student, R3)

4) Networking and socialising with other health professional students

For example, '*Getting to meet other students from various disciplines.*' (Occupational therapy student, R46)

5) The task itself was beneficial to student learning and provided opportunity for communication and interaction

For example, *'It is a very engaging and interactive activity. HCC was a great opportunity to have students to work together, understand and bond with other disciplines.'* (Nursing student, R9)

6) Perspectives of other disciplines in patient management

For example, *'Learning about the priorities of other health professionals when assessing a case.'* (Dietetics student, R19).

Student responses: suggested improvements for interprofessional learning

In total, 374/584 (64%) of respondents commented on *'How might the HCC be improved for interprofessional learning next year?'* Of these respondents, 56/374 (15%) were nursing students, 57/374 (15%) were medical students, 36/374 (10%) were pharmacy students, 22/374 (6%) were dentistry students, 9/374 (2%) were oral health students, 29/374 (8%) were physiotherapy students, 31/374 (8%) were speech pathology students, 52/374 (14%) were occupational therapy students, 46/374 (12%) were diagnostic radiography students, 9/374 (2%) were exercise physiology students, and 27/374 (7%) were dietetic students.

These comments were characterised into six common themes (Themes 7 to 12) as presented and explained in Table 3. These additional themes identified were:

7) Equality in assessment weighting

For example, *'Only some team members had weighted marking for the assessment. Others did not so that affected amount of effort put towards the project'.* (Physiotherapy student, R5)

8) Improve the team mix and case relevance

For example, *'It would have been helpful to have the necessary personnel based on the case. For example, my group would have benefited from a dental student and occupational therapist' (Medical student,* R14)

9) Modify the form of assessment

For example, *'I don't think that creating a video that focuses on creative ways to demonstrate interprofessional learning was really the most constructive way of facilitating learning.'* (Occupational therapy student, R2)

10) Equal contribution and time commitment

For example, *'It was a shame that the medicine student had to leave at midday for classes as I felt he had a lot to contribute and was a great leader.'* (Diagnostic radiography student, R39)

11) Logistical improvements and place in each curriculum

For example, *'Do the HCC in 1st year of the masters of nutrition and dietetics instead of the 2nd. I had already done a placement that involved working in a multidisciplinary team, so I did not gain anything from the HCC. The HCC would have been useful for the placement had it been done the other way around.'* (Dietetics student, R23)

Table 3 Most prevalent themes in response to the question "How might the HCC be improved for interprofessional learning next year?" (*N* = 374)

Most prevalent themes across all disciplines	Explanation of each theme	Overall theme occurrence in all disciplines (N=374)
Theme 7 Equality in assessment weighting	Students were aware of the inequality of assessment weightings between disciplines	77 (21%)
Theme 8 Improve the team mix and case relevance	An improvement in the discipline mix of teams and case relevance would be beneficial in managing the patient case	70 (19%)
Theme 9 Modify the form of assessment	Students described a dislike for video assessment and suggested other forms of assessment	68 (18%)
Theme 10 Equal contribution and time commitment	Students disliked medical students leaving early and feel that all students should contribute equally to the assessment	32 (9%)
Theme 11 Logistical improvements and place in each curriculum	Room availability and registration for the activity could be streamlined and improved further. Select a different time within the student's degree to have the assessment when the experience would be more relevant	32 (9%)
Theme 12 Task guidance and assessment instructions	Students found the assessment instructions or site navigation difficult. Students would appreciate more guidance on the assessment task from facilitators on the day	16 (4%)

Table 4 Theme occurrence with disciplinary quotes in response to "What was most beneficial to your learning?" ($N = 381$)

Most prevalent themes	Number and percentage of respondents	Examples of quotes from respondents
Nursing ($N = 58$)		
Theme 2: Peer learning and collaboration	($n = 23/58$) 40%	*The teamwork component was a good opportunity to find out the scope of practice of other disciplines and to learn to interact and collaborate on a case for people who do not have previous interdisciplinary experience this would be a good learning opportunity …* (R18)
		Collaboration and making a plan for the patient that I think was coherent, comprehensive and integrative. (R28)
Theme 1: Opportunity to practice working in an interprofessional team	($n = 20/58$) 34%	*The teamwork component was a good opportunity to find out the scope of practice of other disciplines and to learn to interact and collaborate on a case for people who do not have previous interdisciplinary experience this would be a good learning opportunity...* (R18)
		Being able to work in a multidisciplinary team. It was wonderful to get to know other students from different faculties. (R31)
Theme 5: The task itself was beneficial to student learning and provided opportunity for communication and interaction	($n = 10/58$) 17%	*It is a very engaging and interactive activity. HCC was a great opportunity to have students to work together, understand and bond with other disciplines.* (R9)
		I loved collaborating with the other disciplines and the use of a creative medium made it fun! (R23)
Medicine ($N = 56$)		
Theme 5: The task itself was beneficial to student learning and provided opportunity for communication and interaction	(n = 28/56) 50%	*The best part was discussing the case with the other health professionals.* (R26)
		It had a lot of creative freedom and discussion (R2)
Theme 1: Opportunity to practice working in an interprofessional team	($n = 19/56$) 34%	*Working with other healthcare students! Working through a case together was largely beneficial. Seeing what other people's priorities were was interesting.* (R5)
		… The importance of MDT collaboration in case management. (R12)
Theme 4: Networking and socialising with other health professional students	(n = 19/56) 11%	*Working with other healthcare students! Working through a case together was largely beneficial. Seeing what other peoples priorities were was interesting.* (R5)
		Interacting with other health disciplines. (R50)
Pharmacy ($N = 40$)		
Theme 1: Opportunity to practice working in an interprofessional team	($n = 12/40$) 30%	*I liked that we got to work with other disciplines and get a gauge of what knowledge other disciplines have/don't have.* (R12)
		Having the opportunity to work with other health care disciplines. (R15)
Theme 2: Peer learning and collaboration	($n = 11/40$) 28%	*Collaborating with other health care professionals and seeing their techniques in approaching a case scenario.* (R3)
		Collaborating on a case. (R34)
Theme 3: Role clarification	($n = 7/40$) 18%	*Learning about other professions other than my own.* (R10)
		Learn what other disciplines actually do. (R28)
Dentistry (N = 20)		
Theme 2: Peer learning and collaboration	(n = 7/20) 35%	*The best aspect was meeting people from other professions and talking to them about their point of view about things. Really good to collaborate.* (R3)
		Collaborating with colleagues from other health disciplines. (R19)
Theme 4: Networking and socialising with other health professional students	($n = 6/20$) 30%	*Met fellow healthcare students.* (R10)
		Social aspect. (R13)
Theme 1: Opportunity to practice working in an interprofessional team	(n = 3/20) 15%	*Working on a case study together with students of different disciplines was interesting and worthwhile. I can understand that the HCC is designed to allow collaboration of different professions to manage a case.* (R17)

Table 4 Theme occurrence with disciplinary quotes in response to "What was most beneficial to your learning?" (*N* = 381) *(Continued)*

Most prevalent themes	Number and percentage of respondents	Examples of quotes from respondents
		Meeting and working with other disciplines. (R20)
Oral Health (*N* = 8)		
Theme 4: Networking and socialising with other health professional students	(n = 5/8) 63%	*Meeting different professions.* (R2)
		Meeting other students and work with them. (R6)
Theme 3: Role clarification	(n = 3/8) 38%	*It allowed me to learn from other disciplines and the roles of other health professionals.* (R3)
		Learning about other health professionals and what they do. (R7)
Physiotherapy (*N* = 32)		
Theme 1: Opportunity to practice working in an interprofessional team	(n = 10/32) 31%	*Working as a MDT and learning from one another.* (R8)
		Meeting people from different professions and analysing the case from a variety of perspectives … (R27)
Theme 2: Peer learning and collaboration	(n = 7/32) 22%	*Collaboration with other health students* (R16)
		Being placed in a team of other disciplines, helped me to learn the role of other disciplines in the holistic care of a patient (R18)
Theme 4: Networking and socialising with other health professional students	(n = 3/32) 9%	*Consulting with other students on their degree and how they analyse the patient.* (R22)
		Talking between different disciplines about how everyone would contribute to the case study. (R24)
Speech Pathology (N = 28)		
Theme 3: Role clarification	(n = 10/28) 36%	*Completing the HCC allowed me to have a glimpse into how other health professionals approach a client's health and condition. It was particularly interesting see our Physiotherapy student take over the necessary OT role and activities, as we didn't have an OT in our group.* (R10)
		Working with other professions as SP (speech pathologist) can be a quite isolated profession especially in community setting. Also good to know more about the professions that I might refer to or get referral from. (R25)
Theme 1: Opportunity to practice working in an interprofessional team	(n = 7/28) 25%	*Interacting with other professionals and seeing how you all can contribute to the betterment of a patient.* (R12)
		Working in an interprofessional team and learning about each member's scope of practice. (R18)
Theme 2: Peer learning and collaboration	(n = 7/28) 25%	*Collaborating with students from other disciplines in a multidisciplinary team. I was lucky to have a team of motivated and diligent students for HCC.* (R20)
		Working collaboratively, not in just a professional manner but also through a creative manner with the video making. (R27)
Occupational Therapy (*N* = 49)		
Theme 3: Role clarification	(*n* = 18/49) 37%	*Better clarity around roles of specific clinicians, particularly pharmacology and other non-allied health because I have had no contact with these disciplines on placements.* (R2)
		Meeting other professions and finding out more about what they do in the field, and being able to represent my own discipline and share knowledge about our scope of practice. (R33)
Theme 1: Opportunity to practice working in an interprofessional team	(n = 8/49) 16%	*Practice working in multi-disciplinary teams* (R7)
		The opportunity to work with medical and dental students was extremely valuable. (R19)
Theme 4: Networking and socialising with other health professional students	(n = 8/49) 16%	*Getting to meet other students from various disciplines* (R46)
		Meeting new people (R49)

Table 4 Theme occurrence with disciplinary quotes in response to "What was most beneficial to your learning?" (*N* = 381) *(Continued)*

Most prevalent themes	Number and percentage of respondents	Examples of quotes from respondents
Diagnostic Radiography (*N* = 41)		
Theme 1: Opportunity to practice working in an interprofessional team	(*n* = 9/41) 22%	*Working with other disciplines* (R4)
		Working with other health professions seems to be a interesting idea. (R31)
Theme 3: Role clarification	(n = 9/41) 22%	*Meeting students from other disciplines and learning first-hand about their roles in a patient's care. Great perspective to see them analyse a patient's case and discuss what they would do in their profession.* (R25)
		It was interesting to develop more of an understanding of other fields (R35)
Theme 4: Networking and socialising with other health professional students	(n = 8/41) 20%	*Meeting other students from other professions* (R1)
		Meeting people from other professions (R10)
Exercise Physiology (*N* = 14)		
Theme 2: Peer learning and collaboration	(n = 6/14) 43%	*Collaborating with others* (R3)
		Teamwork and collaboration (R14)
Theme 1: Opportunity to practice working in an interprofessional team	(n = 4/14) 29%	*Working with other disciplines* (R4)
		Getting to work with different disciplines and learning about each other's roles as an allied health professional (R8)
Theme 4: Networking and socialising with other health professional students	(n = 4/14) 29%	*Meeting new people and understanding that priorities differ depending on your profession* (R2)
		Meeting with other undergrad (uate) students from different disciplines. (R12)
Dietetics (*N* = 25)		
Theme 1: Opportunity to practice working in an interprofessional team	(n = 9/25) 36%	*Working with other health professionals and discussing different elements of patient care.* (R9)
		Experience of working with other disciplines (R17)
Theme 2: Peer learning and collaboration	(n = 5/25) 20%	*Collaborating with other professionals and making the video.* (R6)
		The team environment (R21)
Theme 6: Perspectives of other disciplines in patient management	(n = 5/25) 20%	*I enjoyed seeing how other health professionals play a role in the patients care and their thought process behind their actions.* (R4)
		Learning about the priorities of other health professionals when assessing a case. (R19)

12) Task guidance and assessment instructions

For example, '*More clear and concise instructions given for students, earlier in advance if possible.' (Exercise physiology student, R8).*

Disciplinary specific findings

Disciplinary specific findings: perceived benefits to learning

Disciplinary specific student responses to '*What was most beneficial to you learning?*' are presented in Table 4, with illustrative quotes to support our findings. The most common theme, mentioned by all disciplines, with the exception of oral health was Theme 1 'Opportunity to practice working in an interprofessional team', with many students reporting this was their first time participating in an interprofessional team setting. The second most prevalent theme was Theme 2 'Peer learning and collaboration', with 7/11 disciplines highlighting the value of general team collaboration and the opportunity to work in a team setting. These comments did not make reference to the interprofessional aspect of the activity. Similarly, Theme 4, 'Networking and socialising with other health professional students', was mentioned by 7/11 disciplines, including, medicine, dentistry, oral health, physiotherapy, occupational therapy, diagnostic radiography, and exercise physiology. Theme 3, 'Role clarification', mentioned by 5/11 disciplines, was common amongst pharmacy, oral health, speech pathology, occupational therapy and diagnostic radiography. Students highlighted their improved ability to better understand their own roles and responsibilities within a team, as well as the roles of others. Theme 5, 'The task itself

Table 5 Theme occurrence with disciplinary quotes in response to the question "How might the HCC be improved for interprofessional learning next year?" (N = 374)

Most prevalent themes	Number and percentage of respondents	Quotes from respondents
Nursing (N = 56)		
Theme 7: Equality in assessment weighting	(n = 27/56) 48%	*I found it was unfair that each degree had a different percentage of their grade attributed to the task. I found the students who had the HCC worth 10–15% put in far more effort than those who only required a pass or fail.* (R23)
		It is really unfair that the HCC is worth 10% for some disciplines like nursing but carries no weightage at all for other disciplines like medicine. This causes some students to not put in any effort into doing the work. Either make it worth 10% across ALL disciplines or no weightage at all. (R33)
Theme 9: Modify form of assessment	(n = 13/56) 23%	*The video was a bit too much to work on and we couldn't have done it if all of us were inexperienced in making a video* (R1)
		I don't feel the video was beneficial to our collaboration in a health care context. I feel discussing and writing a care plan is more beneficial. (R3)
Theme 12: Task guidance and assessment instructions	(n = 6/56) 11%	*Improve Canvas so it's easier to find and gain access to the group page* (R14)
		Canvas interface and instructions for accessing modules, groups, upload areas …. (R18)
Medicine (*N* = 57)		
Theme 9: Modify form of assessment	(n = 23/57) 40%	*Have alternative options for the video.* (R6)
		The time spent filming and editing the video, for instance, could have been used to consider a second contrasting case. (R30)
Theme 10: Equal contribution and time commitment	(n = 10/57) 18%	*Schedule more time for medical students to be able to do it* (R29)
		Making sure all students were at the HCC for the same amount of time. Medical students had to leave halfway, it would have been better to just allocate that amount of time for all students rather than others having to stay back. (R52)
Theme 8: Improve the team mix and case relevance	(n = 7/57) 12%	*It would have been helpful to have the necessary personnel based on the case. For example, my group would have benefited from a dental student and occupational therapist* (R14)
		Making sure that the case is relevant to all parties involved - assign disciplines based on case (R2)
Pharmacy (*N* = 36)		
Theme 9: Modify form of assessment	(n = 9/36) 25%	*Not having to make a video. It was pointless and did not help us learn.* (R30)
		The complexity of the case with no additional information was not aligned with criteria of the video assessment. I did not feel like I answered the case problems within the framework of the video. (R8)
Theme 8: Improve the team mix and case relevance	(n = 5/36) 14%	*I feel like pharmacist is not needed in my case, Dao Chan.* (R2)
		Better allocation of health care professionals to cases e.g. *would've been helpful to have a dentist in my case. In doing this, people won't feel redundant in their case and ensures that everyone has an important role* (R22)
Theme 10: Equal contribution and time commitment	(n = 5/36) 14%	*One student in my group can only attend 4 h (9 am - 1 pm) because he has lab on that day. It would be good if everyone in the team were free on that day.* (R17)
		Some team members had class in the middle of the day that were compulsory thus not all team members could attend for the whole day - addressing timetable issues might mean everyone is working together not just half the team (R24)
Dentistry (*N* = 22)		
Theme 9: Modify form of assessment	(n = 8/22) 36%	*No video. Just have the different faculties collaborate on a joint case. The video is just awkward and doesn't help the collaborative effort* (R2)
		Take out the 30 min video. The abstract is more than enough to assess inter-professional work. Getting graded on how creative/how well you can video edit is not very fair. (R20)
Theme 10: Equal contribution and time commitment	(n = 4/22) 18%	*Make sure med students are available for the entire day. Having to leave at 12 made it difficult particularly for groups who registered later* (R1)
		Ensuring med students have their schedules cleared. Only available until 12 was not appropriate particularly for those groups that registered later. (R22)

Table 5 Theme occurrence with disciplinary quotes in response to the question "How might the HCC be improved for interprofessional learning next year?" (N = 374) *(Continued)*

Most prevalent themes	Number and percentage of respondents	Quotes from respondents
Theme 11: Logistical improvements and place in each curriculum	(n = 3/22) 14%	*Could be given to younger year (DMD2) as I feel like they would have learnt more and gotten more out of it.* (R5)
		Have degrees not already working in hospitals with teams participate. Those whom already work in a hospital setting contacting different clinicians should be exempt as this provides no gain from what we learn in the first few weeks in a hospital setting. (R14)
Oral Health (N = 9)		
Theme 10: Equal contribution and time commitment	(n = 5/9) 56%	*Medical student participation for the entire day* (R7)
		Not everyone has this assignment graded (medicine) and they said they (medicine) had something to do and leave early but you see them eating next door relaxing and not working with us. (R8)
Theme 9: Modify form of assessment	(n = 2/9) 22%	*Instead of a video, we should make something else as it was hard to make a video as a group.* (R3)
		Not a video - time restraints and too hard to organize a time outside of course work. (R9)
Theme 7: Equality in assessment weighting	(n = 2/9) 22%	*Everyone getting marked equally - some students only had to participate to pass, and therefore did not participate in all areas of the HCC assignment.* (R5)
		I do not understand how is it possible that some students are marked and some are not. - the mark from this challenge is going towards my final mark within the unit. This is unfair for obvious reasons, just to mention two: motivation, distribution of the workload. (R6)
Physiotherapy (*N* = 29)		
Theme 11: Logistical improvements and place in each curriculum	(n = 6/29) 21%	*Honestly, taking part on the HCC when I had completed almost 4 clinical placements was not a helpful experience. I had treated cases similar to the one presented at the HCC during placements, and done that within a MDT.* (R10)
		I think the HCC was not relevant to those in their final years of their degree. (R18)
Theme 9: Modify form of assessment	(n = 6/29) 21%	*The video was a waste of time. The value of HCC is from talking to other professionals about the case, not making a short clip* (R19)
		The video aspect was very time consuming and in my opinion unnecessary. I would have preferred that we create a longer abstract and peer review each others? (R20)
Theme 7: Equality in assessment weighting	(n = 3/29) 10%	*Only some team members had weighted marking for the assessment. Others did not so that affected amount of effort put towards the project.* (R5)
		Don't make the mark count for some degrees but not others. It should be unweighted for everyone. (R6)
Speech Pathology (*N* = 31)		
Theme 9: Modify form of assessment	(n = 7/31) 23%	*The video making - it really disadvantages those groups where everyone has no experience in this.* (R26)
		Get rid of the video aspect, a powerpoint or abstract is enough. (R30)
Theme 12: Task guidance and assessment instructions	(n = 6/31) 19%	*Easier video submission process.* (R5)
		Make the modules more accessible and less complex - it was extremely hard to navigate everything. (R6)
Theme 8: Improve the team mix and case relevance	(n = 5/31) 16%	*Make sure that the case study contains relevant details for each profession.* (R15)
		There were some team members that couldn't really be involved as their disciplines weren't relevant to the case, e.g. radiographer for me case. It would be good to only assign people to cases that they can take part in using their disciplinary knowledge. (R7)
Occupational Therapy (*N* = 52)		
Theme 7: Equality in assessment weighting	(n = 23/52) 44%	*Equal or no weighting for all disciplines.* (R6)
		Ensure that the HCC is a weighted % for each team member - as individuals who only need to attend and 'pass' may not be willing to put in as much effort as individuals who have HCC as a 20% weight in one of their subjects. (R8)

Table 5 Theme occurrence with disciplinary quotes in response to the question "How might the HCC be improved for interprofessional learning next year?" (N = 374) *(Continued)*

Most prevalent themes	Number and percentage of respondents	Quotes from respondents
Theme 10: Equal contribution and time commitment	(n = 17/52) 33%	*Better organisation: med students had to leave for class halfway through* (R1)
		To ensure that all students have the day off - the med students left early and the rest of us had to stay and complete the work (R23)
Theme 9: Modify form of assessment	(n = 9/52) 17%	*I don't think that creating a video that focuses on creative ways to demonstrate inter-professional learning was really the most constructive way of facilitating learning* (R2)
		I don't think making a video is necessary, I think only a written component is necessary for students to gain same benefits from HCC. (R45)
Diagnostic Radiography (*N* = 46)		
Theme 8: Improve the team mix and case relevance	(n = 24/46) 52%	*Our group didn't have a medical student. We were limited due to this and the case study was irrelevant for my profession. I did not play a major part in the discussion due to this.* (R8)
		Ensuring that individuals are assigned to patient case studies that are more relevant to their profession (R4)
Theme 10: Equal contribution and time commitment	(n = 12/46) 26%	*It was a shame that the medicine student had to leave at midday for classes as I felt he had a lot to contribute and was a great leader.* (R39)
		Pick a date where the medical students don't need to leave early for class if possible. (R9)
Theme 7: Equality in assessment weighting	(n = 9/46) 20%	*Ensuring that the HCC has a balanced assessment weighting across disciplines can improve the contribution of each team member. I was fortunate to have hard working team mates, but I heard that other teams encountered difficulties because some members didn't contribute as the assessment wasn't marked for them, which is unfair for others.* (R43)
		Make sure it is graded for all involved. It was graded for me, but what a pass/fail for everyone else in the group, so I feel like I had to take on more responsibility. (R41)
Exercise Physiology (N = 9)		
Theme 11: Logistical improvements and place in each curriculum	(n = 5/9) 56%	*Better signage for finding learning spaces at RPA. There was a construction zone in front of the building that made it hard to find.* (R5)
		Have the HCC at Cumberland campus, as that's where the majority of health science degrees are located. (R4)
Theme 12: Task guidance and assessment instructions	(n = 4/9) 44%	*Information released earlier so we have a better understanding of what is expected early on and can better prepare for it. (R1)*
		More clear and concise instructions given for students, earlier in advance if possible (R8)
Dietetics (N = 27)		
Theme 11: Logistical improvements and place in each curriculum	(n = 9/27) 33%	*Less rigidity regarding timetable* (R11)
		Do the HCC in 1st year of the masters of nutrition and dietetics instead of the 2nd. I had already done a placement that involved working in a multi-disciplinary team, so I did not gain anything from the HCC. The HCC would have been useful for the placement had it been done the other way around. (R23)
Theme 9: Modify form of assessment	(n = 4/27) 15%	*The video felt more like a chore than a learning activity.* (R26)
		Group debrief (larger group) on different case perspectives eg. discussion/healthy debate. (R10)
Theme 8: Improve the team mix and case relevance	(n = 4/27) 15%	*From speaking to other students, some were allocated a case where their profession did not have a significant role whist that role would be more beneficial in another case.* (R17)
		Please consider incorporating a more substantial role for the radiographer. (R22)

was beneficial to student learning and provided opportunity for communication and interaction' was mentioned by only 2/11 disciplines, medicine and nursing. Theme 6, 'Perspectives of other disciplines in patient management' was mentioned only by dietetics.

Disciplinary specific findings: suggested improvements for interprofessional learning

Disciplinary specific student responses to '*How might the HCC be improved for interprofessional learning next year?*' are presented in Table 5, with additional

illustrative quotes to further support our findings. Theme 9, 'Modify the form of assessment', was the most common theme of the disciplines (9/11), including nursing, medicine, pharmacy, dentistry, oral health, physiotherapy, speech pathology, occupational therapy and dietetics. Students identified the video form of assessment as being difficult and time consuming. Theme 10, 'Equal contribution and time commitment', was common across six disciplines, including medicine, pharmacy, dentistry, oral health, occupational therapy, and diagnostic radiography. Students felt there was an uneven distribution of work within their teams and a lack of time commitment from some disciplines.

Theme 7, 'Equality in assessment weighting', was identified by 5/11 disciplines including nursing, oral health, physiotherapy, occupational therapy and diagnostic radiography. Students felt that all students should be given the same assessment weighting as they were all completing the same tasks. Theme 8, 'Improve the team mix and case relevance', was also identified by 5/11 disciplines, including medicine, pharmacy, speech pathology, diagnostic radiography and dietetics. It was reported that some patient cases lacked relevance to some professions. Theme 11, 'Logistical improvements and place in each curriculum', was prevalent in 5/11 disciplinary groups, including dentistry, physiotherapy, exercise physiology and dietetics. Theme 12, 'Task guidance and assessment instruction', was the least prevalent (3/11), only identified by nursing, speech pathology and exercise physiology students.

Discussion

This study sought to explore the similarities and differences of students' learning experience of participating in a large-scale interprofessional activity, held across 11 disciplines. Overall, participants perceived their experience to be largely beneficial to their learning and interprofessional skill development. Positive aspects included opportunities for peer learning and collaboration, the ability to learn the roles and responsibilities of different health professions, and networking and socialising with other health professions. Students were most dissatisfied with the video task as a form of assessment, the inequity in assessment weighting across disciplines, and the perceived imbalance of student contributions to teamwork. Students felt that improvements could be made to the discipline mix in teams and the relevance of case studies to the health professions of their team. Notably, dentistry was the least satisfied with the HCC activity, and reported finding the patient case less challenging. In order to consider the implications of our findings we use the categories of social constructivist theory [16], 'student knowledge transfer', 'knowledge construction', 'personal meaning' and 'social interactions' to discuss our findings, and assist our understanding of students' interprofessional learning within the HCC activities.

Students' knowledge transfer is facilitated by authentic tasks

Learning transfer occurs when students apply their knowledge in a relevant context [24]. The team activities were based around the use of authentic patient cases. While our results indicate that students generally felt the patient cases had the right level of difficulty, a large proportion (43%) of dentistry students reported finding the case "very easy or easy". Additionally, responses to open ended questions indicate that a fifth of students (19%) felt their team's patient case lacked relevance to their own discipline. While literature highlights the importance of including the disciplinary background and knowledge of all team members when designing patient cases for small group activities [12], our results highlight the logistical difficulties of conducting interprofessional learning activities simultaneously for such a large number of disciplines [21]. Similar findings were reported by Lochner et al., 2018, who reported on an IPL activity on the common topic of 'patient safety', involving 39 students from five healthcare disciplines [22]. Although not a large number of students were involved, their results suggested that student learning outcomes were hindered by the excessive number of disciplines (five) working on the one patient case, with some students being afforded more valuable learning opportunities specifically relating to their disciplines [22]. Perhaps by reducing the number of disciplines included within each student team (for example, from five to three disciplines), it would be possible to increase the relevance of the case for every discipline, increasing student engagement with IPL. This would be logistically achievable by closely considering curriculum alignment for each discipline with the patient case topic, and grouping students accordingly.

Knowledge is continuously constructed and specific to context

Learning that provides an emphasis on active learner engagement, with information created in various ways reinforces student learning [23, 24]. The HCC assessment tasks were designed to provide a shared goal and means of engagement for all team members. Literature suggests that the 'peer pressure' placed on individuals working in small groups encourages students to complete tasks [25]. However, 18% of students indicated a dislike of the video activity, and suggested a modified form of assessment. Additionally, 21% of students, predominantly from five disciplines (nursing, oral health, physiotherapy, occupational therapy and diagnostic radiography) indicated their dissatisfaction with the inequity across disciplines in the weighting of assessments on grades, with a

nursing students stating *"This causes some students not to put in any effort into doing the work …"* . Chan et al. (2017) mentioned similar findings, where the IPL activity was considered integral to only four of their seven programs involved and was considered to impact on student motivation [9]. This highlights the need for consistency in the management and alignment of assessment tasks to ensure fairness and transparency for students. Buhse et al. 2017, reported in an IPL activity involving disciplines nursing, physician assistant and public health, reported the difficult challenge of creating student 'buy in' [26]. They anticipated that this would have been achieved by increasing the weight of summative assessment for all disciplines, indicating that without appropriate assessment weighting, the IPL activity was viewed as an 'add on', rather than integrated within the respective curriculum [26]. It is clear, the assessment grading needs to be changed to ensure equity across disciplines, and ensure student accountability and buy in.

Personal meaning is created

Students play an active role in the joint creation of their own learning by taking part in meaningful learning experiences that are authentic and relatable to the 'real world' [27]. Our findings demonstrate that the HCC activities based on patient cases fostered students' learning about each other's roles in patient management, with 9% of students commenting that the activity helped them to gain an understanding of the roles of others and themselves, and 12% stating they gained an understanding of the perspective of disciplines in patient management. IPL activities in small groups allow students to construct their understanding of new knowledge and build on their attitudes and beliefs while working through problem-solving activities as a team [28]. Interprofessional activities allow for clarification of student's own roles within a team setting, their purpose and how they can contribute to a patient/client's care plan [4, 29, 30]. Notably, students from oral health (38%), occupational therapy (37%), speech pathology (36%), diagnostic radiography (22%), and pharmacy (18%) valued the opportunity to work with students of other health professions to further develop their understanding of roles and responsibilities of others.

Again, this stresses the importance of better alignment in interprofessional activities with individual discipline curricula. Students could see value in their disciplinary knowledge and the need for their active contribution in case management. Those that were not able to contribute or noticed that others could not contribute to the case due to the team mix or case relevance identified this as an area needing improvement. A large proportion of diagnostic radiography (52%), speech pathology (16%), dietetics (15%), pharmacy (14%), medicine (12%) felt that the case was not aligned with the roles and responsibilities of all disciplines in the team.

Social interaction occurs amongst learners, teachers, and the environment

Learning occurs in the process of meaning construction, involving verbal interaction, questioning and negotiation of team members [17]. Twenty seven percent of students indicated that the HCC activities provided the opportunity to practice working in interprofessional teams. Although controversial, our findings support literature indicating that early experience of IPL within the first two years of health professional education enhances students' preparedness for further interprofessional learning and improves their attitudes to interdisciplinary teamwork [31, 32]. Students (11%) felt that the small group activities of the HCC provided opportunities for communication and interaction to foster skills in listening and shared decision making among disciplines. Students need to practice working together in teams [5, 33], and the HCC activity, utilises small group work, helping to facilitate this learning process. Due to the number of students and disciplines, there was limited access to facilitators. Students wanted more guidance and feedback on the task from facilitators (4%) with some mentioning they would like more explicit training on communicating with other disciplines before attending the activity. In the junior years, there is limited opportunity for formal interactions with other disciplines [34]. Evidently, students appreciated the opportunity for this early teamwork and networking.

Strengths and limitations

The strength of this study is that it demonstrates the feasibility and effectiveness of a large-scale IPL activity. The qualitative analysis gives a rich appreciation of the experiences of IPL, but may not be generalisable to other educational settings. The response rate is 35% and there is variation in disciplinary response rates. This may be due to distribution of the questionnaire being two weeks after the face-to-face component of the activity. Bias may exist in that those who chose to respond may have favoured the activity and our results may not be reflective of the wider population.

Conclusion

We used social constructivist theory as a lens to interpret students' perceptions of their experience in the HCC. By analysing the responses of students at a disciplinary level we were able to explore the perceived similarities and differences of learning benefits and improvements in interprofessional learning across 11 health professions. The learning activity provided a

framework for healthcare students to practice and develop their skills in interprofessional teamwork, self and peer review and feedback, as they prepare for increased clinical and community placements. Overall, students perceived their experience to be beneficial to their learning and professional development early in their degree. Importantly, students perceived an increased understanding of the roles of other health professionals. However, some students expressed dissatisfaction with the inequity of assessment weighting across the disciplines; the lack of relevance of the case to some disciplines; and with the required activity itself, of producing a video. To build on the success of the large-scale HCC in the early years, multiple IPL activities should be offered in the senior years of healthcare education and contextualised to meet the needs of disciplines. Further research is needed in respect to disciplinary findings regarding the ideal number of disciplines to include in teamwork specific to a patient case.

Abbreviations
HCC: Health Collaboration Challenge; IPL: Interprofessional Learning

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Authors' contributions
CvD contributed to study design, data collection, data analysis, drafting and critical review of the manuscript. CR contributed to the study design, data analysis and critical review. IH contributed to study design and critical review of the manuscript. All authors read and reviewed the final version of the manuscript. All author(s) read and approved the final manuscript.

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Ethics approval and consent to participate
The University of Sydney Human Research Ethics Committee approved the study.

Consent for publication
Not applicable.

Competing interests
CR and IH declare that they are on the Editorial Board of BMC Medical Education. CvD has no conflicts of interest to declare.

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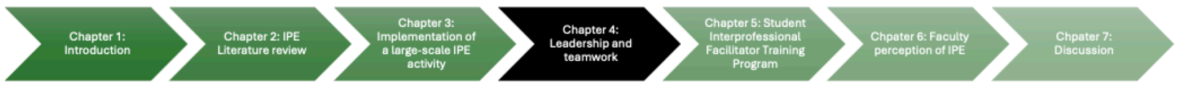
Publisher's Note

CHAPTER 4:

Leadership and teamwork



4.1. Introduction

Effective leadership within teams supports high-quality patient care. With a shortage of emerging leaders, it is important to consider how we nurture leadership skills for all health professional students. When analysing student data from the Health Collaboration Challenge (HCC), it became evident that students were displaying various leadership qualities in their interprofessional teamwork setting. This led us to examine the peer feedback comments within the HCC, taking note of the qualities displayed in an interprofessional student team setting.

Situational leadership theory (Hersey et al., 2008) provided a lens to observe student perspectives of peer leadership within their team settings. Students had the common goal of the assessment task focused on patient care through which they would need to adapt their leadership qualities to function as effective team members. Situational leadership requires flexibility and an ability to assess the situation to adopt an appropriate leadership style best suited to team members (Hersey et al., 2008).

Our overarching research question was:

> *'What are the leadership qualities identified by students during interprofessional teamwork?'*

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4.2. Summary

In 2018, 1674 students were required to provide anonymised written feedback to their peers after completing a series of team assessment tasks. The peer feedback data provided valuable insight into team function, and in particular leadership qualities being displayed within interprofessional student teams working on a shared task. Using situational leadership theory as a conceptual framework, we were able to code and categories the feedback comments into four themes (Braune & Clarke, 2006).

Our findings from the study showed that most students demonstrated a reasonable ability to display leadership behaviours appropriate to teamwork. However, we identified that further training would be beneficial to students. The most frequent comments provided by students related to a 'delegating' or 'supporting' style of leadership. Notably, a large proportion of comments were unconstructive, demonstrating a need to teach students how to provide effective feedback, and embed this in future learning activities.

The findings from this study resulted in the following publication which forms the content of this chapter:

> *van Diggele, C., Roberts, C., Lane, S. (2022). Leadership behaviours in interprofessional student teamwork. BMC Medical Education. Dec 2;22(1):834. https://doi.org/10.1186/s12909-022-03923-5*

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4.3. Linkage to the next chapter

Findings from this study led us to consider how interprofessional activities assist in the development of students' leadership qualities. With this in mind, I conceptualised the idea of the Student Interprofessional Facilitator Training (SIFT) program, focused on the advancement of students' leadership and teaching skills through interprofessional facilitation. We anticipated the SIFT program would not only allow students to build skills in teaching and facilitation, but also build capacity and develop the IPE community of practice across the University.

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RESEARCH Open Access

Leadership behaviours in interprofessional student teamwork

Christie van Diggele[1*], Chris Roberts[2] and Stuart Lane[2]

Abstract

Background: Effective leaders support high-quality patient care and improve patient safety by embodying a collective leadership style. Training in leadership skills needs to be integrated longitudinally throughout a clinician's career. Models of leadership drawn from organisational theories can provide a conceptual framework for cultivating student leadership qualities during teamwork and the evaluation of emergent outcomes. Using the conceptual framework of Situational Leadership Theory, we sought to explore the leadership qualities identified by students of their team members, during a large scale interprofessional learning activity.

Methods: In 2018, 1674 students from 11 health disciplines were required to participate in the "Health Collaboration Challenge" (HCC). The HCC required students to work in small interprofessional teams of five or six students. Following team activities, students were required to provide constructive written feedback to their team members. Peer feedback data were coded and categorised into themes using the conceptual framework of Situational Leadership Theory. Data were then quantified within each theme.

Results: A total of 1282 comments were analysed. The most frequent comments related to 'delegating' (456/1282, 36%) and 'supporting' (402/1282, 31%). This was followed by comments categorised as 'directing' (244/1282, 19%), and 'coaching' (180/1282, 14%) leadership styles. Notably, a total of 1112/2597 (43%) of comments were unconstructive. A total of 298 comments provided by students informed their peers of areas for self-improvement. The most frequent comments were recommendations relating to 'active team member contribution' (111/298; 37%), followed by 'communication' (83/298; 28%), 'interprofessional practice' (77/298; 26%), and 'disciplinary knowledge' (27/298; 9%).

Conclusion: Although most students demonstrated a reasonable ability to display leadership behaviours appropriate to teamwork, further development is needed through training. Leadership skills are an expectation of health professional graduates, and should be explicitly taught and vertically integrated within interprofessional education curricula. Further research is warranted in how students contribute to and understand the requirements of leadership within interprofessional teams.

Keywords: Interprofessional, Leadership, Teamwork, Health professions, Education, Peer review

Introduction

The impact of COVID-19 exposed existing vulnerabilities within healthcare systems and highlighted the need for educational systems to prepare students for an era of rapid change and constant evolution as new models of care arise [1]. Collaboration within and between health service delivery teams enables accomplishment of common goals to improve patient safety and quality of care [2–5]. High-quality patient care is supported by embodying a collective leadership style [6, 7]. However, there is a shortage of emerging leaders moving into leadership roles, and expectations that

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a large number of experienced clinicians will retire in the near future [6, 8, 9]. A recent review of health professional leadership programs found notable gaps in the integration of non-physicians with physicians, and limited interactive learning and feedback [10].

Leadership has had a major influence in shaping organisational culture, however, little attention has been paid to the systematic preparation of health professional students as leaders in the various levels of healthcare delivery [6]. It is important to consider how the cultivation of leadership skills can be nurtured and supported within the interprofessional education setting [4, 6, 11, 12]. There is a gap in empirical research exploring the contexts and activities that promote leadership development in interprofessional settings, and how students give and receive peer feedback around leadership qualities. An opportunity to explore these issues arose in the context of a large scale interprofessional learning activity at an Australian university.

Organisational theories assist in understanding student team function and leadership within an educational context. Leadership is socially constructed, and there are many different leadership models [13]. One theoretical perspective suitable for examining team function behaviours in relation to large scale interprofessional activities is Situational Leadership Theory. This theory proposes that leadership is contextual and influenced by situational factors. It suggests that a leader must adjust the degree to which they direct or support their subordinates based on context [14]. Individuals should adapt their leadership style based on the skills of their team members, catering to situational demands [15]. Situational leadership requires individuals to be flexible, assess the situation and adopt a leadership style that best fits the needs of team members. It is based on two key behavioural characteristics: task behaviour (the extent to which responsibilities are assigned); and relational behaviour (the depth to which communication is extended). Situational Leadership Theory posits that there are four styles of leadership [15]: (1) Directing, characterised by 'high task and low relationship' behaviours; (2) Delegating, characterised by 'low relationship and low task' behaviours; (3) Supporting, characterised by 'high relationship and low task' behaviours; and (4) Coaching, characterised by 'high task and high relationship' behaviours.

Using Situational Leadership Theory, we sought to explore the leadership qualities identified by students of their team members, during a large scale interprofessional learning activity. Our research question was: What leadership qualities do health professional students display in an interprofessional team setting when working on a shared task?

Methods

Participants

In 2018, 1674 students from 11 health disciplines were required to participate in the "Health Collaboration Challenge" (HCC), which has been previously described [16]. Students were from 11 disciplines: Dentistry, Diagnostic radiography, Dietetics, Exercise physiology, Medicine, Nursing, Occupational therapy, Oral health, Pharmacy, Physiotherapy, and Speech pathology.

Research context

The HCC required students to work in small interprofessional teams of five or six students, each consisting of four or more disciplines. Students completed three team activities based on the review of a complex patient case: (1) develop a one-page patient management plan, (2) produce a five-minute video demonstrating case management, and (3) provide a peer review for two other team videos. The activities were student-led and involved meeting in their assigned teams for a pre-assigned one-day session, with the requirement of completing all components over a six-day period. The tasks were assessable and written feedback was provided to student teams on their performance.

Peer review activity

Following completion of the three team activities, students were required to provide written feedback to their own team members, based on their team contributions. The peer review was designed to promote professional behaviours within teams and to develop skills in feedback. Students were required to complete the peer review using the online tool Sparkplus [17]. This tool supports group work by enabling students to self review and peer review via a website, promoting collaborative learning. They were required to:

- Self-assess their own contributions to the activity. Nine statements were provided, and students were required to respond, using a Likert scale of 1 to 5 (1 = strongly disagree; 5 = strongly agree).
- Rate all team members on their contributions to the activity, using the same scale.
- Provide constructive written feedback to at least two team members of their choice on their contributions to the activity. It was noted that feedback should be honest and constructive. An example of

peer feedback was provided to students. The feedback was anonymous.

Study design

Data collection and analysis

The focus of this study was on the qualitative (written) feedback provided by students during the peer review activity. Framework analysis was used to code and categorise the data into themes using the conceptual framework of Situational Leadership Theory [18]. All researchers (CvD, SL, CR) participated in an initial calibration exercise where each researcher independently coded and categorised the same 50 instances of students' peer review comments. Researchers met to discuss any discrepancies in their coding. The first author (CvD) then coded the remaining data into themes. The researchers then quantified the data to show the prevalence of each theme [19]. Feedback of 15 words or less was categorised as being insufficient for analysis. Comments that were cut and pasted were considered unconstructive, so were excluded from data analysis. Data were categorised by the four themes of Situational Leadership Theory:

- *Directing*: is characterised by 'high task and low relationship' behaviours. The leader makes decisions and allocates tasks to members, with limited feedback provided to team members. Communication is limited and focused on task or goal achievement.
- *Delegating*: is characterised by 'low relationship and low task' behaviour. The leader facilitates decision making by the team, giving team members responsibility for their own tasks. The leader refrains from intervening unless needed, and communication takes place only when required.
- *Supporting*: is characterised by 'high relationship and low task' behaviours. Team members are supported by the leader who encourages communication and feedback, with less of a focus being placed on the tasks themselves.
- *Coaching*: is characterised by 'high task and high relationship' behaviours. Contribution is encouraged from team members in a cooperative and democratic manner. The leader role models, encouraging communication and feedback. Sometimes knowledge and skills are shared between team members.

During the secondary analysis, the researchers recognised patterns in relation to students providing their peers with suggestions for improvement in future practice. These comments were analysed and coded thematically within descriptive categories. The comments within each category were then quantified. Four themes were used to categorise the data:

- *Communication*: Communication with the team needed to be clearer, conscience, or students needed to 'speak up' more.
- *Disciplinary knowledge*: A student's own sharing of disciplinary knowledge was limited, or they did not know much about the other disciplines they were working with.
- *Interprofessional practice*: Students needed to listen to others, work collaboratively with team members or allow for input from the patient/client.
- *Active team member contributions*: Students needed to be more active team members, contributing more to the task or have more confidence in being actively involved.

Ethics approval

The University of Sydney Human Research Ethics Committee approved the study (Project number: 2015/556).

Results

A total of 2597 comments were submitted by students and ranged in length from 1- 212 words per comment. Of these, 1112/2597 (43%) comments were excluded from the study due to being unconstructive comments that consisted of 15 words or less, or duplicate comments that were cut and pasted to multiple team members. Of the remaining 1282 comments coded, the most frequent comments related to the theme of 'delegating' (456/1282, 36%), and 'supporting' (402/1282, 31%). This was followed by comments categorised as 'directing' (244/1282, 19%), and 'coaching' (180/1282, 14%). These comments were categorised into four themes and presented in Table 1.

A total of 298 comments provided by students informed their peers of areas for self-improvement. These comments were grouped into four themes and are summarised in Table 2. The most frequent comments related to recommendations relating to 'active team member contribution' (111/298; 37%), followed by 'communication' (83/298; 28%), 'interprofessional practice' (77/298; 26%), and 'disciplinary knowledge' (27/298; 9%).

Discussion

We sought to explore the leadership qualities and styles identified by students during a large scale, small team interprofessional learning activity, using Situational Leadership Theory as a conceptual framework [15]. The

Table 1 Feedback from students according to the themes of 'delegating', 'supporting', 'directing' and 'coaching' within Situational Leadership Theory

Theme	Examples of student peer feedback comments	No. of similar comments
Delegating Details relating to a Delegating leader were linked to shared decision making within the team, and members taking responsibility for their own tasks. Communication was likely to only take place when needed.	*(Name) actively participated in the video and abstract. Added in ideas that we forgot. You have contributed well on the day of the group activity. However, ongoing feedback and effort to contribute and assist with the completion of the group project would have been ideal.*	(456/1282, 36%)
Supporting Comments categorised as Supporting were those that indicated team communication and feedback, with less of a focus being placed on tasks.	*(Name) was a good team member who put forth her own ideas and listened well to others. She collaborated well with all other disciplines and was able to make recommendations that fit within the contributions of other team members.* *(Name) actively participated and was easy to work with. She contributed to the knowledge of other professional roles as well as her own. She assisted with coming up with different ideas for videos, and was able to make adjustments where needed given the limited resources. Listened and showed respect to others' opinions.*	(402/1282, 31%)
Directing Feedback categorised as Directing indicated that the student receiving the peer feedback made decisions with limited input from others and communication. These comments were mostly focused on task-based items.	*(Name) took the initiative to edit and submit the abstract on our behalf and he edited the document to a professional standard. He applied his clinical knowledge professionally by considering the patient holistically. He was very prompt on communicating the status of editing.* *I appreciate all the hard work you put into the project, but I also feel like you commandeered the abstract and didn't allow time for appropriate review and excluded some people's input.*	(244/1282, 19%)
Coaching Comments categorised as Coaching described team contribution and cooperative team function, valuing communication, feedback and the sharing of knowledge.	*(Name) is a valuable member of the team. He takes the initiatives and drives our team forward. He would complete his tasks effectively and to a high quality. He'd always be open to actively listen and take in the opinions of other team members, making sure that everyone's opinions are valued.* *(Name) strongly contributed to the team with his medical knowledge of the patient. He worked collaboratively with others and contributed to new ideas to the team. He displayed a willingness to work to learn other disciplines roles. He demonstrated strong initiative to guide the team as he generated new ideas without prompting. He related to others in an open, friendly and professional manner and showed understanding to other member ideas on how to create the video. He demonstrated leadership skills to keep the team informed with all necessary information. He set goals and allocated times to complete the video and abstract.*	(180/1282, 14%)

Table 2 Areas of improvement identified by students in their feedback (*N* = 298)

Category	Examples of student comments	Number of similar comments
Active team member contribution *Students needed to be more active team members, contribute more to the task, or have more confidence to be actively involved.*	*…In the future, I hope you have more confidence to share your expertise spontaneously, even amid a team of such forceful personalities as ours. Focus more on the purpose of the task, i.e. know what the patient currently already has in place as part of their plan and work around that.*	111/298 (37%)
Communication *Communication needed to be clearer, conscience, or students needed to 'speak up' more.*	*…Little improvement is suggested, although as per other students, it is recommended that lay terms can be utilised when speaking with other disciplines so a greater understanding can be made by everyone.* *…The only place for improvement I could see with (name) is with his communication style. He is rather quiet and at times can be difficult to understand. In the future (name) might improve his professional competency by being more assertive and being a bit clearer with his language.*	83/298 (28%)
Interprofessional practice *Students needed to listen to others, work collaboratively with team members or allow for input from the patient/client.*	*… However, a more holistic management plan could have been delivered by considering how your discipline can collaborate with other discipline, in order to maximise the patient and management goals. (Name) was a helpful member of the team and considered her role in helping the client achieve each of her goals. I think something we could all improve on is to address the patient's concerns and emotional impact in the video.*	77/298 (26%)
Disciplinary knowledge *Own disciplinary knowledge sharing was limited, or they did not know much about other disciplines there were working with.*	*… However, I would improve on the knowledge of how dietitians could liaise with speech pathologists, occupational therapists, and physiotherapists. That being said, your knowledge of your own and other disciplines were already very good. Well done!* *…However, I would have liked if you could clearly explain the role of a pharmacist in Lulu's case (although I probably should have asked). Thanks!*	27/298 (9%)

most common leadership styles identified were 'Delegating' (36%) and 'Supporting' (31%). Fewer responses were identified as 'Directing' (19%), and 'Coaching' (14%). The need for improvement identified by students included the need for more active contributions to teamwork and clearer communication, including listening to others, demonstrating a greater awareness of interprofessional patient-centred care, and contributing to teamwork by sharing one's own disciplinary knowledge.

A key task of leadership is utilising appropriate skills and adapting an appropriate style for the given situation in supporting effective team function [20]. Peer feedback provided during team activities, suggests that some students performed their own tasks accurately and efficiently using task-oriented leadership behaviours. Students using relational-oriented behaviours focused on communicating support and appreciation for others. Both types of behaviours are core to basic leadership and are learned behaviours. Behaviours traditionally associated with leadership, such as 'Directing' were not always perceived favourably by peers. In line with current literature, student feedback to peers highlighted the importance of listening to others, and considering all viewpoints. Oates (2012) suggests that a key characteristics of tomorrow's clinical leaders is "being a team player as well as a team leader" [4]. Good team leaders value the opinions of others, and display respectful communication, acknowledging the strengths and ideas of others [4]. Yet if some team members in the group are less confident, capable or willing, a 'directing' or 'coaching' approach may be appropriate [15, 21]. For example, 'directing' will be appropriate in their future workplace context, such as during patient treatment and management during a medical emergency.

A collective leadership style is essential to support excellence in patient care [22]. Our findings align with literature emphasising the importance of cultivating clinical leaders with qualities that include clear and concise communication; the sharing of disciplinary knowledge and willingness to learn from others; collaborative interprofessional practice, whereby team members are encouraged to contribute, and support input from the patient; and active contribution from all team members towards the task and team discussion [4]. A recent systematic review by Sfantou and colleagues (2017) identified a correlation between effective leadership and patient outcomes, finding that effective leadership fosters a high-quality work environment leading to positive patient outcomes, while failure to create a quality workplace ultimately harms patients [23].

While some attempts have been made within the university sector to embed leadership in health professional

curricula, there is an identified need for explicit training and development in this area [24]. Rather than being taught informally, skills such as communication and teamwork should be identified as leadership competencies and reinforced throughout a vertically integrated, interprofessional curricula. Steps could be taken to make leadership behaviours more explicit in practice, by creating an awareness of the importance of leadership and how their work environment (and clinical placement) is influenced by good leadership. Leadership in team settings should be specifically identified, trained, rewarded, and encouraged at all levels of a health professional students' degree.

West et al. (2015) suggest longitudinal leadership development is essential, noting shared and collaborative leadership to be the most effective [22]. Our results indicate that while most students contributed effectively to team goals, they may benefit from training in leadership skills. Furthermore, there is an identified need to promote consistency in leadership training approaches across health professional degrees [25]. Although concerns surround the place of leadership training within crowded healthcare curricula [26], our study suggests that interprofessional learning activities provide an opportunity to frame and embed leadership skills training, practice and assessment for a range of health professional degrees. Interprofessional team learning is increasingly used as a teaching and learning method in health professions education [27]. The interprofessional setting provides the opportunity for faculty to meaningfully address the topic of leadership both in university and clinical practice settings.

Importantly, given the high number of student feedback comments regarded as unconstructive, training in how to provide feedback will likely assist in the growth of students' leadership skills. A recent study on peer review using a specific rubric to assess the quality of medical student peer feedback during a team exercise highlighted the need for training in this area. Common breaches in professional feedback included 'cutting and pasting', as well as banal feedback [28]. This study found that while students were comfortable identifying positive learning behaviours of their peers, they were less able to identify needs for improvement (gap) and detail a plan for improvement (action) [28].

Limitations

To our knowledge, this study is one of the first qualitative studies to explore the leadership qualities of health professional students identified by team members during a large scale interprofessional learning activity. Findings of this study may not be generalisable to other educational settings.

Conclusion

Leadership involves influencing team members in a process towards achievement of a common goal [14]. Effective leadership is a complex and highly valued component of clinical practice, where changes in healthcare systems occur rapidly. Our study shows that although most students demonstrated a reasonable ability to display leadership behaviours appropriate to teamwork, further development is needed through training. Leadership skills are an expectation of health professional graduates, and should be explicitly taught and vertically integrated within interprofessional education curricula. Further research is warranted in how students contribute to and understand the requirements of leadership within interprofessional teams.

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Authors' contribution
CvD conceptualised the study, analysed the data, drafted and reviewed the manuscript. SL and CR contributed to analysing the data and reviewing the manuscript. All authors agreed on the final version of the manuscript.

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Availability of data and materials
Datasets supporting the conclusions of this article are included within the article. Additional data at the level of individual students is not available as per confidentiality agreements approved by the Human Research Ethics Committee, University of Sydney.

Declarations

Ethics approval and consent to participate
The University of Sydney Human Research Ethics Committee approved the study. Written informed consent for participation was obtained from participants to enable us to include their data from this study. All methods were carried out in accordance with relevant guidelines and regulations. The study was performed in accordance with the Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests
Authors Christie van Diggele and Stuart Lane declare that they have no competing interests. Author Chris Roberts is a member of the editorial board for BMC Medical Education. He had no editorial role in the review process of this manuscript.

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Publisher's Note

CHAPTER 5:

Student Interprofessional Facilitator Training (SIFT) program

5.1. Introduction:

In the previous studies we identified the need for students to further develop and practice their skills in leadership and teamwork. There was also a recognised shortage of interprofessional facilitators within our University. Therefore in 2021, I led the development of the Student Interprofessional Facilitator Training (SIFT) program to allow students already trained in peer teaching, to strengthen and practice their leadership and teaching skills in interprofessional contexts.

The SIFT program consisted of five modules, 1) Introduction, 2) Interprofessional education, 3) Leadership in health professions education, 4) Practical requirements and facilitation activity, and 5) Critical reflection task. Formative assessment and feedback on students' teaching skills formed an important component of this work. To achieve this, we developed and utilised Entrustable Professional Activities (EPAs), as they provide a useful tool to establish objective levels of performance and supervision required for each facilitation competency (ten Cate, 2013). Thirteen senior students from medicine, nursing, diagnostic radiography, medical imaging, dentistry and speech pathology completed the program.

Due to the social and contextually situated nature of the program, we selected communities of practice as the theoretical lens (Lave & Wenger, 1991). As described by Lave and Wenger (1991), the theoretical notion of communities of practice views learning as a social activity,

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with participation being the key source of engagement and learning. This theory is characterised by the three elements of joint enterprise, mutual engagement and shared repertoire.

This study aimed to pilot the newly established SIFT program to answer the following research questions:

'As peer teachers, how competent are students in facilitating small group interprofessional activities?' and

'How do students perceive leadership roles as peer teachers?'

5.2. Summary

Thirteen students participated in the SIFT program. Twelve students (92%) participated in individual semi-structured in-depth interviews, to gain an understanding of their perspective of the activity. Thematic analysis was used to code and categorise the data in themes. Assessment data were analysed using descriptive statistics. Our findings indicated that students valued the formal nature of the SIFT program and recognition of teaching as a learned skill. Students reported an increased awareness of the roles of other health professions and an increased understanding of leadership. The use of Entrustable Professional Activities (EPAs) provided a suitable method to document and record students' level of competency attainment during observational teaching task, with most students needing minimal input from their supervisors. Students reported the program provided the opportunity to develop proficiency in leadership skills needed for future clinical practice.

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The SIFT program provided a sustainable framework for health professional students to develop evidence of their teaching and leadership skills in an interprofessional context.

The findings from this study resulted in the following publication which forms the content of this chapter:

> *van Diggele, C., Lane, S. & Roberts, C. (2022). Student Interprofessional Facilitator Training (SIFT) program: building capacity in clinical education leadership. BMC Medical Education 22, 665. https://doi.org/10.1186/s12909-022-03725-9*

5.3. Linkage to the next chapter

Now that we had a greater understanding of the student experience in these IPE activities, we sought faculty insight and feedback on the newly established IPE curriculum. This led to staff interviews on the implementation of the new curriculum which is discussed in the next chapter of this thesis, 'Faculty Perception of IPE'.

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RESEARCH Open Access

Leadership behaviours in interprofessional student teamwork

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Abstract

Background: Effective leaders support high-quality patient care and improve patient safety by embodying a collective leadership style. Training in leadership skills needs to be integrated longitudinally throughout a clinician's career. Models of leadership drawn from organisational theories can provide a conceptual framework for cultivating student leadership qualities during teamwork and the evaluation of emergent outcomes. Using the conceptual framework of Situational Leadership Theory, we sought to explore the leadership qualities identified by students of their team members, during a large scale interprofessional learning activity.

Methods: In 2018, 1674 students from 11 health disciplines were required to participate in the "Health Collaboration Challenge" (HCC). The HCC required students to work in small interprofessional teams of five or six students. Following team activities, students were required to provide constructive written feedback to their team members. Peer feedback data were coded and categorised into themes using the conceptual framework of Situational Leadership Theory. Data were then quantified within each theme.

Results: A total of 1282 comments were analysed. The most frequent comments related to 'delegating' (456/1282, 36%) and 'supporting' (402/1282, 31%). This was followed by comments categorised as 'directing' (244/1282, 19%), and 'coaching' (180/1282, 14%) leadership styles. Notably, a total of 1112/2597 (43%) of comments were unconstructive. A total of 298 comments provided by students informed their peers of areas for self-improvement. The most frequent comments were recommendations relating to 'active team member contribution' (111/298; 37%), followed by 'communication' (83/298; 28%), 'interprofessional practice' (77/298; 26%), and 'disciplinary knowledge' (27/298; 9%).

Conclusion: Although most students demonstrated a reasonable ability to display leadership behaviours appropriate to teamwork, further development is needed through training. Leadership skills are an expectation of health professional graduates, and should be explicitly taught and vertically integrated within interprofessional education curricula. Further research is warranted in how students contribute to and understand the requirements of leadership within interprofessional teams.

Keywords: Interprofessional, Leadership, Teamwork, Health professions, Education, Peer review

Introduction

The impact of COVID-19 exposed existing vulnerabilities within healthcare systems and highlighted the need for educational systems to prepare students for an era of rapid change and constant evolution as new models of care arise [1]. Collaboration within and between health service delivery teams enables accomplishment of common goals to improve patient safety and quality of care [2–5]. High-quality patient care is supported by embodying a collective leadership style [6, 7]. However, there is a shortage of emerging leaders moving into leadership roles, and expectations that

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a large number of experienced clinicians will retire in the near future [6, 8, 9]. A recent review of health professional leadership programs found notable gaps in the integration of non-physicians with physicians, and limited interactive learning and feedback [10].

Leadership has had a major influence in shaping organisational culture, however, little attention has been paid to the systematic preparation of health professional students as leaders in the various levels of healthcare delivery [6]. It is important to consider how the cultivation of leadership skills can be nurtured and supported within the interprofessional education setting [4, 6, 11, 12]. There is a gap in empirical research exploring the contexts and activities that promote leadership development in interprofessional settings, and how students give and receive peer feedback around leadership qualities. An opportunity to explore these issues arose in the context of a large scale interprofessional learning activity at an Australian university.

Organisational theories assist in understanding student team function and leadership within an educational context. Leadership is socially constructed, and there are many different leadership models [13]. One theoretical perspective suitable for examining team function behaviours in relation to large scale interprofessional activities is Situational Leadership Theory. This theory proposes that leadership is contextual and influenced by situational factors. It suggests that a leader must adjust the degree to which they direct or support their subordinates based on context [14]. Individuals should adapt their leadership style based on the skills of their team members, catering to situational demands [15]. Situational leadership requires individuals to be flexible, assess the situation and adopt a leadership style that best fits the needs of team members. It is based on two key behavioural characteristics: task behaviour (the extent to which responsibilities are assigned); and relational behaviour (the depth to which communication is extended). Situational Leadership Theory posits that there are four styles of leadership [15]: (1) Directing, characterised by 'high task and low relationship' behaviours; (2) Delegating, characterised by 'low relationship and low task' behaviours; (3) Supporting, characterised by 'high relationship and low task' behaviours; and (4) Coaching, characterised by 'high task and high relationship' behaviours.

Using Situational Leadership Theory, we sought to explore the leadership qualities identified by students of their team members, during a large scale interprofessional learning activity. Our research question was: What leadership qualities do health professional students display in an interprofessional team setting when working on a shared task?

Methods

Participants

In 2018, 1674 students from 11 health disciplines were required to participate in the "Health Collaboration Challenge" (HCC), which has been previously described [16]. Students were from 11 disciplines: Dentistry, Diagnostic radiography, Dietetics, Exercise physiology, Medicine, Nursing, Occupational therapy, Oral health, Pharmacy, Physiotherapy, and Speech pathology.

Research context

The HCC required students to work in small interprofessional teams of five or six students, each consisting of four or more disciplines. Students completed three team activities based on the review of a complex patient case: (1) develop a one-page patient management plan, (2) produce a five-minute video demonstrating case management, and (3) provide a peer review for two other team videos. The activities were student-led and involved meeting in their assigned teams for a pre-assigned one-day session, with the requirement of completing all components over a six-day period. The tasks were assessable and written feedback was provided to student teams on their performance.

Peer review activity

Following completion of the three team activities, students were required to provide written feedback to their own team members, based on their team contributions. The peer review was designed to promote professional behaviours within teams and to develop skills in feedback. Students were required to complete the peer review using the online tool Sparkplus [17]. This tool supports group work by enabling students to self review and peer review via a website, promoting collaborative learning. They were required to:

- Self-assess their own contributions to the activity. Nine statements were provided, and students were required to respond, using a Likert scale of 1 to 5 (1 = strongly disagree; 5 = strongly agree).
- Rate all team members on their contributions to the activity, using the same scale.
- Provide constructive written feedback to at least two team members of their choice on their contributions to the activity. It was noted that feedback should be honest and constructive. An example of

peer feedback was provided to students. The feedback was anonymous.

Study design

Data collection and analysis

The focus of this study was on the qualitative (written) feedback provided by students during the peer review activity. Framework analysis was used to code and categorise the data into themes using the conceptual framework of Situational Leadership Theory [18]. All researchers (CvD, SL, CR) participated in an initial calibration exercise where each researcher independently coded and categorised the same 50 instances of students' peer review comments. Researchers met to discuss any discrepancies in their coding. The first author (CvD) then coded the remaining data into themes. The researchers then quantified the data to show the prevalence of each theme [19]. Feedback of 15 words or less was categorised as being insufficient for analysis. Comments that were cut and pasted were considered unconstructive, so were excluded from data analysis. Data were categorised by the four themes of Situational Leadership Theory:

- *Directing*: is characterised by 'high task and low relationship' behaviours. The leader makes decisions and allocates tasks to members, with limited feedback provided to team members. Communication is limited and focused on task or goal achievement.
- *Delegating*: is characterised by 'low relationship and low task' behaviour. The leader facilitates decision making by the team, giving team members responsibility for their own tasks. The leader refrains from intervening unless needed, and communication takes place only when required.
- *Supporting*: is characterised by 'high relationship and low task' behaviours. Team members are supported by the leader who encourages communication and feedback, with less of a focus being placed on the tasks themselves.
- *Coaching*: is characterised by 'high task and high relationship' behaviours. Contribution is encouraged from team members in a cooperative and democratic manner. The leader role models, encouraging communication and feedback. Sometimes knowledge and skills are shared between team members.

During the secondary analysis, the researchers recognised patterns in relation to students providing their peers with suggestions for improvement in future practice. These comments were analysed and coded thematically within descriptive categories. The comments within each category were then quantified. Four themes were used to categorise the data:

- *Communication*: Communication with the team needed to be clearer, conscience, or students needed to 'speak up' more.
- *Disciplinary knowledge*: A student's own sharing of disciplinary knowledge was limited, or they did not know much about the other disciplines they were working with.
- *Interprofessional practice*: Students needed to listen to others, work collaboratively with team members or allow for input from the patient/client.
- *Active team member contributions*: Students needed to be more active team members, contributing more to the task or have more confidence in being actively involved.

Ethics approval

The University of Sydney Human Research Ethics Committee approved the study (Project number: 2015/556).

Results

A total of 2597 comments were submitted by students and ranged in length from 1- 212 words per comment. Of these, 1112/2597 (43%) comments were excluded from the study due to being unconstructive comments that consisted of 15 words or less, or duplicate comments that were cut and pasted to multiple team members. Of the remaining 1282 comments coded, the most frequent comments related to the theme of 'delegating' (456/1282, 36%), and 'supporting' (402/1282, 31%). This was followed by comments categorised as 'directing' (244/1282, 19%), and 'coaching' (180/1282, 14%). These comments were categorised into four themes and presented in Table 1.

A total of 298 comments provided by students informed their peers of areas for self-improvement. These comments were grouped into four themes and are summarised in Table 2. The most frequent comments related to recommendations relating to 'active team member contribution' (111/298; 37%), followed by 'communication' (83/298; 28%), 'interprofessional practice' (77/298; 26%), and 'disciplinary knowledge' (27/298; 9%).

Discussion

We sought to explore the leadership qualities and styles identified by students during a large scale, small team interprofessional learning activity, using Situational Leadership Theory as a conceptual framework [15]. The

Table 1 SIFT module outline

Module	Outcomes	Activities
Module 1: **Introduction to the SIFT program** Completed asynchronous, approx. 30 min Theoretical content and discussion board via Canvas	This module provides the opportunity for participants to: • Understand the layout and requirements of the program • Revise content delivered in the PTT program	Students meet individually with the co-ordinator to explain program requirements and individual student aims/goals
Module 2: **Interprofessional Education** Completed asynchronous, approx. 1 h Theoretical content and activity-based discussion board via Canvas	This module provides the opportunity for participants to: • Prepare for interprofessional learning activities • Evaluate the needs for interprofessional facilitation • Consider the benefits and challenges of implementing and facilitating interprofessional activities	Provision of theory and online discussion boards • Activity 1 (discussion board): Facilitating interprofessional education
Module 3: **Leadership in health professions education** Completed asynchronously, approx. 1 h Theoretical content and activity-based discussion board via Canvas	This module provides the opportunity for participants to: • Identify the differences between leadership and management • Describe the meaning and difference between 'transactional' and 'transformational' leadership • Describe the concept of 'distributed leadership' and the roles within successful teams • Evaluate key leadership competencies for health professional educators • Recognise the challenges health education leaders may encounter	Provision of theory and online discussion boards • Activity 1 (discussion board): Characteristics of leadership • Activity 2 (discussion board): Organisational leadership
Module 4: **Practical requirements and facilitation activity** Delivered synchronously with individual students and the coordinator via a meeting and email communication. Approx 20 min Followed by the synchronous practical assessment and feedback session. Approx. 2 h	This module provides the opportunity for participants to: • Identify the interprofessional learning session of interest for facilitation • Facilitate a small group teaching session (with supervision and feedback) • Discuss requirements with coordinator and complete any preparatory material or training	• Meet with the SIFT coordinator and select an activity. The coordinator explains the facilitation requirements and discusses any training needs related to the selected activity • Students complete the practical facilitation requirements e.g. small group teaching of the Peer Teacher Training program • Students facilitate and receive verbal feedback from their observer • Observer completes EPA rubric based on teaching performance and provides verbal feedback to participants at the end of the session
Module 5: **Critical reflective task** Completed asynchronously with reflective task submitted via Canvas assignments Followed by a meeting with coordinator and student for feedback and setting future goals Approx 1 h	This module provides the opportunity for participants to: • Reflect on their learning, facilitation experience, and future teaching goals • Gain personalised feedback on their facilitation session and written task	• Students complete a 500-word critical reflective essay based on their facilitation experience. Key concepts covered include (identification, subjective, objective, assessment, future planning comments) • Students attend a verbal feedback session with the co-ordinator to review their reflection and EPA rubric feedback from practical session, and discuss future goals and teaching opportunities available to them

- Demonstrated an ability to facilitate team discussion
- Provided the learner with guidance on the activity as required
- Showed consideration for multiple viewpoints of different healthcare students
- Provided learners with the opportunity to ask questions
- Supported and encouraged team interaction and involvement
- Responses to questions were appropriate, with referrals to senior staff where required

Using EPA ratings adapted from Rekman et al., 2016, each student was rated in one of the four categories based on their performance [28]:

1. "I needed to facilitate". The SIFT student required a lot of guidance or was unprepared for the session.
2. "I talked them through it". The SIFT student was able to perform some tasks but required repeated directions.
3. "I had little input". The SIFT student demonstrated independence and only required intermittent prompting.
4. "I only supervised". The SIFT student functioned independently and only needed assistance with nuances or complex situations.

Descriptive statistics were used to analyse quantitative data. Thematic analysis of the comments provided by the supervisors was performed by all authors (CvD, CR, SL) to determine prevalent themes [27].

Ethics approval

The University of Sydney Human Research Ethics Committee approved the study, protocol number 2021/057.

Results

In total, 16/74 (22%) of the available pool of students registered for the SIFT program in 2021, and 13/16 (81%) of these students completed the program. Students were from 6 disciplines: Medicine ($n=6$, 46%), Nursing ($n=2$, 15%), Diagnostic Radiography ($n=2$, 15%), Medical Imaging ($n=1$, 8%), Dentistry ($n=1$, 8%), and Speech Pathology ($n=1$, 8%).

Semi-structured Interviews

In total, 12/13 (92%) of students attended the individual semi-structured interviews. Of these participants, 6 were male and 6 were female. Extracts from the student interview data are presented in Tables 2, 3 and 4 to answer the first research question, "How do students perceive their experience of participating in the Student Interprofessional Facilitator Training (SIFT) program, and their future clinical teaching and leadership roles?".

Table 2 illustrates the sub-theme of joint enterprise. Participants found it valuable to have a formal way to engage in teaching, with those with a mutual interest. They found the preparation material clear with a manageable workload, particularly since it could be completed asynchronously. They felt the course provided opportunities to develop proficiency in leadership skills relevant to their future roles as peer teachers at university and clinical educators in the workforce.

Table 3 illustrates the subtheme of mutual engagement. Students highlighted the importance of learning interprofessional skills relevant to their future careers. They valued engaging in the online discussion boards to gain an understanding of the roles of other health professionals. They would appreciate future opportunities to network, collaborate and again put theory into practice in an interprofessional context, ideally in a face-to-face setting.

Table 4 illustrates the subtheme of shared repertoire. Students found the structured framework gave them the tools needed for teaching in the workplace across disciplines. They emphasised the need to develop an understanding of how other health professions communicate. Students felt the experience provided in the small group sessions mirrored experiences found in the workplace, where multiple professions meet to discuss patients/clients. The certificate provided was viewed as useful in demonstrating competency in leadership, interprofessional communication and teaching skills when seeking career advancement and as part of their degree portfolios.

Assessment of student competencies

In total, 12 of the 13 SIFT participants consented to their formative assessment data being used in the study. In order to address our second research question, "How competent are students to facilitate and teach their interprofessional peers?", the rating of students across each of the EPA descriptors were analysed. Students displayed a reasonable level of competence in most competencies, with the supervisor required to 'have little input' or 'only supervise'. Within the competency of "Responses to questions were appropriate with referrals to senior staff where required", one student needed guidance from the supervisor ('I talked them through it').

Qualitative feedback provided to SIFT students by the small group facilitators (clinical and academic staff) displayed a good balance of positive feedback and suggestions for improvement. Positive feedback emphasised the provision of clear instructions and introductions at the start of the session; the creation of a supportive and friendly environment; adaptability; adherence to

Table 2 Themes relating to "Joint Enterprise" (a shared domain of interest and a desire for proficiency)

Themes relating to "Joint Enterprise"	Examples of comments provided by students
Students appreciated the provision of theory and preparation provided prior to the actual facilitation activity	*I really enjoyed it… …I liked how there were learning modules before we actually took part in a practical session. (Dentistry student)* *I also found Module 2 on leadership really interesting, about transactional and transformational leadership. This knowledge will definitely shape how I view my experiences in future clinical settings and how I behave as a future clinical professional. (Medical student)*
The modules were clear and the workload was manageable. It could be worked through asynchronously without interrupting clinical placements	*I found that it was really easy to follow. So, you have some clear modules, you had clear things that you needed to do and I liked that you could work through them at your own pace. (Radiography student)* *The program was really good. I liked that it is self-directed, that you can do it at your own pace. That was really helpful, especially when it is alongside the Masters course, which is quite intense. So it is good the onus is on us to do our own learning at our own pace, but the end goal and expectations are still there… (Nursing student)* *A good thing about it is that with my requirements to study in medicine and to cover a lot of theory on a daily basis and study, I didn't feel the program was content heavy, it was very doable, in a good amount of hours and it gave me a foundation for me to build on.. …without interrupting my education, or my daily number of hours of studying, or my placement. It was very doable. (Medical student)*
Students felt it was valuable to have a way to formally engage in teaching & teacher training	*I want to be more involved in teaching as I go through the healthcare system – and it is one thing you never get taught. They always say there are two things you are never taught. You will become a manger, but you are never taught how to manage people and as a doctor, and you are never really taught how to teach people. The same complaints you get from lecturers and faculty – you are rewarded for research, not for teaching. (Medical student)* *It is nice to have something to formally engage in teaching. (Medical student)*
Students valued developing feedback skills	*The thing that really interests me the most is about giving feedback. That part was covered during the modules but also helped me to apply that knowledge or apply that theory in the practical sessions… which develop these techniques of what works for me in giving feedback, the certain words to use, the way a phrase might be taken on my reflection to others, it just it helps me perfect that small skill, but it has a huge impact for my experience or for my career at least. (Medical student)*
Provided an opportunity to develop leadership skills, and consider themselves as role models and reflect on how they will practice in the future	*I found the overall SIFT program very informative… it gave me an opportunity to really develop all of my leadership skills, but also it had a practical component that helped me facilitate that. (Speech pathology student)* *With the leadership module…. the literature and also the discussion threads on people's experiences with transformational and transactional leadership…that was really interesting…learning about that definitely makes me reflect on how I would want to practice as a clinician in my career. And my relationships with other people, how like my actions can have a positive impact on other people in terms of inspiring them and being a role model. Role modelling is really important as you progress through your career because in health care, you're always training younger professionals. That's how they learn and how you learn at a point and so in that sense transformational leadership is good to know about so that when you're at that position you can be better to the next generation. (Radiography student)*
Students were motivated to participate in the program because they had a desire to improve their skills in teaching based on their own learning experiences	*What made me interested in this program specifically is that I spent a lot of time in clinical placements and engaging with mentors and supervisors and also engaging with students in the more junior years and I realised how important teaching and giving feedback is and how it can make a huge difference in someone's experience on a daily basis. I saw the SIFT program as a great opportunity not only for me right now but also for the future years, just like the little moments of giving feedback, on the job on a daily basis, I thought this program would be extremely helpful to that and so far, I've already seen good results. (Medical student)*
Peer teaching was considered a valuable method to improve one's own knowledge and skills	*I will be teaching in the future. Peer teaching is so useful. You can't teach something if you don't know it yourself – just like studying for an exam, you are learning off each other. (Nursing student)* *…a valuable opportunity that was well run and I received valuable insight into my performance. (Medical student)*

Table 3 Themes relating to "Mutual Engagement" (joint activities that promote collaboration and the development of learning relationship)

Themes relating to "Mutual Engagement"	Examples of comments provided by students
Highlighted the importance of learning interprofessional skills early on, and relevance for future career	*The peer teaching training program was really useful… this was a natural step up from that—as you do these programs you kind of realise the significance of interprofessional collaboration and education. This program was useful… as you progress more in your career these sorts of skills are really useful to have. And if you're good at it from when you're a young clinician, that will make you a better clinician as you progress through your career. (Radiography student)*
Valued the discussion boards within the modules to gain an understanding of the experience of others, and reflect on their own	*I really liked how there was all of the discussion boards. It forced me to really reflect on my own experiences and also look at other people's experiences, and learn from them as well. (Speech pathology student)*
Students would appreciate future networking and teaching opportunities, including face-to-face opportunities	*I definitely enjoyed this program so if there are other opportunities that arise I'd definitely love to partake in them and meet new people. In this program and the PTT there was always interesting people and their discipline. (Radiography student)* *It makes those events more fun when you meet someone new and they're from an interesting discipline. Networking in terms of.. you met people within your own profession, that would also be important networking and it would be more important the further up you are in your career. (Radiography student)* *It would be so much better if it was actually face-to-face and there was a bit more collaboration. Hopefully after the lockdown we will have the opportunity to do that. (Speech pathology student)*
While some students felt comfortable teaching within the PTT as they were familiar with it, others would prefer a variety of teaching experiences	*I wish that for the practical component we were given different situations. Just because I took part in the Peer teacher training program already, and I just felt that when I was facilitating it, yes it was from a different angle, but I have already experienced it. So, I was just hoping if there were more opportunities in the future to facilitate activities in other settings. (Dentistry student)* *It would have been great if we had more practical experiences because I really enjoyed putting all of the theory into practical knowledge. And because it was the first time that I did facilitate a training session, I would love to do more in the future just to develop all of my skills. (Speech pathology student)*
Students felt the interprofessional aspect was relevant to their future work practice	*The SIFT program was super relevant because I'm a nursing student so almost everything I do is going to be interprofessional. (Nursing student)* *I feel like it was really relevant, not only to speech pathology but also across all other disciplines because it really teaches you how to work interprofessionally which is such an important skill out in the workforce, and we don't actually have anything in our separate disciplines that actually teaches that to you. So I'm really happy that I actually enrolled in this. (Speech pathology student)*

timeframes; provision of feedback and appropriate use of questioning; and provision of a clear summary and conclusion to the session. Areas for suggested improvement included taking more time for introductions; the need to listen to students as a facilitator, rather than dominating peer student presentations; provision of a clear plan; and time management skills.

Discussion

We sought to explore participant perceptions of a new Student Interprofessional Facilitator Training (SIFT) program, the level of competency developed, and the contextual factors that influenced student learning outcomes. Our findings suggest that the process of engagement throughout the SIFT program had many associated benefits. These included: increased recognition of teaching as a learned skill, development of clinician identity formation as educators, development of interprofessional communication skills, increased awareness of the roles of other health professions, and an increased understanding of leadership. Participants expressed a desire for additional opportunities for interprofessional networking and peer teaching. A good level of competence in facilitation skills was reached by participants. Our findings, however, highlight the importance of opportunities for practice, direct observation, formative assessment and individualised feedback. These findings are further explored in relation to existing literature using the conceptual lens of communities of practice.

Joint enterprise

The SIFT program could be viewed as a joint enterprise in formally preparing students as peer teachers and future clinical educators. The SIFT program provided a shared domain of interest, facilitated by the structured, modular, self-directed format, with clear instructions, and an appropriate amount of content. This allowed students to work through the modules asynchronously,

Table 4 Themes relating to "Shared Repertoire" (the promotion of shared language, resources, concepts, experiences, and tools used and developed through interactions)

Themes relating to "Shared Repertoire"	Examples of comments provided by students
Students appreciated being able to use the structured frameworks provided	*It's just giving us a structured framework…towards what we should actually do when we are facilitating a group, especially one with people from different health backgrounds. (Dentistry student)* *The structure of facilitating is really good in high stress or time poor situations to have a structure to go back to is really useful. (Nursing student)*
Students valued the briefing session provided immediately before the teaching session	*We had our five minute briefing session before the session that it was really clear what was going on and what we were required to do. I think it was lucky that I was able to facilitate the PTT program, so that is something that I did last year, so I was familiar with it as well. (Nursing student)*
Interprofessional aspects highlighted the importance of understanding the knowledge and role of different health professions, and learning how to interact and foster teamwork	*Once we are in the workforce we need to deal with people from different health backgrounds everyday so it's really important that we understand that. You know I'm from a dentistry background and not everyone thinks that teeth are important. There are nurses and doctors, they may prioritise other things and it's important to not only know how the knowledge of different fields are different, but also….the way that you interact with people and get that point across. (Dentistry student)* *How to foster better teamwork, between people of different disciplines I think is quite important. (Dentistry student)*
Participants appreciated learning different perspectives of healthcare from others, which mirrors workplace experiences	*We have different people from different specialities discussing health care topic—the exact same thing that we have in actual hospital placements where we have multiple different people joining into a meeting—coming in with different perspectives, about healthcare topics. It's very important to see where everyone is coming from and be open minded to not always think that my perspective or my opinion is always right. That sort of helped me to pause and realise this and make sure that I apply this on the job itself. Just taking these few minutes to actually listen to other people with different opinions and different perspectives on maybe a topic that I thought I would understand really well, but seeing somebody else's perspective adds to your experience and your knowledge. I definitely think it's quite reflective of the actual experience in real life working with other specialities. (Medical student)*
Students appreciated receiving a certificate that demonstrates interprofessional involvement and development of leadership and facilitation skills	*The certificate was definitely useful because I can include it in my portfolio and also for future job prospects, I can demonstrate that I was involved in a program where I was working interprofessionally and I know all about leadership and how to facilitate good leadership. (Speech pathology student)* *I will use the certificate in the future. I want to keep doing SIFT and make sure that whoever I am teaching gets the most out of it. And to have the certification because it is quite difficult to show people in an interview in a hospital. The supervisor needs to be able to judge that you have been engaged in improving your teaching skills rather than someone who just wants to. (Medical student)* *What I gain from the program will be helpful in my career, but my certificate is something that I can also talk about in future interviews or in future job applications. Having these skills will definitely add to my profile when I'm applying for future jobs. I'm sure employees are looking for someone with these skills in the future. (Medical student)* *I will be starting an intern job and part of the duties of an intern is to teach. So having those skills will be very important on the job. (Medical student)*

alongside their busy health curricula schedules. Small group activities assist in creating a process where shared decision-making is fostered by students interacting, collaborating and listening to each other [29, 30]. This also helps communication to become more open and collaborative, with an appreciation of the diversity of knowledge within the group [31].

Notably, students felt completion of the leadership module helped them to identify and increase their awareness of leadership styles they currently witness in the workplace, and characteristics they would like to emulate in their future careers as role models. Although rarely taught within undergraduate health professional training, effective leadership in healthcare education is increasingly recognised as essential to achieving high standards of education, research and clinical practice [32, 33]. Students valued the opportunity to develop their knowledge and skills in teaching. However, they recognised that teaching is commonly viewed as not being rewarded in the health professional workforce. It is important that institutions foster students' desire for lifelong learning,

where teaching skills are continually refined, and that systems exist to shape a teaching culture [34, 35]

Encouragingly, student comments indicate that their experience was enhanced through the use of EPAs, and a clear rubric that defined the requirements to demonstrate competency. They appreciated the targeted feedback, with a dedicated time for provision of both written and verbal feedback from supervisors. This is in line with recent literature demonstrating that the use of EPAs in the clinical setting has been shown to enhance student feedback when delivered by a trustworthy supervisor in a safe environment, immediately following an observed activity, and highlighting both strengths and points for improvement [18, 36]. While assessment results demonstrate that students were reasonably competent to facilitate small group sessions with their peers, this also emphasises the need for adequate supervision, assessment, and feedback while students develop their teaching capabilities, prior to carrying out unsupervised teaching tasks.

Mutual engagement

Our findings highlight the need for opportunities for students to practice facilitation on a variety of topics within interprofessional contexts to develop relevant practical teaching experience. This is supported by evidence that in order to reinforce learned skills, multiple opportunities for practice need to be made available [37]. Students appreciated the flexibility that the online SIFT program brought but expressed a preference for face-to-face opportunities. While online activities have the capacity to increase flexibility, greater enjoyment and increased development of skills is known to occur through face-to-face activities [37, 38]. Furthermore, it is well recognised that face-to-face interactions play an important role in developing relationships with peers and teachers and networking opportunities [39]. Certainly, students expressed a desire to network and collaborate as alumni of the SIFT program. A willingness of network members to share their knowledge is key to success of interprofessional programs [40]. Social relationships help support development of health professionals' identity as teachers [5], and it will be important to build on this network.

Motivation, institutional support and effective networks all contribute to the development of professional identity [13]. Students mentioned altruistic reasons for participating in the SIFT program, such as helping with the sustainability of the PTT and other interprofessional programs, and to help ensure the quality of teaching for other students. The certificate of completion was also identified as important by students, as it was regarded as a valuable means to enrich their portfolio for future job applications. That is, evidencing not only their commitment to training in teaching, but also demonstrating interprofessional and leadership skills. For some students, it was their own good and poor experiences as learners that motivated them to participate in the SIFT program. This teaching activity also helped to reinforce knowledge of their own healthcare learning topics, and motivated them to review topics. In situated learning, the context has a strong influence on what learning is taking place through interaction, co-participation and interaction with others. As noted by Sargeant (2009), both of these elements are also essential elements of IPE [41]. Building on this, the community of practice created through the SIFT program, with individual preparation and small group activities, helped students to work together, and collaboratively create their new knowledge and skills [41].

Shared repertoire

Literature suggests that early experience of IPE helps to enhance students' readiness for further interprofessional learning and their attitudes to multidisciplinary teamwork [42, 43]. Through interprofessional activities conducted in the SIFT program, students shared their disciplinary knowledge with each other, with the content being simultaneously relevant to learning needs across disciplines. The activities were viewed by students as mirroring activities that occur in the workplace, such as interdisciplinary meetings. However, it is possible that the interprofessional value of the activity was reduced due to the lack of face-to-face interaction [40]. Participants appreciated facilitation by various health professionals, helping to build social capital across disciplines [44]. The presence of role models, mentors, the academic environment and training provided all contribute to the development of professional identity [13, 45–48].

Students recognised the importance of interprofessional activities and teaching skills development during their university education. They felt this was reinforced with the theory provided in the modules, as well as the opportunities for practice as facilitators. The learning frameworks and models provided common tools that allowed students to feel well prepared before practice. The practical activities helped to foster their skills in teamwork and communication with other disciplines—skills that are not otherwise explicitly taught in their healthcare curricula. Achievement of an education-focused health professional workforce is reliant on long-term faculty development programs that provide informal experiences in group settings, and are well supported by institutes [9] Although there are many challenges to conducting interprofessional learning activities,

it provides a promising pedagogical tool for preparing students for collaborative practice in the workplace [49].

Limitations

Our study is the first of its kind to explore the professional development pathways of student interprofessional educators. Although the SIFT program participants were recruited on a voluntary basis, the 12 interviews had sufficient information and depth to demonstrate the uniqueness of their views, through their shared experience of the SIFT program). With these caveats, our results may be of value to interprofessional educators in other contexts and settings seeking to adapt the principles to provide their own pathways to capacity building in student interprofessional clinical teaching. This study also highlighted the important role of observation, assessment and feedback in student educator training programs.

Conclusion

Our findings indicate that the SIFT program provided a sustainable framework for health professional students to develop and evidence their teaching and leadership skills in an interprofessional context. This study also highlighted the important role of observation, assessment and feedback in student teacher training programs. The process of clear assessment guidelines, direct observation with feedback from trusted supervisors provided a way to ensure the quality improvement of peer teaching and skill development that can be taken into the workforce. The SIFT program not only provides opportunities for health professional students to develop skills in leadership and interprofessional facilitation, but in addition, will help to build capacity of interprofessional programs where large numbers of teachers are required for small group teaching. The next step will be to ensure a variety of opportunities in various interprofessional contexts for both SIFT alumni and newcomers, and to renew face-to-face engagement post-Covid.

Abbreviations

EPA: Entrustable Professional Activity; IPE: Interprofessional Education; PTT: Peer Teacher Training; SIFT: Student Interprofessional Facilitator Training.

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Authors' contributions

CVD designed the study, collected the data, analysed the data, drafted and revised the manuscript. CR and SL contributed to data analysis and revised the manuscript. All authors agreed on the final version of the manuscript.

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Availability of data and materials

Datasets supporting the conclusions of this article are included within the article. Additional data at the level of individual participant is not available as per confidentiality agreements approved by the Human Research Ethics Committee, University of Sydney.

Declarations

Ethics approval and consent to participate

The University of Sydney Human Research Ethics Committee approved the study, protocol number 2021/057. Written informed consent for participation was obtained from participants to enable us to include their data from this study. The study was performed in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests. Author Chris Roberts is a member of the editorial board member for BMC Medical Education. He had no editorial role in the review process of this manuscript.

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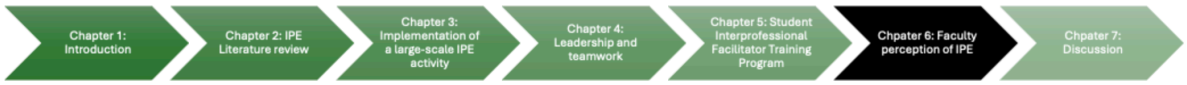
Publisher's Note

CHAPTER 6:

Faculty perception of IPE



6.1. Introduction

Although student perception and engagement in IPE had largely been the focus of my research, how faculty respond and engage with IPE initiatives are important factors. Recognising that the sustainability and success of the IPE curriculum is dependent upon faculty 'buy in', the next phase of the project was to consider their perception. Failure to properly prepare faculty for their IPE roles and responsibilities can provide a barrier to the success of IPE (Cuff et al., 2014). It was important to consider if new initiatives targeted both individual and organisational goals to create opportunities for collaborative learning and practice among faculty. This would provide a holistic picture of the associated challenges and enablers to specifically inform successful administration and delivery of IPE curriculum models.

The conceptual lens chosen was social capital theory (Hean et al., 2003). Social capital theory has been used previously to describe the gains and challenges of student participants within interprofessional activities (Hean et al., 2003), however, less has been reported in relation to faculty involvement in IPE. The three dimensions of social capital theory include, 1) structural, 2) cognitive and 3) relational.

Our research question was:

> *'What are faculty perceptions of a newly established IPE curriculum, and the enablers and barriers to successful implementation?'*

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6.2. Summary

Faculty (n=11) from the health professional disciplines of nursing, medical imaging, pharmacy, oral health, dentistry, applied science, health science, dietetics, medical science and occupational therapy, participated in individual interviews reflecting on faculty engagement with the IPE curriculum. Framework analysis was used to categorise data into the three themes of social capital theory (Gale et al., 2013).

Most faculty were positive about the new curriculum, with an increased feeling of connectedness and appreciation for the scaffolded approach to interprofessional learning. However, they did perceive inequities in workload distribution. Faculty acknowledged that at times a more pragmatic approach to IPE was needed, with less emphasis on a pedagogically informed approach. There was an identified need for further faculty training and engagement in the development of interprofessional activites. This was particularly evident with the remaining misconception regarding the integrated approach to curriculum design.

The findings from this study resulted in the following publication which forms the content of this chapter:

> *van Diggele, C., Roberts, C., Bloomfield, J., & Lane, S. (2024). Interprofessional Learning: building social capital among faculty, are we there yet? Focus on Health Professional Education, 25(1). https://doi.org/10.11157/fohpe.v25i1.716*

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FOCUS ON HEALTH PROFESSIONAL EDUCATION

INTERPROFESSIONAL EDUCATION

Interprofessional education: Building social capital among faculty. Are we there yet?

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Abstract

Introduction: Interprofessional education (IPE) is advocated by governments, health professional bodies and universities as key to health professional education and improvement in patient safety. Although many universities have implemented scaffolded IPE curricular models across multiple disciplines, few have reported on faculty perception of this approach. This study sought to explore faculty perception in response to a new IPE curriculum model using the theoretical lens of social capital theory.

Methods: In 2021, 24 key University of Sydney Faculty of Medicine and Health (FMH) academics (from nursing, medical imaging, pharmacy, oral health, dentistry, applied science, health science, dietetics, medical science and occupational therapy) involved in the delivery of IPE were invited to participate in individual interviews. Using the conceptual lens of social capital theory, framework analysis was used to categorise themes in the data.

Results: In total, 46% (n = 11) of invited FMH faculty were interviewed. Positive elements to the implementation of the curriculum model included a feeling of connectedness, recognition of a scaffolded approach to IPE integrated in existing coursework and growing interest of early career academics in IPE. However, a number of challenges were revealed, including structural barriers in course design, timetabling, misunderstanding regarding the IPE curricula and inequity in distribution of workload.

Conclusion: Social capital theory provided a useful framework to consider the perceived enablers and barriers to the newly established IPE curriculum. Although the findings indicate that faculty felt positive about implementing the IPE curriculum, a number of barriers were identified, highlighting the need for increased faculty training and broader engagement in development of IPE curricula.

Keywords: interprofessional education; social capital; curriculum; faculty

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Introduction

Interprofessional education (IPE) is defined by the World Health Organisation (2010) as occurring "when two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes" (p. 13). To varying extents, IPE is advocated by governments, healthcare regulators and universities as key to health professional education and improvement in patient safety and care (Steven et al., 2017; Thistlethwaite et al., 2019). The inclusion of interprofessional experiences within university health professional education activities contributes to improving students' collaboration, communication and leadership skills in preparation for entering the healthcare workforce (Brock et al., 2013; Dalton et al., 2007, Reeves et al., 2013; Reeves et al., 2017). Another strong driver to implement IPE is the requirement from health professional regulators that students learn to work collaboratively in healthcare teams. A recent review of governance models for quality assurance discussed the "need to achieve greater alignment between the academic and health service governing systems", suggesting an integrated governance structure to improve the link between education and practice (O'Keefe et al., 2020, p. 1148).

Effective education and training in interprofessional education is required to ensure a "collaborative practice-ready health workforce" (Khalili et al., 2019, p. 19) capable of optimising the individual skills within healthcare teams, sharing case management and providing improved health outcomes (Global Forum on Innovation in Health Professional Education, Board on Global Health, & Institute of Medicine, 2013; Khalili et al., 2014; Khalili et al., 2019). Although the importance of developing skills for effective collaboration is widely accepted, it is too often that the first time health professionals work together is as new graduates (Lawlis et al., 2014; Mladenovic & Tilden, 2017; Reeves et al., 2017). This is largely due to the complexities of universities delivering IPE. Widely reported barriers include the logistical issues and timetabling associated with IPE activities (Curran et al., 2015; Evans et al., 2019) and the preference of individuals to work within their established silos (Horsburgh et al., 2001; Keshtkaren et al., 2014; Salamonson et al., 2009).

The design of student-centred learning activities with content that is simultaneously relevant to multiple health professions and suitable for large-scale implementation is critical to success (Bloomfield et al., 2021; Burgess & McGregor, 2022). Additionally, how faculty respond and engage with IPE initiatives is an important factor. A failure to properly prepare faculty for their IPE roles and responsibilities has been cited as a significant barrier to the success of IPE (Cuff et al., 2014). Initiatives that target both individual and organisational change assist in breaking down these barriers to IPE by creating opportunities for collaborative learning and practice (Cuff et al., 2014; Hinderer et al., 2016; Steinert, 2005). Such initiatives are deliverable in varying formats, such as regular meetings, facilitation guides, role modelling and formal training (Acquavita et al., 2014; Bogossian et al., 2023; Di Prospero & Bhimji-Hewitt, 2011). In a recent study

collecting data on the current state of IPE within higher education globally, Khalili and colleagues (2022) reported that less than half of the responding universities provide dedicated faculty training and development in IPE.

While internationally, higher education institutes are increasingly supportive of IPE activities, there is an identified need for further reporting regarding the associated challenges and enablers, to specifically inform successful administration of IPE curriculum models (Bogossian et al., 2023; Lee et al., 2019). Given this research gap, we sought to explore faculties' perceptions of strategies and academic engagement in the implementation of IPE curricula at a large Australian university. Using the theoretical framework of social capital theory, our primary research questions were:

1. What are faculty perceptions of a newly established interprofessional learning curriculum?
2. What are perceived enablers and barriers to successful implementation of the interprofessional learning curriculum?

Conceptual lens

Social capital theory is one of the many sociocultural learning theories that views social interactions as key to learning (Hean et al., 2003). Social capital has been described as "a collective asset in the form of shared norms, values, beliefs, trust, networks, social relations, and institutions that facilitate cooperation and collective action for mutual benefits" (Bhandari & Yasunobu, 2009, p. 408). First developed by Bourdieu (1986), the concept of social capital has been adapted and built on by various sociologists (Bhandari & Yasunobu, 2009). The conceptual lens of social capital has been used previously to describe the gains and challenges of student network participants within interprofessional activities (Hean et al., 2003). However, less has been reported on how faculty perceive student and faculty involvement in IPE activities.

Building on theory development by Nahapiet and Ghoshal (1997), Lee and colleagues (2019) suggest that the lens of social capital theory can also be used to identify, understand and overcome the barriers to IPE. They note that in the context of faculty development, social capital consists of not only the network but also the assets that are mobilised within that network, which are characterised by three key dimensions: structural, cognitive and relational (Lee et al., 2019). These dimensions, although separate in nature, do have similar descriptions that are interdependent and interrelate with each other.

Structural: This dimension explores the communication, roles, rules and procedures within the organisation (Claridge, 2018). It focuses on the interactions and relationships among individuals within the network (Nahapiet & Ghoshal, 1997, 1998; Lee et al., 2019). In the IPE context, this encompasses the tools, knowledge and skills available within IPE activities (Wheeler et al., 2019).

Cognitive: This dimension is centred on the formation of shared goals, values and beliefs and is linked to the enablement of shared understandings and the reduction of misunderstandings (Nahapiet & Ghoshal, 1997, 1998; Lee et al., 2019). Within an IPE context, this involves norms and rules (unspoken values) and expectations for faculty to prepare and engage in IPE.

Relational: This dimension is shaped by trust and reliability, influenced by the trustworthiness and reliability of individuals (Lee et al., 2019; Nahapiet & Ghoshal, 1997, 1998). A sense of trust is developed when faculty feel they are part of an IPE community that has shared goals (Hean et al., 2003). Trust builds between faculty through their interactions and underpins the willingness of network members to engage and assist others and the expectation that individual efforts will be reciprocated (Wasko & Faraj, 2005).

Methods

Study context

This study took place at The University of Sydney, Faculty of Medicine and Health (FMH), Australia. Although IPE activities have been implemented since the late 1990s, in 2017, the FMH IPE strategy was developed and an IPE leadership team formed, as outlined below.

IPE strategy: The long-term aim of the strategy is to scaffold IPE activities and assessments for all health professional students in each year of their degree program and to graduate health professional students capable of delivering high-quality, collaborative, patient-centred care.

IPE leadership: Current funding provides one part-time (0.2) academic and one full-time administrative coordinator. Overseen by the associate dean, education, FMH, this team is responsible for the delivery, curriculum development, faculty development and maintenance of student records for IPE across FMH. Two key groups are involved in decision making about interprofessional learning within the faculty. The "advisory group", with representation from heads of school, is responsible for the strategic oversight of IPE and the "community of practice", with membership open across university schools and local health districts. A representative from each FMH school is encouraged to attend and act as a liaison with the schools.

IPE faculty: All FMH faculty are welcome to participate in IPE activities. Approximately one to two representatives from each school attend the once monthly IPE meetings. Training in general IPE facilitation is provided once a semester, and activity-specific training is offered 2 weeks prior to each activity. Unit of study coordinators are responsible for embedding IPE activities within their unit of study coursework.

IPE activities: Each year, approximately 5,000 healthcare students engage in IPE activities organised by the IPE team. Students are from across six schools (Medicine, Dentistry, Nursing, Health Sciences, Pharmacy and Medical Sciences) and 13 disciplines (medicine,

dentistry, oral health, nursing, pharmacy, physiotherapy, medical imaging, medical sciences, speech pathology, dietetics, occupational therapy, exercise physiology and applied sciences). Most IPE activities are large scale, involving between 650 to 2,500 students. Examples of key activities are presented in Table 1. All activities implemented by the IPE team are accredited to an "IPE ePassport" system that is longitudinal, spanning each student's degree. The IPE ePassport acts as a comprehensive learner record (CLR), allowing students to capture, collate and communicate their interprofessional achievements.

Data collection and analysis

In October 2021, key faculty (n = 24) from each discipline across the FMH involved in the delivery and facilitation of two or more IPE activities were selected and invited to attend individual interviews. A semi-structured interview guide was used. Interviews were conducted at the end of the academic year, with questions providing the opportunity for faculty to reflect on the implementation of IPE curricula activities and faculty engagement. The individual interviews were conducted by the first author, who is an experienced educationalist and researcher trained in the facilitation of interviews. Interview questions centred on current perceptions of past and current IPE curricula activities, approaches to implementation and the support provided, the benefits of IPE activities for staff and students, and ideas of what could further assist in improving the current IPE model.

Framework analysis was undertaken using a 6-step model (Gale et al., 2013):

1) Using verbatim transcripts of the interviews, the researchers familiarised themselves with the data.
2) Initial codes were developed.
3) A working analytical framework was generated by the researchers using the pre-determined themes of social capital theory (Lee et al., 2019), which included sub-themes developed in Phase 2.
4) Data were re-analysed, with the removal of irrelevant sub-themes and agreement of sub-themes from the researchers.
5) Theme and sub-theme definitions were written, agreed and recorded.
6) Data were charted into the framework matrix by the first author and reviewed by all researchers.

Ethics approval was gained from The University of Sydney Human Research Ethics Committee (approval project number: 2018/830). Written consent was provided by each research participant. The study was performed in accordance with the Declaration of Helsinki.

Table 1

IPE Activities at the Time of the Study (2021), Implemented on an Annual Basis by the IPE Team

Name of Activity	Activity Outcomes	Year of Students	Disciplines Involved	Number of Students	Format/Description and Faculty Involvement
IPE introductory workshop	At the end of this workshop, students will be able to: • describe the characteristics of an effective team • reflect on the challenges of establishing an effective team • understand the role of interprofessional teamwork for collaborative healthcare • demonstrate an awareness of how to communicate effectively in a healthcare environment • demonstrate an awareness of the different roles of team members in healthcare.	Year 1	Diagnostic radiography, occupational therapy, physiotherapy, speech pathology, exercise physiology, pharmacy, medicine, dentistry, oral health, dietetics, health sciences	2,547	Students work in interprofessional teams of 5–6 students online via three workstations to develop students' understanding of role identification, effective communication and teamwork. The activities were purposely developed to promote collaborative practice from an early stage in a student's degree. **Faculty** Academic team of five lead the activity. Facilitator training is provided (1 hour). Facilitator guide and running sheet are provided. Approximately 60 facilitators are involved in hosting workshops.
Health collaboration challenge (HCC)	At the end of this activity, students will be able to: • understand the contribution of a range of different health professions to meet complex patient care needs • integrate and prioritise key contributions from different health professions into a patient management plan • apply a collaborative approach to problem solving with different health professions for a challenging creative task.	Years 2 & 3	Nursing, medicine, pharmacy, diagnostic radiography, dietetics, occupational therapy, speech pathology, physiotherapy, exercise physiology, dentistry, oral health, medical sciences	1,697	Students are allocated to interprofessional teams of 5–6 students and collaborate to develop a 7-minute video and one page written management plan based on a complex patient case. Students then peer review two video submissions and complete an intra-team peer review on their peers' contribution and effort. **Faculty** Academic team of two leads the project, which is reviewed at committee level. Facilitator marking guide is provided with no formal training. Approximately 15 staff are involved in grading assignments.

Name of Activity	Activity Outcomes	Year of Students	Disciplines Involved	Number of Students	Format/Description and Faculty Involvement
Medication safety workshop	At the end of these activities, students from medicine, pharmacy and nursing should be able to: • demonstrate an understanding of the contribution of effective interprofessional teamwork for patient medication safety • construct an understanding of the roles of the different health disciplines in the context of the medication safety • apply effective communication skills within the interprofessional team to work collaboratively • record individual and shared decision making regarding medications using a simulated electronic medical record (e.g., discussion board) • develop a safe and effective prescription as an interprofessional team.	Medicine and nursing (Year 2), pharmacy (Year 4)	Medicine, nursing, pharmacy	654	This activity is delivered asynchronously and recapitulates the system-based approach used by medical practitioners, pharmacists and nurses. Students work through each of the steps within the medication management cycle when prescribing medicines to patients. **Faculty** Academic team of six leads the project. Facilitator training and meetings are provided (approximately 3 hours). Facilitator guide and running sheet are provided. Approximately 8 facilitators are involved in hosting workshops.
Interprofessional communication education (ICE) workshop	The workshop included five learning objectives as outlined below: • Demonstrate an understanding of the contribution of effective interprofessional teamwork for patient safety. • Develop a comprehensive interprofessional transition of care team plan. • Apply effective communication skills within the interprofessional team to work collaboratively. • Identify patient safety priorities within the context of the transition of care. • Construct an understanding of the roles of the different health disciplines in the context of the transition of care.	Year 1	Pharmacy, medicine and nursing	736	A two-part workshop that focuses on communication and the development of a joint transition of care plan. **Faculty** Academic team of six leads the project. Facilitator training is provided (approximately 1 hour). Facilitator guide and running sheet are provided. Approximately 15 facilitators are involved in hosting workshops.

Name of Activity	Activity Outcomes	Year of Students	Disciplines Involved	Number of Students	Format/Description and Faculty Involvement
Patient safety workshop: Understanding and learning from errors	By the end of the workshop, students will be able to: • understand the nature of error within healthcare • understand the ways to learn from error to improve patient safety • explain the terms error, violation, near miss and hindsight bias • demonstrate the use of "graded assertiveness".	Senior students	Medicine, nursing, pharmacy, oral health, dentistry	751	The content of the patient safety workshop is based the World Health Organisation Patient Safety Curriculum Guide Multi-Professional Edition. A team-based learning format is used. Both online only and blended learning formats have been used. Large classes of 150 students, with small group activities in groups of 5 to 6. **Faculty** Academic team of three leads the project. Facilitator training is provided (approximately 1 hour). Facilitator guide and running sheet are provided. Approximately 12 facilitators are involved in hosting workshops.
Peer teacher training program	This program provides students with the opportunity to: • develop the teaching and assessment skills required for health professional students to participate in teaching and assessment programs • develop the skills required of health professional students to provide effective feedback to peers and future colleagues • recognise opportunities for teaching and learning within clinical settings and contribute to the knowledge and skill development of others • participate in interprofessional learning and team collaboration that can be applied to professional practice.	Senior students	All health disciplines	March: 74 July: 42 Total: 116	The peer teacher training program is designed to provide health professional students with opportunities to develop skills in teaching, assessment and feedback. Both online only and blended-learning formats have been used. Participants are provided with theoretical background and opportunities to apply new knowledge and concepts. Delivered asynchronously and synchronously to large classes of 50–100, with small group activities of 4 to 6 students. **Faculty** One academic leads the project. Facilitator training is provided (approximately 10 minutes). Facilitator guides, marking rubrics and running sheets are provided. Approximately 8 facilitators are involved in hosting workshops.

Results

In total, 11/24 (46%) of invited FMH faculty attended an individual interview. Of those interviewed, two were male and nine were female. They were from the disciplines of nursing (n = 1), medical imaging (n = 2), pharmacy (n = 1), oral health (n = 1), dentistry (n = 1), applied science (n = 1), health science (n = 1), dietetics (n = 1), medical science (n = 1) and occupational therapy (n = 1). Interview data from the interviews are presented within three tables using the conceptual framework of social capital theory focused on the structural, cognitive and relational dimensions.

Structural dimension

The theme of "structural" dimension is illustrated in Table 2. Faculty appreciated the central coordination of IPE in allowing growth and connection between departments. There was also a reduced feeling in being "siloed" within disciplines. Faculty reported the need for showcasing and promoting IPE to encourage participation. They also expressed a desire to engage with junior staff and encourage further faculty development in IPE. One faculty member commented, "Staff are starting to get interested. We've had some more junior staff come on board and wanted to do the training, but then you know, we do send out … voluntary [registration]" (Participant 2).

Table 2

*Faculty (Interviewee) Perceptions That Relate to the "Structural" Dimension**

Sub-theme	Comments
The centralised coordination of IPE has supported growth and connection	*We are improving … it's driven centrally by the Faculty of Medicine and Health, and I think it has connected … (previously holding) a one-off event. … Students were finding it hard to understand where it fits in* (Participant 2). *I believe that the university have* [sic] *done a really good job in mapping out now a process of IPL across curricula* (Participant 3). *I think the … communication and working with the staff seem to be very well organised and, you know, everyone seems to know where they needed to be at any stage of the process* (Participant 9).
A reduced feeling of being "siloed" in schools	*We've been very siloed and on merging of [the] faculty … we have … really good opportunities to make that much more seamless so that the students get to really work with others* (Participant 4). *I think there is scope. I tried this year, but I got to know who's who in the faculty, and I look forward to more interdisciplinary interaction among staff as well* (Participant 7).
IPE needs to be showcased and promoted to encourage participation	*I haven't seen anything this year about showcasing these amazing interprofessional projects. And I think, … promoting [it] gets the staff really enthused about the whole process. We do have some really enthusiastic staff. We could do it across more disciplines and with more involvement* (Participant 8). *More marketing. Bring it out there, so that staff are aware. Yes, so that we can encourage more involvement, I guess, yeah* (Participant 7).

Sub-theme	Comments
Faculty development in IPE is needed, with engagement of junior staff	*We should be providing staff with options for doing workshops … lectures or a seminar series or things like that, where we can actually learn from each other* (Participant 5). *Staff that are starting to get interested, we've had some more junior staff come on board and wanted to do the training, but then you know we do send out … voluntary [registration]* (Participant 2).

* The "structural" dimension explores the communication, roles, rules and procedures within the organisation (Claridge, 2018) whilst also focusing on trust and expectations through network interactions (Lee et al., 2019).

Cognitive dimension

The theme of "cognitive" dimension is illustrated in Table 3. Faculty demonstrated an appreciation for the scaffolded curriculum and viewed this as beneficial to staff and students. Some participants did not understand that IPE was embedded within the various health professional education curricula. Timetabling was acknowledged as a concern due to the number of students, and there was a perception that increased forward planning would improve this. Faculty also reported they were starting to feel fatigued and wanted to "spread the load". One member of faculty commented, "You know, [you ask for] assistance and sometimes you don't get a great response in people coming on board, so as with anything you have champions, who do a lot of the work" (Participant 4).

Table 3

*Faculty (Interviewee) Perceptions That Relate to the "Cognitive" Dimension**

Sub-theme	Comments
A scaffolded approach was seen as beneficial to embed IPE in curriculum and to build on students' knowledge	*[We have] used scaffolding to do that through first, second, third and fourth year of students, in both postgraduate and undergraduate courses. … The scaffolded activities is [*sic*] a great way of embedding interprofessional learning into the curriculum* (Participant 4). *We're looking at a more scaffolded approach, where we start from first semester, then build on in second semester. So having a really big activity in first semester for health students is really important, starts to get them thinking* (Participant 2).
Faculty involved in IPE are starting to feel fatigued, feel they would ideally "spread the load"	*It's the same staff, so I think there needs to be ways to engage the wider university for interprofessional activities. For interdisciplinary education to occur, you need greater involvement of staff, and … people don't even realise the possibilities of interprofessional collaboration and how that could occur* (Participant 4). *I felt a bit of fatigue at the last meeting I attended, … it's just the same people again and again and, … I thought we could spread the load. … It is a small, small group of the usual suspects* (Participant 6).
It was perceived by some faculty that IPE is not embedded in the curricula but rather as an "add on"	*It might say something in the curriculum, but it's not actually embedded and then the study coordinators aren't all on board with it, and I think that that can be very difficult* (Participant 10). *I really felt it was a bolt on. You know it's … not embedded in the curricula. There's investment in it … but … it's done as an add on* (Participant 1).

Sub-theme	Comments
Continued concerns about timetabling difficulties and feel forward planning would assist in resolving issues	*We need to collaborate on our timetabling; so you know, pharmacy are about to start a new curriculum, but the first thing we should do is to embed or print into that that cannot be sort of moved* (Participant 3). *To timetable students … if you want a number of different disciplines in a particular activity … [with] 600 students, it makes it very difficult to timetable* (Participant 2).

* The "cognitive" dimension centres on the formation of shared goals and values, enabling shared understanding of the knowledge and tools available to individuals (Lee et al., 2019).

Relational dimension

The theme of "relational" dimension is presented in Table 4. Faculty appreciated the contributions that IPE "champions" from each discipline made in ensuring the continuity of disciplinary involvement. IPE was perceived as causing increased workload for unit of study coordinators. Faculty felt that IPE should be seen as "everybody's business". To support involvement of individuals, they would like the added workload of IPE acknowledged. Faculty also noted that a dedicated team of professional and academic staff are needed to ensure sustainability of IPE. One faculty member commented, "There needs to be more staff in there, supporting the activities. I think one person alone is not enough, especially when we're doing large scale activities" (Participant 2).

Table 4

*Faculty (Interviewee) Perceptions That Relate to the "Relational" Dimension**

Sub-theme	Comments
Appreciation for the role that disciplinary representatives play in maintaining disciplinary involvement in IPE through the community of practice	*What I'm saying is the people making it happen, made it happen! Because you know [name] is our IPL person, like, I often I assume he has it all under control, so I will liaise with him as well, making sure things are happening* (Participant 3). *The champions of interprofessional education in the disciplines have been able to connect them [students and faculty] together and certainly we're starting to see some growth"* (Participant 2).
More staff should be involved in IPE, and it should be seen as "everybody's business"	*I'd like to, to actually see … more staff working interprofessionally. Everybody should be involved in much more* (Participant 5). *I think there's a core group of people who are really passionate to keep it going, but it's not being seen as everybody's business* (Participant 11).
There is a continued need for dedicated IPE professional and academic staff to support the implementation of IPE	*There needs to be more staff in there, supporting the activities. I think one person alone is not enough, especially when we're doing large scale activities* (Participant 2). *You really need champions to make this happen, like it's not something that you can just leave 100% up to a unit of study coordinator. Like it sort of needs to be above that position because they change, but you really need the IPL team* (Participant 3).

Sub-theme	Comments
IPE is seen as additional work by unit of study coordinators, so may not be the appropriate target audience for engagement	*Sometimes IPL is seen as a nice add on but not always integral. The unit of study coordinators … look at it and go, 'Oh, this is too much work. I've got enough work on my plate. I don't want to know anything about it', and I think we do deal with that* (Participant 11). *Some unit of study coordinators that say yes, it can go into my unit, but they won't put their hand up to support the sessions … That's a problem for us moving forward, because we need to get more people on board and seeing the relevance of it* (Participant 2).
There is a recognition of the need for acknowledgement of workload hours for developing, teaching and participating in IPE activities Relational: recognition of group members accomplishments.	*As far as I can see, you don't have allocated workload to it [IPE]. So there's … not going to get [allocated] teaching hours in there, which means you're basically operating off goodwill, which is one of those structural barriers* (Participant 1). *I think that there should be an allocation of time. … It takes a lot of time for development and coordination. I think that we need to acknowledge the academic staff that are involved. You know, it is, it is a big commitment for them, and there's also a lot of advisory meetings and team meetings* (Participant 4).

* The "relational" dimension focuses on the trustworthiness and reliability of individuals. This theme examines the leadership, opportunities for participation and recognition of accomplishments (Lee et al., 2019).

Discussion

Using social capital theory as a conceptual lens (Lee et al., 2019), we sought to explore faculty perceptions of IPE curricula, strategies and implementation, including the enablers and barriers. A number of positive elements were identified, including a sense that IPE activities and engagement were expanding, utilisation of a scaffolded approach that could be integrated into existing coursework, growing interest of early career health professional academics in IPE and a range of engaging activities built around relevant patient cases. However, a number of challenges were also identified, such as timetabling across disciplines with large student numbers, structural barriers in course design and the equity of workload distribution among faculty. Additionally, faculty demonstrated a lack of understanding regarding the extent to which IPE activities have been embedded in the curriculum and scaffolded throughout student degrees. Due to the interlinked nature of the three dimensions of social capital theory, key findings have been discussed as topics of exploration rather than dimensional themes.

Social relationships and interactions that occur between network members assist in the development of trust, communication and setting of expectations (George et al., 2014; Mohaupt et al., 2012; Nahapiet & Ghoshal, 1997). Within the context of IPE, network members are reliant on each other to contribute to the planning, preparation, implementation, facilitation, assessment and evaluation of various large-scale IPE activities. Encouragingly, our results suggest an increased awareness of the relevance of IPE, with faculty reporting that the centralised coordination from the dedicated IPE staff and structures provided clearer communication and a sense of connectedness. Faculty reported a reduced feeling of being siloed within their own discipline and looked forward to more interdisciplinary interaction between staff. Lee et al. (2019) report that

frequent opportunities to socialise and discuss IPE and common interests enable shared understanding and values, strengthening the structural dimension.

A recent review of Australia's health workforce identified experiences of isolation and disconnection from large educator groups involved with IPE at national, local and university level (COAG Health Council, 2017). As noted by Lee and colleagues (2019), engaging suitable community members in IPE is critical to success. Encouraging participation from all career levels assists growth, innovation and sustainability (Buja et al., 2013; Cooke et al., 2003; Irby et al., 2004; LaMantia et al., 2010; Searle et al., 2010). Furthermore, building strong networks and interprofessional collaborations will reduce competition for resources between projects and enable the sharing of best practice.

Within our study, many educators were unaware of how colleagues in different disciplines were engaged in IPE activities. This may have a profound impact on any potential for network formation (COAG Health Council, 2017), as networks are characterised by a shared understanding of common goals and values, with efforts to minimise misunderstandings (Lee et al., 2019; Nahapiet & Ghoshal, 1998). As evidenced by our findings, it cannot always be assumed that all faculty are aware of all IPE activities and the various contexts in which they are offered. Some faculty perceived IPE as existing as "one-off" activities rather than integrated as regular activities embedded within curricula, highlighting the need for faculty development and training in IPE.

Training in IPE facilitation through both formal and informal learning and engagement has previously been identified as essential to success (Li, 2007; Steven et al., 2017). This may entail workshops, seminar series, courses and development workshops and involvement in meetings (Li, 2007; Steven et al., 2017). Likewise, there are associated benefits of showcasing IPE innovations and achievements. This could be in the form of faculty newsletters, conferences, webinars or faculty events.

Shared resources, such as knowledge, skills, equipment and time, contribute to the success of networks (Hean et al., 2012; Lee et al., 2019). This is of particular importance in IPE, since activities are often large-scale, involving multiple courses and disciplines (Burgess & McGregor, 2022). Encouragingly, faculty felt that IPE activities were starting to build on each other. However, timetabling was reported as being an area of concern for unit of study coordinators, with it often being difficult to timetable for such large student numbers. Staff felt forward planning through the development of new school curricula would be beneficial in overcoming this obstacle. Indeed, the complexities of IPE mean that decisions around timetabling in large-scale IPE activities are often determined by pragmatic and logistical demands rather than pedagogical reasoning (Reeves et al., 2017).

There is a lack of any national approach to the governance of IPE and often a lack of local governance (Thistlethwaite et al., 2019). Implications of this include fragmentation in practice, poor structures and frameworks, and reduced capacity for IPE implementation (Thistlethwaite et al., 2019). As noted by faculty, a challenge of IPE is ensuring equal

input from all faculty and from different disciplines, including the acknowledgement of the additional workload associated with implementing and teaching in IPE programs. This becomes particularly important for large-scale IPE activities involving up to 2,500 students, which require multiple facilitators.

Faculty appreciated the role that disciplinary representatives played at advisory group and community of practice meetings, as they worked collaboratively and helped to make IPE "happen". There was a strong feeling that IPE was not seen as "everybody's business", with a limited number of core IPE "champions" leading the way. This is not uncommon in universities, with a deficit of IPE champions acknowledged as a key challenge in engaging faculty in IPE (Khalili et al., 2022). However, participants noted that a greater number of dedicated IPE staff should be involved in the planning of IPE activities and that additional administrative support is needed. A recent systematic review of IPE activities highlighted the excessive administrative time required for planning and implementation (Burgess & McGregor, 2022). Challenges include the equal distribution of students from various disciplines, additional cost burdens, alignment of training level and development of patient cases that engage all disciplines (Burgess & McGregor, 2022; Chan et al., 2017). A willingness of individuals to assist each other during teamwork activities is required for IPE to flourish (Hean et al., 2003).

By participating in IPE, faculty learn to build their own social capital by investing in the network and associated activities. The quality of social capital is influenced by the quality of the relationships formed by those undertaking the activity (Hean et al., 2012). It is possible that a negative bias towards IPE has been created by the burden of workload, hence, limiting the associated benefits. Building an equal distribution of workload and a reward system (for example, as part of performance appraisal) will encourage teamwork practice among faculty, which may be transferrable to future collaborations across disciplines in the workplace.

Limitations and future research

The small sample size of faculty interviewed is not representative of all disciplines involved in IPE at the University and can, therefore, not be generalised to other disciplines. Findings of this study may not be generalisable to other university settings. Future research would be valuable in exploring how relational and structural networks contribute to faculty perceptions of IPE and its implementation. This would provide a more comprehensive understanding of social capital dynamics at play within the IPE context.

Conclusion

Using social capital theory as a theoretical framework, we have explored faculty perceptions of a newly established interprofessional learning curriculum at The University of Sydney. We identified a number of enablers and barriers to the successful implementation of IPE. There is a responsibility for excellence in IPE framework

development and implementation within university education to better prepare students for their graduate roles that will involve shared learning and interprofessional teams (Hammick et al., 2009). Social capital theory provided a useful framework to consider the perceived enablers and barriers to IPE and how organisational advantages may be created. Although faculty felt positively about implementing the IPE curriculum, they found inequities in IPE workload distribution. Additionally, many did not have a clear understanding of the extent to which IPE was scaffolded throughout degrees, indicating a need for additional faculty development opportunities specific to IPE. It will be important to cultivate social capital to strengthen and highlight the importance of interprofessional teamwork and faculty engagement in the development and endorsement of a shared IPE curricula.

Conflicts of interest and funding

The authors declare no conflicts of interest or funding was obtained for this study.

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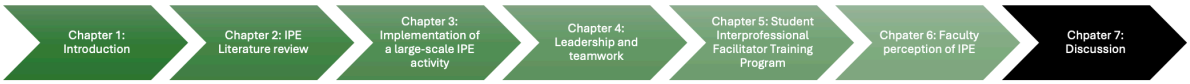
CHAPTER 7:

Discussion



7.1 Introduction

The aim of the study was to investigate health professional students' experience and engagement in interprofessional activities and faculty perception of a new IPE curriculum. The context of IPE reported in this thesis was within learning activities designed and implemented at the Faculty of Medicine and Health, The University of Sydney, Australia. There was a focus on two IPE activities: the large-scale Health Collaboration Challenge (HCC) and the small-scale Student Interprofessional Facilitator Training (SIFT) program. Aspects covered included student perception of the activities, the identified similarities between disciplines (Chapter 3), the concept of leadership and team function within interprofessional settings (Chapter 4), and students' development of professional skills as facilitators (Chapter 5). Additionally, there was a focus on faculty perception of a newly implemented IPE curriculum (Chapter 6).

Literature on the topic of IPE in higher education continues to expand in depth and breadth. This is due to the identified need for students to be better prepared on entering the healthcare workforce, where collaboration with interprofessional team members within increasingly complex healthcare systems is required (Thistlethwaite & Moran, 2010; Thistlethwaite et al., 2019; van Diggele et al., 2020). Various aspects of IPE have been studied in multiple contexts. The studies conducted for this thesis included both large and small-scale IPE activities involving multiple disciplines, conducted within a range of health professional degree programs at one university. This

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chapter reports the key significance of the findings, the challenges encountered, and the future directions of this work.

7.2 Significance of the findings

We found that both large and small-scale IPE activities provide a worthwhile and effective learning experience for students. Although large-scale interprofessional activities within an IPE curriculum that are consistent across health professional degrees at one university enables a unified approach (O'Keefe & Ward, 2018; Buring et al., 2009), we identified disciplinary differences between students' experiences and perceived learning outcomes.

Our study using Situational Leadership Theory (Northouse, 2011) to explore leadership qualities of students during teamwork activities highlighted the need for explicit training in leadership within the IPE curriculum (van Diggele et al., 2022b). Given the need to promote consistency in leadership training approaches across health professional curricula (Winters et al., 2022), and concerns regarding crowded healthcare program curricula (Hardy & Neve, 2019), the IPE curriculum provides the opportunity to frame and embed a consistent approach.

The small-scale IPE activity, where students voluntarily participated in a student interprofessional leadership and facilitator training program, emphasised the value of offering such programs, and the importance of direct observation, formative assessment and provision of feedback (van Diggele et al., 2022a). Utilising Entrustable Professional Activities (EPAs) as a way for students to demonstrate their teaching and

facilitation capabilities within the interprofessional context prior to participation as teachers has not been previously reported.

There is an identified need to build our understanding of the organisation of IPE curriculum models to help inform university practice (Bogossian et al., 2023; Lee et al., 2019). Using Social Capital Theory as a conceptual framework (Hean et al., 2003; Bhndari & Yasunobu, 2009) faculty's perception of the enablers and barriers to implementing the new IPE curriculum was investigated. Although faculty generally felt positive about the curriculum, two key barriers were identified: inequities in distribution of workload, and a lack of awareness and understanding of how IPE was embedded within curriculum and the extent to which it was scaffolded throughout degrees. The significance of findings is discussed below in relation to each study.

Implementation of a large-scale IPE activity

The successful implementation of the student-led Health Collaboration Challenge for 1674 students across 11 health disciplines highlights the feasibility of large-scale IPE activities during the early stages of university education. The provision of an effective large-scale learning experience for students from a range of disciplines was demonstrated (van Diggele et al., 2021). Students valued the opportunity to practice working in interprofessional teams, experience peer learning and collaboration, increase their understanding of disciplinary roles, network with other students across degree programs, practice communication skills, and gain the perspectives of other disciplines in patient management. Importantly, we identified the differences between

disciplines in student perceptions of IPE, and the reasons for areas of dissatisfaction experienced by some student groups.

Reported dissatisfaction was based around the patient case, the discipline mix within teams, the assessment task, and grading. A large number of students disliked the video task as a form of assessment. Twenty-one percent of students, predominantly from five disciplines (nursing, oral health, physiotherapy, occupational therapy and diagnostic radiography) noted inequities in the weighting of the assessment task across disciplines and programs. They felt this contributed to an imbalance of peer contributions to teamwork when completing the assessment tasks. Further contributing to dissatisfaction, some students needed to leave teamwork meetings early to attend scheduled classes within their discipline specific healthcare programs. Our findings support current literature stating that variations in academic and task requirements between disciplines may hamper the development of feasible assessments in IPE (Dunworth, 2007).

A large proportion of students (19%), predominantly from diagnostic radiography, speech pathology, dietetics, pharmacy and medicine, felt that the patient cases was not aligned with the roles and responsibilities of all team members. Notably, dentistry students found the task less challenging than other disciplines. Our findings reinforce previous reports that the design of IPE activities should be conducive to teamwork (Jorm et al., 2016; Thistlethwaite, 2019). There were perceived differences in contribution to the assignment due to lack of patient case suitability for some disciplines, such as diagnostic radiography and dentistry. There is a need for

consistency in the management and alignment of assessment tasks in large-scale activities involving multiple disciplines, to ensure fairness and transparency for students. Our results suggest that by reducing the number of disciplines included within each student team, it may be possible to increase the relevance of the patient case for each discipline, and increase their engagement with interprofessional teamwork. This would be logistically achievable by having closer curriculum alignment for each discipline, and grouping of students accordingly for teamwork activities.

Leadership and teamwork

Health professional graduates are expected to demonstrate leadership qualities within the workplace, yet little attention has been paid to the preparation of health professional students as leaders in IPE contexts (Matthews et al., 2018; Oates, 2012; Swanwick & McKimm, 2012; Till et al., 2020). Inconsistencies in student leadership programs are evident across health professions (Hardy & Neve, 2019; Winters et al., 2022). While we found that most students contributed effectively to interprofessional teamwork, our results indicated that some would benefit from training in leadership skill development. Although 'leadership' features as a core competency in the Canadian Interprofessional Health Collaborative framework (CIHC, 2010), it is less prominent in other popular frameworks, such as Interprofessional Education Collaborative Core Competency framework (IPEC, 2023).

Our research demonstrates that interprofessional activities such as the Health Collaboration Challenge, lend themselves to leadership development opportunities for students in multiple health degrees. Some students naturally display leadership

qualities when working in interprofessional student teams. Student peers were able to identify and value these leadership qualities in team settings. Additionally, given the large number of students providing unconstructive feedback, our study provides evidence that complements wider literature, in that students need explicit training in the provision of constructive peer feedback to team members (Burgess et al., 2021).

Student Interprofessional Facilitator Training (SIFT) program

The Student Interprofessional Facilitator Training (SIFT) program demonstrated a sustainable framework for health professional students to develop their teaching and leadership skills, and to evidence their competence within an interprofessional context (van Diggele et al., 2022a). While peer training programs are aplenty, there is a lack of interprofessional programs that incorporate feedback and assessment (Burgess & McGregor, 2018). The SIFT program allowed for targeted feedback from supervisors, that was timely in both verbal and written formats. Although participants demonstrated a good level of competence, assessment results highlighted the importance of observation, assessment and individualised qualitative feedback by academics and clinicians in student teacher training programs. The provision of clear assessment guidelines and direct observation and feedback from supervisors provided a way to ensure the quality improvement of peer teaching skills in preparation for the healthcare workforce. The study utilised Entrustable Professional Activities (EPAs) and demonstrated their suitability as a method of documenting and recording students' levels of competency attainment during observational teaching tasks.

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Provision of modules on leadership theory and teaching practice within the program were valued by students. They found the information useful in identifying characteristics of leaders they would like to emulate in the workplace. The development of a strong teacher identity early on in health professional studies may enhance a student's intention to further contribute to education and faculty development in future (van Lankveld et al., 2021). Our findings further supported this in that students indicated their intention to contribute as peer teachers and health professional educators once they graduate. The SIFT program provided a model to build capacity of interprofessional programs where large numbers of teachers are needed for small group teaching activities. This was the first study exploring the professional development pathways for students as interprofessional educators.

Faculty perception of IPE

With an identified need for further reporting of associated challenges and enablers of IPE curriculum administration (Bogossian et al., 2023; Lee et al., 2019), social capital theory provided a useful framework for analysing faculty's perspective of the implementation of a new interprofessional curriculum model (Lee et al., 2019). The centralised administration and organisational support of IPE was seen as beneficial to faculty, bringing a greater sense of connectedness with faculty from other disciplines, and an increased awareness of the importance of IPE. However, the inequity in workload distribution for individuals and a reliance on a small number of "IPE champions" was recognised as a key barrier to IPE implementation. A need to ensure greater engagement across disciplines and career levels was highlighted. Additionally,

faculty lacked understanding of the IPE curriculum, and how it was embedded within health professional programs in their own disciplines.

Our findings support wider literature recommending faculty's engagement in all phases of implementation of new curriculum, particularly one that is interprofessional and is embedded within multiple health profession degrees (Hean et al., 2012; Khalili et al, 2022; Khalili & Orchard 2020). There is a clear need for faculty development and cultivation of social capital to strengthen faculty engagement in the development and endorsement of a shared IPE curricula within university health professions education settings.

7.3 Problems encountered

Social distancing restrictions implemented because of the COVID-19 pandemic across 2020 to 2022 impacted the implementation of the SIFT program. The teaching activities undertaken as part of the practical activity needed to be implemented in synchronous, online format via Zoom, rather than 'in person' format which would have been optimal. This also limited the networking and social interaction students would normally encounter when programs are 'in person', having a potential impact on student experience.

Participation in the small-scale SIFT program was undertaken on a voluntary basis. Although a range of practical teaching activities could have been used for the practical component of the SIFT program, choices were restricted due to the disruption in the

delivery of the curriculum created by COVID-19, as only the Peer Teacher Training program could be used for the practical module. However, we considered that this activity complemented educational activities, and assisted in the development of professionalism attributes.

7.4 Future directions of the work

Initially, the focus of my research was around the learning experiences of students in large-scale IPE activities. However, as my studies progressed, I became increasingly interested in not only designing effective effective IPE activities, but also student leadership and teamwork development within interprofessional contexts. This later evolved and extended to include faculty engagement in the IPE curriculum.

Implementation of a large-scale IPE activity

While the large-scale Health Collaboration Challenge reported in Chapter 3 demonstrated an effective way to run IPE across a large number of disciplines and programs involving more than 1800 health professional students, it also highlighted a key area for future research. It remains unclear as to what is the optimal number of disciplines to include in student teamwork that is specific to a patient case. The feasibility and sustainability of large-scale IPE models also need further research. Investigating the cost and resource implications of such models would provide insight to the effectiveness of the investment from universities.

Leadership and teamwork

When reporting on how students identified leadership qualities of their peers, we found that it would be beneficial to integrate explicit training in leadership skills within the IPE curriculum. Further research is warranted in how students contribute to and understand the requirements of leadership within interprofessional teams. There would also be value in investigating the changes in student perceptions and abilities after attending clinical placements.

Student Interprofessional Facilitator Training (SIFT) program

As reported in Chapter 5, the benefits of the SIFT program were twofold. It provided an opportunity for students to develop and evidence their skills in teaching within the interprofessional context. It also provided a way to build teaching resources for future IPE activities where there is limited faculty engagement, and large student cohorts involved. It may be possible to carry out longitudinal studies to determine the impact of the SIFT program in terms of alumni engagement in IPE facilitation, and development as educators after entering the health professional workforce. Further research is needed to determine the specific peer facilitation, communication and leadership skills needed for interprofessional peer teaching. It also provided a unique opportunity, not elsewhere reported, to assess students on their ability in small group facilitation. However, broader exploration is needed in terms of continued engagement of alumni and expertise in comparison to faculty as facilitators.

Faculty perception of IPE

Despite the central coordination of a scaffolded IPE program, Chapter 6, reporting on faculty perception of the IPE curriculum highlighted a lack of understanding and educator engagement across disciplines. A constant theme was that IPE needs to be seen as "everybody's business", without the heavy reliance on individual "champions". Future studies in this area should focus on development of an IPE curriculum that improves sustainability with strategies to engage educators across all career levels and health disciplines within organisations. This need has also been highlighted by wider literature (Hean et al., 2012; Khalili et al., 2022; Khalili & Orchard, 2020). Future research exploring how relational and structural networks contribute to improving the status of the IPE curriculum and faculty engagement will provide a more comprehensive understanding of the social capital dynamics at play in these university contexts.

In conclusion, although there is a wealth of evidence that IPE is beneficial to student learning, ongoing research and evaluation is essential to improve a number of elements crucial to optimal IPE curriculum design and implementation. The cultivation of social capital for all stakeholders, including students and faculty is important to the future engagement and sustainability of IPE.

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Appendices:

Appendix 1: Additional publications completed during candidature

1.1 Mentorship in the health professions: a review

Faculty Development Review

Mentorship in the health professions: a review

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SUMMARY

Background: The importance of mentorship within health care training is well recognised. It offers a means to further enhance workforce performance and engagement, promote learning opportunities and encourage multidisciplinary collaboration. There are both career and life benefits associated with mentorship, and it is increasingly recognised as a bidirectional process that benefits both mentors and mentees. Recently, mentoring has been considered an essential step in professional and personal development, particularly in the field of health care.

Literature: This article provides a review of the recent literature to assist those considering the implementation of mentorship programmes within their institutions. Discussion includes topics relating to the key elements of effective mentorship, the various phases and styles of mentorship, the need for career-long mentoring, ethical issues and potential difficulties in mentorship.

Take-home message: Learning within the workplace includes the development of knowledge and skills, and an understanding of the values important to the profession and the culture of organisations. Within health care training, organisations may encompass hospitals, universities, training organisations and regulatory bodies. The practice of mentorship may help to foster an understanding of the enduring elements of practice within these organisations. Mentoring involves both a coaching and an educational role, requiring a generosity of time, empathy, a willingness to share knowledge and skills, and an enthusiasm for teaching and the success of others. Being mentored is believed to have an important influence on personal development, career guidance and career choice. Ethical issues and potential difficulties in mentorship include conflict of interest, imbalance of power and unrealistic expectations.

Recently, mentoring has been considered an essential step in professional and personal development

[Mentorship] is increasingly recognised as a bidirectional process, benefiting both mentors and mentees

INTRODUCTION

Mentorship is described as a process through which an experienced person (mentor) guides another (mentee) in developing skills and knowledge for their professional development.[1] The concept of mentoring has existed for many years, but over the last 20 years it has gained popularity as a formal concept in health professional education and training. Many consider mentoring an essential step in professional and personal development. Health professionals (medicine, nursing and allied health staff) may be employed by health service providers or academic institutions, or can be self-employed. Some have mixed employment. Additionally, health professionals may have variable combinations of clinical practice, patient care, teaching, supervision and research responsibilities. Challenges facing many within the health professions include unclear career pathways and varied work roles.[2] Those entering the health professions may be more easily frustrated by this lack of clarity than their more experienced counterparts; however, interest has grown around the development of mentoring programmes for mentees at all levels of career development, within a variety of health professional settings.[3] Through such programmes, the mentor may facilitate the development of the mentees' goals through effective implementation of a number of roles: teacher, counsellor, guide and role model.[4,5] The aim of mentorship is to enhance the abilities of the mentee, building their capacity to produce the desired career outcomes. The purpose of this article is to assist readers involved in faculty member development to implement or review mentorship programmes within their institutions.

WHAT ARE THE BENEFITS OF MENTORSHIP?

The effectiveness of mentoring is well documented. For example, Feldman and colleagues described a large and comprehensive mentoring programme at the University of California, USA, encompassing dentistry, nursing, medicine and pharmacy. Compared with those without a mentor, mentees reported receiving more help with issues of promotion and tenure, increased job satisfaction and higher academic self-efficacy.[6] They also found that clinical faculty members with more teaching and patient care responsibilities were less likely to have a mentor, compared with research faculty members.[6] Previous research has demonstrated that mentors contribute significantly to development of mentees' research output, teaching and clinical skills, and networking and career management.[7] Through mentoring, the learning curve for new trainees can be decreased through the formal and informal sharing of experiences. Mentors are able to steward knowledge, impart skills, instil values, and orientate trainees to the cultural and social aspects of their profession. Below we explore the goals of mentorship, and the key elements of effective mentoring within the context of health professional training.

Mentoring may offer a means to further enhance workforce performance and engagement, promote learning opportunities and encourage multidisciplinary collaboration. There are both career and life benefits associated with mentorship, and it is increasingly recognised as a bidirectional process, benefiting both mentors and mentees.[1] Both parties have the opportunity to grow and develop throughout mentorship. Benefits for the mentee may include increased self-efficacy,[6] increased job satisfaction,[6,8] and increased research productivity.[9] Although the mentee primarily benefits, there are also potential benefits for the mentor. They are given the opportunity to share their experience and wisdom to nurture future leaders. By helping others, they may become more aware of their own professional skills and work practices, and they may gain insight into other fields or

Table 1. Potential benefits for mentorship stakeholders (mentees, mentors and organisations)

Mentees	Mentors	Organisations
Increased job satisfaction	Personal fulfilment ('giving back')	Increased work performance
Feeling of empowerment	Assistance on projects	Enhanced strategic planning
Increased research grant opportunities	Development of leadership and coaching skills	Improved communication and organisational culture
Enhanced productivity	Increased recognition	Professional development of employees
Increased protected time for scholarly activities, e.g. publications	Renewed interest in personal career	Retention and distribution of organisational knowledge
Improved academic 'self-efficacy'	Potential financial reward	Reduced turnover
Greater networking opportunities	Career advancement	Accelerated training
Career advancement		Cost effectiveness

areas within their organisation. A summary of the potential benefits for the mentees, mentors and organisations are outlined in Table 1.[1]

RELATIONSHIP

Mentoring is relationship oriented, and although the development of the mentoring relationship varies, it typically involves four key phases: initiation, cultivation, separation and redefinition.[10] The initiation phase typically occurs over a short period of time (6–12 months), where the mentorship relationship commences, commitment is gained, and objectives and expectations are set. The cultivation phase typically occurs across a period of 2–5 years, with more frequent and progressively more useful meetings between the mentor and mentee. During this period, both the mentee and mentor derive optimum benefits from the relationship. The separation phase typically occurs over 6 months to 2 years, as the mentee becomes more confident and self-reliant. At this stage, both the mentee and mentor should have gained satisfaction from the achievement of their objectives. If the separation phase occurs prematurely, feelings such as abandonment or resentment may be experienced, and this can break down the mentoring relationship. The redefinition phase may be indefinite. The relationship between the mentee and mentor may close or change in nature, where the 'hierarchy' is reduced or no longer exists.

WHAT ARE THE FEATURES OF AN EFFECTIVE MENTOR?

Effective mentors seek opportunities for a mentee to succeed, and take pleasure in their success. They encourage their mentees to set high, yet realistic standards for themselves. Effective mentors are commonly found to have personal attributes and behaviours that support and encourage the continuing professional and personal development of mentees,[1] as listed in Table 2. Key characteristics of a successful mentor may include enthusiasm, generosity, patience, a sense of humour, knowledge and competence. Ideally a mentor will possess: a willingness to share personal and professional experiences; the ability to impart knowledge, skills and values; and the ability and willingness to promote networking opportunities for the mentee.[11] Importantly, the mentor must act as an advocate for the mentee.

Table 2. Personal attributes and behaviours of effective mentors

Personal attributes	Behaviours and actions
Generous	Makes themselves accessible and available
Enthusiastic and motivating	Offers helpful and useful advice
Patient and honest	Works in a way that is compatible with the mentee's practice style and personality
Responsive	
Excel at active listening	Assists mentees in reaching goals

Table 3. Personal attributes and behaviours of effective mentees[1]

Personal attributes	Behaviours and actions
Understanding	Takes responsibility for driving the relationship
Responsive	Respectful of meeting times and the mentors' time
Open to feedback	
Excels at active listening	Proactive in identifying problems and issues
Honest and patient	Comes to meetings prepared
Non-judgemental	Self-evaluates

Effective mentors are often associated with verbs such as guide, advise, motivate, support, listen, question and facilitate. Their main role is assisting mentees with identifying and reviewing their own areas of strength and those needing further development.[12] Their role is to pass on their skills and assist the mentee in their problem solving through support and motivation. Ideally, mentors should follow the principles listed below:[12]

- provide a comfortable and safe learning environment;
- allow the mentee to be a part of planning future projects;
- provide opportunities for mentees to assess their own needs;
- encourage the joint formulation of learning objectives;
- identify resources needed to achieve personal and work goals;
- support mentees' attempts to achieve their goals; and
- complete a joint evaluation of the mentees' goal achievement.

WHAT ARE THE FEATURES OF AN EFFECTIVE MENTEE?

The mentee's commitment to the mentorship relationship is just as important as the mentor's commitment. It is important that the mentee does not act as an empty vessel, merely receiving the mentor's advice and wisdom, but rather as an active participant in shaping the relationship.[7,13] Just as mentors have particular personal attributes and behaviours that contribute to their effectiveness, so too do mentees, as listed in Table 3.[1] The mentee

The mentor must act as an advocate for the mentee

Evidence suggests that mentoring works best when the mentor and mentee have similar values and interests

Table 4. Key elements to consider when choosing a mentor

Key element	Description
Attraction	The mentee must be attracted to their mentor in the sense that they want to emulate them in some way. In return, the mentor must see potential in the mentee. The mentor should have a personality that allows them to get along easily. They should be someone the mentee admires and looks up to, and is good at what they do.
Affect	The mentor should be positive, supportive and encouraging, displaying respect for the mentee. This is often achieved through good communication and rapport.
Action	The mentor needs to be willing to invest time and energy into the mentee through guidance, teaching and counselling. They need to be available, and respond in a timely manner.

must demonstrate a willingness to learn, display a positive attitude, and have a desire for professional growth and development.[1] To gain from the relationship, a mentee should identify his or her goals and expectations for the relationship, be proactive and take the initiative, and remain sensitive to the mentor's time constraints.[4] Being open to suggestions by the mentor, showing enthusiasm towards working together, asking questions and using the mentor's knowledge help to foster the mentorship relationship.

SELECTING AN APPROPRIATE MENTOR

Although some organisations have mentorship programmes where mentors and mentees are assigned, others require mentees to seek their own mentor. Evidence suggests that mentoring works best when the mentor and mentee have similar values and interests.[1] This implies that mentors should not be directly assigned, but rather that they should be self-identified. This can work well when mentees have already identified their ideal mentor in a staff member where a clinical rotation has already been worked; however, it can be challenging for those new to the organisation. When selecting a mentor, there are three key elements to consider: attraction, affect and action,[1] as outlined in Table 4.

Practical strategies for effective mentorship include the establishment of clear priorities, with defined short- and long-term goals and associated tasks, and the scheduling of regular meetings with pre-agreed agendas and checklists.[1] Although it is preferable to meet in person at private and convenient locations, internet-based communication systems, phone or e-mail may also be considered.

STYLES OF MENTORING

Numerous styles of mentoring exist and range from more traditional forms, such as the classic model, through to more recent styles, such as virtual mentoring. Examples of differing mentoring styles are provided in Table 5.[12,14] Most workplaces continue to use traditional models of mentoring;[12,14] however, as more millennials enter the workforce, the expectations of mentorship are changing, resulting in new mentoring styles.[14] It is valuable to select a style that is appropriate and well suited to the personalities, time availability, resources and workplace arrangements.

POTENTIAL NEGATIVE CONSEQUENCES OF MENTORSHIP

It should be recognised that mentorship is not always without problems. Difficulties can arise because of a lack of clarity and understanding of the roles of the mentor and mentee, and the boundaries of the relationship.[15] Time requirements may make it difficult for health professionals to commit to mentorship. If few mentors are available within one institution, the mentors may be at risk of work overload.[15] When mentors are assigned, rather than selected by the mentee, the mentorship relationship may be less likely to be based on mutual respect and shared interest, and therefore is less likely to succeed.[12] If there is an overlap in roles between that of the mentor and the research supervisor, the trust in the relationship may be reduced. In such cases, there may be potential conflicts of interest and a reluctance from students or mentees to share their problems or challenges. The situation of overlapping roles is more likely to occur in resource-poor institutions.[15]

WHEN MENTORING FAILS

Although the benefits outweigh the risks in most mentoring relationships, not all mentoring relationships are effective or successful. These cases can often be linked to several contributing factors,[16] which may include: poor communication; lack of commitment; personality differences; competition (both perceived or real); conflict of interest; and a lack of experience (of the mentor). Consequences of an unsuccessful mentoring relationship can include: damaged relationships and a lack of collegiality in the workplace. There may be a risk of dependency on the

Table 5. Examples of differing mentoring styles

Mentoring style	Characteristics
Classic model	Formal approach Well planned with a specific setting One on one A more experienced mentor and less experienced mentee from the same field
Shadowing	Not considered a true form of mentoring Based on observation of experienced professionals
'Trans' model	Mentor works outside of the mentee's area of focus: e.g. clinical research paired with basic scientist Widens development of professional network Fosters multidisciplinary and multi-departmental collaborations
Networking model	Less intense than traditional styles Less dependence on an individual mentor Offers a wider range of perspectives
Reverse mentoring	Both parties act in the capacity of mentor and mentee The older generation learns from millennials, who may have open minds, and are engaged with present and future technology The millennials learn from the older generation, who have experience in the skills and practice of their field Two-way learning experience (both the mentor and the mentee learn) Brings different employee generations closer together
Group mentoring	Suitable in organisations with lack of senior leaders Delivery is virtual or face to face Peer mentoring also occurs Possibility of rotating between mentors
Spot mentoring	More casual approach Seek out a senior leader One-off mentoring 'spot' meetings Specific and focused
Virtual mentoring	Using Skype, FaceTime or chat facilities More geographically friendly Potential risks include miscommunication, slower development of the mentoring relationship, trust and confidence

mentor when too much support is provided, and the development of a 'halo' effect, when the mentee fails to question the opinion of the mentor. If the mentee is no longer learning from the mentor, or if either party is consistently disengaged, it may be appropriate to end the mentorship. It is important that mentorship programmes, particularly where mentors are assigned, provide a formal process for change of mentor.

ETHICAL ISSUES IN MENTORSHIP

Many ethical issues can arise in mentorship, and the key issues can be categorised as follows.[1,12]

- **Confidentiality:** should be preserved within the limits of good practice. It is possible for a betrayal of confidence to occur in general conversation, and what was said in confidence should be remembered.
- **Conflict of interest:** should always be acknowledged.
- **Power**: mentoring may give the mentor considerable knowledge about the mentee and their work. The inherent imbalance of power can lead to dysfunctional behaviours. Examples include theft of ideas, authorship conflict, bullying, exploitation and harassment.
- **Unrealistic expectations:** a mentee may expect more from the mentor than can be provided. False expectations should not be encouraged. Examples include not showing up for meetings, failure to complete agreed tasks and a lack of availability.
- **Access:** limited opportunities for select individuals; denial of access to underrepresented groups; and limited success of diversity goals.

It is important that mentorship programmes provide a formal process for change of mentor

As a way of combating these potential issues, organisations often have structures in place to formalise mentoring programmes that are more inclusive in nature. Another way to alleviate these issues is to introduce training programmes to raise awareness of potential ethical issues in mentoring relationships and guidelines for appropriate behaviour. The careful selection of mentors and follow-up evaluations of mentoring programmes are also proven to support successful mentoring programmes, limiting ethical exploitation.[12]

CAREER-LONG MENTORING

Much of the literature on mentorship focuses on junior health care professionals as mentees;

At any career stage staff may benefit from being mentored

however, at any career stage, staff may benefit from being mentored. Although career flexibility is a privilege within the academic health professions, it also highlights the need for continuing mentorship. Contextual barriers, associated with the organisation and control of academic medicine, present many challenges to not only those entering the field but also those already established.[17] Clinical educators and female faculty members, in particular, often feel neglected in the area of mentorship.[13,17,18] As a mentee's career progresses and evolves, their mentoring needs may also change.

CONCLUSION

Learning within the workplace includes the development of knowledge and skills, and an understanding of the values important to the profession and the culture of organisations. Within health care training, organisations may encompass hospitals, universities and training organisations, as well as regulatory bodies. The practice of mentorship may help to foster an understanding of the enduring elements of practice within these organisations. Mentoring involves both a coaching and an educational role. The desirable attributes of a mentor include: a generosity of time; empathy; a willingness to share knowledge and skills; and an enthusiasm for teaching and the success of others. Being mentored is believed to have an important influence on personal development, career guidance and career choice. An awareness of ethical issues and the potential difficulties in mentorship are important. These include: conflict of interest; an imbalance of power; and unrealistic expectations.

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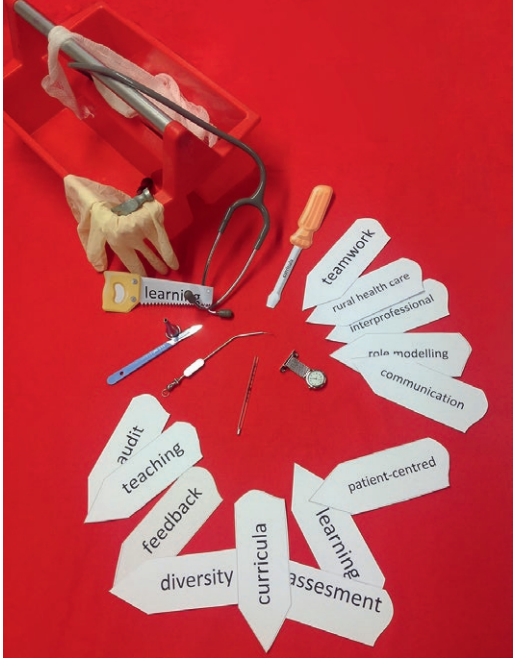
1.2 Journal clubs in health professional practice

The Clinical Teacher's Toolbox



Journal clubs in health professional practice

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Editor's note: Many readers will have experience of participating in journal clubs, but may not have considered why certain clubs are successful while others fail to attract a regular clientele. This toolbox defines the purpose of a journal club and discusses the evidence-based factors that appear to contribute to their success. Journal clubs offer the opportunity to appraise and debate published articles, focusing on clinical practice, health professional education, and other areas of interest to learners and clinical teachers. The authors describe the format of clubs, types of papers that may be selected for presentation and how to ensure there is interaction among participants. The toolbox also considers the potential of online journal clubs and the challenges that these pose.

INTRODUCTION

Journal clubs provide participants with a forum to meet regularly in order to critique current research publications, to improve their knowledge on relevant topics and to develop their critical appraisal skills in a group setting. Participants are provided with an opportunity to voice their understanding and opinions, and to raise questions relating to the research design, applied statistics and other issues that may arise.[1] Over time, the focus of journal clubs has moved to the teaching of critical appraisal skills, evidence-based medicine and evidence-based medical education, and encompasses many health care fields, including pharmacy, nursing and allied health. Additionally, the use of online technology has facilitated the emergence of new delivery platforms for journal clubs. This paper discusses the published evidence on key features of a successful journal club, and provides advice on the selection of manuscripts, presentation requirements, critical appraisal skills and online journal clubs.

GOALS AND FEATURES OF A SUCCESSFUL JOURNAL CLUB

Journal clubs are described as being a 'well-recognized quality improvement strategy used by health practitioners to critique and keep up-to-date with relevant health issues'.[2] They form an integral part of most

Journal clubs form an integral part of most health professional training programmes

The journal club should aim to address important clinical and education questions that arise in practice

Box 1. Features of a successful journal club[1,4]

- 12 or fewer members
- Regular scheduled meetings
- High member interest and motivation
- A suitable number of articles to review
- Use of structured critical appraisal checklist
- Begins with a short briefing
- A leader that keeps the group on task
- Relevant, recent and interesting clinical articles
- Active discussion of issues that arise
- Formal teaching of critical appraisal skills
- Participants come prepared/pre-reading
- Food and coffee provided

health professional training programmes,[1,2] and are increasingly used in health education. The goals of journal clubs are to: disseminate knowledge to the group; improve clinical practice; learn, practise and improve critical appraisal skills; reduce the gap between research and practice; improve educational practice; promote evidence-based practice; improve awareness of research skills and practice; and improve social learning.

A number of predictors of a successful journal club have been identified, as outlined in Box 1.[1,3] These include: the size of the membership; the regularity of meetings; participant motivation and preparation; participant critical appraisal skills; structure and leadership of the session; and the provision of coffee. To ensure relevance and engagement by attendees, the journal club should aim to address important clinical and education questions that arise in the practice of those attending.

LEADING A JOURNAL CLUB

Leaders and supervisors, ideally with substantial skills in critical appraisal, are key to the success of a journal club.[2] Most journal clubs have a rotational presentation timetable, and request that each member presents and leads at some point in time. The rotating facilitator is responsible for: (1) identifying and selecting appropriate clinically or educationally relevant articles for discussion; (2) explaining their search strategy; (3) directing the group discussion; (4) steering the group towards their goals; (5) answering questions on the content of the articles; and (6) ensuring that the session runs on time.

PRESENTING AT JOURNAL CLUB

There are essential areas that should be covered sequentially when presenting at a journal club.[4]

1. Describe the relevance of the paper to your interest/work.
2. Summarise the study and the research question(s).
3. State the importance and relevance of the research question.
4. Describe the methods.
5. Critically appraise, with comments on importance, validity and limitations.
6. Summarise the results.
7. Describe how the results are applicable to the wider population, and relevant to the journal club participants.
8. Conclude with your personal decision about using the study to inform your practice.
9. Provide a one-page summary as a handout.

Ideally, to ensure the high clinical or educational relevance of the chosen articles, either systematic reviews or randomised controlled trials (RCTs) should be the articles most frequently presented at journal clubs. The format of journal club presentations should be modified depending upon the study type, and using an appropriate checklist for that study type. For example, the points to include when presenting a systematic review are provided in Box 2.

Observational studies can be relevant, especially well-conducted cohort studies, but it is best to avoid case–control studies as they are inherently biased, are too easily criticised (and potentially promotes a hyper-critical approach to the published literature) and are often misleading,[5] and consequently the results are less likely to be clinically applicable. Case series and case reports are rarely appropriate.

SELECTING THE RIGHT ARTICLES FOR DISCUSSION

When selecting your articles, consider the four key areas outlined in Figure 1. Prior to the journal club meeting, provide participants with the title of the article and the journal, list of authors and funding sources, and either the abstract or the complete article.

STARTING A JOURNAL CLUB

If there is not already a journal club in your area, you might consider initiating one. Firstly, identify a leader who is willing to provide the organisation required

Box 2. Key elements in presenting a systematic review at journal club

- Provide a brief background to clinical issues/questions being addressed by the systematic review – ideally by using a brief clinical scenario (preferably in relation to a genuine, current clinical quandary)
- Cover the specific aim/s of the systematic review, and methodology (What study types? Inclusions and exclusions?)
- Discuss key issues regarding critical appraisal:
  - How comprehensive was the search (e.g. which databases were searched)?
  - What was the 'quality' of the primary studies (e.g. randomised controlled trials)?
  - Was heterogeneity (i.e. inconsistency between studies) a substantial issue?
  - What are the key results (spend more time on this)?
- Discuss limitations of the review (e.g. risk of publication bias; high risk of bias/poor quality of primary data; and excessive between study heterogeneity)
- Ensure the article is critically appraised using an appropriate checklist
  - Is the study valid?
  - Are the results important?
  - Are the results applicable to other group members' patients?
- Ideally, finish by returning to your clinical scenario with the 'answer', and a brief 'take-home message'.

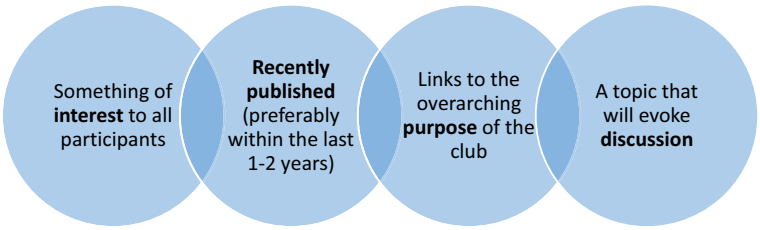

Figure 1. Key areas of article selection for journal clubs

for the journal club. After the first meeting, a roster can be established, with each member taking turns to present.

Ensure that the goals of the journal club, and a suitable meeting venue and time, are established. Copies of the research articles can be shared before the meeting.[6] A useful trick to encourage participants to pre-read the article(s), is to distribute a 'cut-down' version containing only methods and results (but including the tables and the figures). At the journal club, active participation should be encouraged, with the use of frequent questions to promote discussion. Box 3 outlines the key steps in establishing a journal club.

CRITICAL APPRAISAL SKILLS

Critical appraisal skills allow health care professionals to evaluate research and the published literature – skills that are crucial to ensuring evidence-based practice. Critical appraisal uses checklists for careful and systematic evaluation of the literature to ascertain whether the studies are accurately described, address the focus question, use valid methods and are applicable.[7] By critically appraising a study, we aim to identify flaws in the methodology (risk of bias), allowing readers to judge and make an informed decision about the quality of research presented. Critical appraisal involves assessing the validity, strengths/weaknesses, importance of research findings and the applicability of those attending. There are a variety of different study types in the published clinical and education research literature, each of which generally addresses a specific type of clinical or educational question.

Active participation should be encouraged, with the use of frequent questions to promote discussion

- Systematic review: therapy questions (high-level evidence)/best evidence in educational practice.
- Randomised control trials: therapy questions (less common in education research).
- Cohort studies: prognosis questions/questions regarding the longitudinal impact of students' professionalism.
- Case–control studies: harm/aetiology questions (and rare disease questions)/questions regarding risk factors for 'struggling' students.
- Qualitative research: 'Why, behaviour, attitude' questions/'What, when and how' quasi-experimental inquiry.

CRITICAL APPRAISAL CHECKLISTS

Many websites provide sample checklists to effectively appraise the literature for various study types. An excellent series of checklists is available from the UK Centre for Evidence-Based Medicine (CEBM; http://www.cebm.net/critical-appraisal/).[7]

Other checklists are listed below.

Journal clubs can often become a passive experience for those not presenting

Box 3. Key steps in establishing a journal club

- **Step 1: identify a leader to organise the journal club.** This person should be someone who is committed to the concept of a journal club, and is willing to carry out the continuing organisation. It may be a junior or senior member of staff.
- **Step 2: identify the goals of the journal club.** If the group is inexperienced in critical appraisal, then consider critiquing the same article together as a group to assist with the process. For a more experienced group, the identification of a clinical problem and clinical research articles addressing the problem can be critiqued and summarised.
- **Step 3: Establish a regular meeting time and venue.** Decide on the most convenient time and location for participants to meet, and decide on the regularity of the meetings. Often a monthly meeting may be the most successful. Establish a roster of presenters, so that each member of the journal club takes turns in presenting.
- **Step 4: Select and share copies of the articles prior to the journal club.** The rostered presenter should select appropriate articles for discussion at the journal club. E-mail the articles, or 'cut down' versions, to participants prior to the journal club.
- **Step 5: Encourage active participation at the journal club meeting.** Encourage active participation at the journal club meeting with questions for the discussion, and ensure that there are copies of the appropriate critical appraisal checklist available to the group (e.g. laminated versions).

- The Joanna Briggs Institute (JBI), a research and development centre based in the Faculty of Health and Medical Science, University of Adelaide, have developed a series of checklists and critical appraisal tools with detailed explanations (http://joannabriggs.org/research/critical-appraisal-tools.html).[8]
- Critical Appraisal Skills Programme (CASP) checklists (http://www.casp-uk.net/casp-tools-checklists).[9]
- How to critically appraise an article (http://www.medscape.com/viewarticle/706399).[10]
- Best Evidence Medical and Health Professional Education (https://www.bemecollaboration.org/Publications+Research+Methodology/).[11]

EFFECTIVENESS OF JOURNAL CLUBS

Evidence suggests that journal clubs assist in knowledge acquisition and improved reading practices; however, there is uncertainty about measurable improvements in critical appraisal skills, and no studies have reported the clinical impact of journal clubs. A 2001 systematic review found that journal clubs can improve reading practices, knowledge of clinical epidemiology and biostatistics, and the use of medical literature for residents and registrars.[12] There was no evidence to suggest an improvement in clinical appraisal skills, however.[12] A more recent systematic review concluded that the effectiveness of journal clubs in supporting evidence-based decision making is unclear, and that better reporting of educational interventions is needed.[13]

INCREASING INTERACTIVITY OF JOURNAL CLUBS

Traditionally, and in theory, journal clubs include many essential elements of active learning principles, including the provision of relevant content, opportunities for discussion and guided learning; however, journal clubs can often become a passive experience for those not presenting.[14] Rosenthal and Rosenthal suggest building on active learning principles by reformatting the presentation structure.[14] They describe a process whereby the journal club leader directs the discussion by presenting the article title, and data collection and analysis, but without the text. With the raw data, journal club participants are required to provide their own interpretation and critique. The discussion begins and ends with drawing attention to the title of the article, in order to clarify the goals and outcomes of the study. By using this active format, journal club participants are challenged to develop their understanding of the study design and data analysis.[14] While keeping the approach consistent, adjustments can be made to accommodate groups with different numbers of participants and whose members are at different levels of training.

MILLENNIAL LEARNERS AND THE EMERGENCE OF ONLINE JOURNAL CLUBS

With increasing demands placed on those training within health care systems, it is important to consider how trainees learn. It is apparent that millennials typically learn in a much more collaborative and sharing fashion. Descriptions of how to engage millennial learners in journal clubs are now emerging.[15–18] Rodriguez and Hawley-Molley describe a team-based, competitive form of a journal club at the San Antonio Uniformed Services Health Education Consortium.[15] In their journal club, residents are divided into teams of four and each month are tasked with selecting one journal article that best answers a clinical question.[15] Points are allocated to teams on a monthly basis, and at the end of the year the winning team is

announced. Although the new format required residents to learn search techniques, and fostered friendly competition among the teams, the main limitation of this format was less discussion around critical appraisal.

Other forms of engaging millennials focus on the use of online technology. Although journal clubs have largely existed as local, face-to-face meetings, online technologies provide a means for health care practitioners to connect with colleagues on a global basis with the intent of disseminating and discussing the latest literature.[16] Web-based journal clubs are becoming more prevalent and have the advantage of covering remote sites, promoting inclusiveness and providing more networking opportunities.[19] An eruption of Twitter journal clubs uniting health professionals from across the world has also been reported,[16] with social media technology opening up new means to connect, regardless of geographical location. Although not designed to replace face-to-face journal club discussion in smaller groups, online journal clubs offer a means to help remote and dispersed clinicians connect and discuss differences in clinical practice.[16] Even within hospital departments, it is often difficult for clinicians and clinical teachers to find a common time when most members are free to attend. A benefit of online journal clubs is the opportunity for participants to take part at a convenient time in a quiet atmosphere (through asynchronous and synchronous participation). Online journal clubs also enable the involvement of an increased number of clinicians, with diverse practices. Members are able to read a manuscript, and a critique, and then discuss these materials with other journal club members at their convenience. A blog format can be used, providing text-based discourse between members. The establishment and implementation of an online journal club involves four key steps: (1) creation of the online learning platform; (2) establishment of journal club goals; (3) uploading/posting of an article of interest, along with a critique of the article; (4) development and posting of discussion questions; and (5) monitoring of the discussion. To enhance clinical and health education teaching and learning, online journal clubs provide an innovative method of self-directed learning, through interactivity and wider participation. The challenges of online journal clubs include technical difficulties and engagement of larger audiences.[16] Additionally, some argue that online journal clubs do not provide the same effectiveness in teaching critical appraisal skills as face-to-face sessions, which usually have the benefit of experienced moderators.[20]

CONCLUSION

Journal clubs remain an important component of postgraduate training in medical and health education, where clinical and health education research is reviewed, and its credibility and applicability is evaluated. They have stood the test of time as useful and popular educational activities to enable health professionals to keep up to date with the current published literature, improve reading practices, improve knowledge and encourage the acquisition of critical appraisal skills. New online journal club formats are emerging to suit the needs of millennial learners, and extend both reach and participation. The features of successful journal clubs are well documented, enabling those setting up new journal clubs to incorporate as many of these features as possible.

Online journal clubs provide an innovative method of self-directed learning, through interactivity and wider participation

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1.3 The role of reverse mentoring in medical education: current insights

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REVIEW

The role of reverse mentoring in medical education: current insights

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Abstract: Reverse mentoring is a relatively contemporary concept that relies on the reversal of the traditional roles of mentor and mentee and the abolition of the mentorship model as an apprenticeship or hierarchy. Typically, a younger specialist takes on the role of mentor and an older, more experienced specialist the role of mentee. Reverse mentoring is founded in learning and social theories of mentorship and has been practically applied in information technology, business and education fields. However, there is a role for reverse mentoring in medical education and the health sciences, particularly with the inclusion of new technologies in a changing health landscape, and the emphasis on interdisciplinary teamwork and improved workplace culture. Further investigation and analysis of reverse mentoring is warranted, with a particular focus on the implementation of the reverse mentor model in the field of medical education and the health sciences. To assist those considering implementation of mentorship programs in their workplace, this article provides an overview of recent literature, with suggested applications of "reverse mentoring" in the medical education context.

Keywords: mentorship, reverse mentor, mentee, medical education, health sciences, academic medicine

Introduction

The term "mentorship" is derived from ancient times, first mentioned in Homer's "Odyssey". When the King of Ithaca, Odysseus, went to fight in the Trojan War, he entrusted the care of his kingdom and family to Mentor.[1] Mentor provided guidance, counsel and support to Telemachus, Odysseus' son. Although mentorship is a concept that has long existed, it has only recently been formalized as playing a role crucial to both personal and professional development in medical education.[2] A variety of definitions of mentorship exist, reflecting the varied contexts in which mentoring is utilized. It is generally accepted, however, that mentorship relies on 1) reciprocity of the mentee–mentor relationship, 2) developmental benefits for the mentee's career or work, and the mentor's learning partnership and 3) consistent communication between the mentor and mentee.[3]

Traditionally, mentorship is considered a process where the mentor, an experienced person, guides the mentee in developing the knowledge and skills required in their professional development. This core concept of mentoring is applicable to a diversity of organizational contexts. Numerous styles of mentoring exist and extend from the classical model to cascading mentoring, group mentoring, network mentoring, spot mentoring and virtual mentoring.[1,4] Most workplaces use traditional models

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Box 1 Typical characteristics and benefits of reverse mentoring

- The more experienced specialists are mentored by the less experienced specialists (sometimes, the "millennial")
- Junior or mid-career level mentors are engaged with present and future technology
- More inexperienced mentors learn from the more experienced specialists, who have extensive knowledge, skills and experience in their field
- Has the capacity to narrow the gap between different employee generations
- Builds social capital within the workplace
- Provides a two-way learning process; the mentor and mentee learn from each other
- Professional skills of mentoring are developed by the more junior mentor
- Mentors are recognized for their expertise in particular areas, eg, IT skills in literature searches, genetic analysis, clinician well-being

of mentoring aimed at facilitating learning and development of the mentee.[5] With the advent of information technology (IT), followed by the engagement of millennials in the workplace, however, the potential in cross-generational mentorship is increasingly being recognized. This paper provides an overview of the recent literature to assist those considering implementation of mentoring programs in their workplace. In particular, we provide a focus on the new mentoring style of "reverse mentoring" and consider this in the context of medical education.

Reverse mentoring

Reverse mentoring relies on the reversal of the traditional roles of mentor and mentee and the abolition of the mentorship model as an apprenticeship or hierarchy.[4] Ziegler expands the definition of reverse mentoring, outlining the "reciprocal and temporally stable relationship between a less experienced mentor providing specific expert knowledge and a more experienced mentee who wants to gain this knowledge".[5] The mentor fulfills the traditional role of advice-giver, providing new insight regarding ideas or concepts to the mentee.[6] Crucially, as outlined by Zauchner-Studnicka, reverse mentoring "aims at both the development of the mentors and the mentees".[4]

There are unique characteristics of the reverse mentoring relationship.[7] First, the partner status of both parties is different from conventional mentoring roles; a more junior specialist takes on the role of mentor and a generally older, more experienced specialist the role of mentee.[7] The mentor provides advice to the mentee, and the mentee gives the mentor a new insight to stimulate growth and reflection in the mentor.[6] Importantly, the reverse mentoring relationship is characterized by a commitment to a shared goal of mutual learning and collaboration.[6] The exchange of knowledge shifts away from the traditional longitudinal mentoring relationship to a focus on learning from the mentor's specific technical or content expertise.[7] This final characteristic of reverse mentoring reflects its origins in learning and social theories of mentorship. The typical characteristics and benefits of reverse mentoring are summarized in Box 1.

Theoretical underpinnings of reverse mentoring

Mentorship occurs as part of different theoretical frameworks that help guide the way it is developed and implemented. As outlined by Dominguez and Hager, traditional concepts of mentoring arise from three primary theoretical frameworks: developmental, learning and social theories.[8] Reverse mentoring, as a classical form of mentoring, arises more from social and learning theories of mentorship than developmental theory.[4,8]

Developmental theory

Developmental theories of mentorship reflect an inherent hierarchic relationship between mentee and mentor within succeeding phases of an individual's development.[4,9] The mentor provides practical support during a mentee's developmental transitions with effective mentoring relying on matching of academic and occupational strategies. The value is predominantly in the mentee's personal growth. Examples of the application of developmental theory include peer-to-peer student mentoring[10] and junior-senior faculty mentoring relationships.[11]

Learning theory

There are a multitude of learning theories relating to mentorship. The concept of mentorship as a learning partnership is a common foundation for adult learning (andragogy), behaviorist, cognitivist and constructivist theories as well as transformative, action and social learning theories. Within learning theories of mentorship, the mentor becomes a facilitator for a mentee's personal progress.[12] Andragogy theory emphasizes the facilitator role of the mentor, where both the mentor and mentee engage in a mutual learning process through self-reflection and critical

discussion of past experiences and social roles.[13] Similarly, transformative learning theory advocates for active discussion and critical thinking between mentor and mentee to change perspectives on work and identity.[14] The process of mutual development is also seen in social learning theory, which focuses on the process of learning through imitation. Taken together, learning theories of mentorship emphasize the role of the mentee as an active co-constructor of development.[8] The basis of reverse mentoring therefore arises from the notion of an involved and contributory mentee.

Social theory

Social theories of mentorship shift the focus from dyadic relationships to a networking perspective with mutual benefits. Social theories of mentorship include socialization, human/social capital, social exchange and social network theories, as well as communities of practice.[8] Within these theories, the mentee is an active contributor to the mentor relationship. In particular, social exchange theory and communities of practice emphasize the importance of information and knowledge exchange within the relationship. Social exchange theory suggests that a successful mentorship relationship arises when there is a clear cost-benefit to both parties, based on the possession of valued characteristics.[15] The concept of communities of practice regards mentorship as a knowledge network where mentoring is more a partnership than apprenticeship.[16] Mentees enter multiple communities with their own set of skills and knowledge, which allow them to contribute as a mentor in one field and learn as a novice in another.[17] Within the educational field, students can bring up-to-date knowledge to the community,[18] while senior colleagues provide traditional guidance with respect to community roles.[19] The construction of mentorship in this way reflects the core foundation of reverse mentoring.

Practical applications of reverse mentoring

The origins of reverse mentoring lie in business and IT sectors and reflect the need for employees to stay current in the workplace.[20] It is particularly utilized in the IT industry where younger generations can advise on the latest in technological advancements.[21] Reverse mentoring is not limited, however, to fields of IT or business. There are examples of the concept in education,[6] economic theories, language skills and innovative ideas.[22] It has become "best practice" for several large corporations including Dell,[23] Procter and Gamble[24] and Time Warner.[25] It can be particularly useful in workplaces that are frequently exposed to the rapid transformation of technology, including social media, such as the public relations industry.[26]

Differences within these contextual arrangements relate to the formulation of the mentor–mentee relationship. In the IT industry, the younger specialist (mentor) provides his or her experience with a new technology to the older mentee, in line with the mission of traditional mentoring relationships. Reverse mentoring in education is less strictly defined and relies more on a duality of roles; learning is a two-way street or "boomerang".[6] Reverse mentoring in education is therefore not limited to a younger–older interaction.[27] With a focus on specific, content-driven relationships it is important to recognize that reverse mentoring is differentiated from the scenario where a specialist approaches a more junior colleague for assistance with a single issue. There is an established relationship characterized by the mutual exchange of knowledge that continues beyond the static episode. Table 1 provides examples of features that differentiate reverse mentoring from traditional mentoring.

There is a lack of research in the field of health sciences, including academic medicine, relating to reverse mentoring. The benefits of traditional mentoring for mentors have been reported previously.[2,28] A pilot study by Cotugna and Vickery outlined the benefits of reverse mentoring amongst dietitian students assigned older professionals with limited experience in accessing the internet.[29] There is a strong argument for further empiric research in the field of reverse mentoring within the health sciences. Like education, clinical and academic fields of the health sciences are less clearly defined by a younger–older dynamic. However, in traditional forms of mentoring, it is suggested that for both academic and clinical mentoring relationships, the mentor should be one career stage above a mentee in order to provide the mentee with appropriate research and professional guidance.[30]

Attributes and behaviors of the mentee and mentor in reverse mentoring

The unique structure and purpose of the reverse mentoring relationship require a re-evaluation of the attributes and behaviors required by the mentee and mentor. Tables 2 and 3 below outline the qualities required for successful reverse mentorship.

Table 1 Examples of features that differentiate reverse mentoring from traditional mentoring

Traditional mentoring	Reverse mentoring
Length of mentoring relationship	
• Usually longitudinal relationships	• Shorter, specific content-driven relationships
Who mentors who	
• More experienced specialist mentors the less experienced specialists	• Less experienced specialist mentors the more experienced specialist
Subject areas and nature of guideance	
• Broader, holistic mentoring, eg, career, professionalism, research, work/life balance • Mentor fulfills nurturing role • Navigating institutions, warning of pitfalls	• Often targeted mentoring to improve specific knowledge, eg, e-medicine, use of apps, literature searching, clinician well-being • Mentee can provide nurturing role, behavior to emulate • Mentor provides a new perspective

Table 2 Attributes and behaviors of effective mentors in reverse mentoring

Attributes	Behaviors
• Patience required in teaching new concepts (eg, genetics, online modules) • Generous with their time • Enthusiastic in their area of expertise • Responsive to the needs of the mentee • Honest and professional in their feedback • Clear and effective communication skills • Values ongoing learning • Willingness to share their knowledge and experience	• Respects and acknowledges the expertise of the mentee • Understands that the mentee may have limited time, and extensive responsibilities (eg, clinical service, health administration) • Encourages the formation of joint learning objectives and skills outcomes • Provides a comfortable learning environment • Identifies the resources needed to achieve set goals • Provides opportunities for the mentee to assess their own needs and progress • Actively listens to the needs of the mentee to improve cross-generational communication

Table 3 Attributes and behaviors of effective mentees in reverse mentoring

Attributes	Behaviors
• Open to learning new concepts • An ability to be taught by those younger, remember that you are the "mentee" • Ability to receiving honest feedback • Proactive in identifying specific needs • Communication skills	• Shows respect for the skills of the mentor • Articulates their needs clearly to the mentor • May require practice and review to improve specific skills • Affective-based learning, allowing attitudinal changes

Is there a role for reverse mentoring in medicine and health education?

The concept of reverse mentoring is particularly relevant within medical education and the health sciences. For example, the flipped classroom and social media for learning are growing within medical education.[31] The key to enhancing student engagement may be in learning from millennials and gaining skills from early career staff. In particular, the advent of new technologies, including e-learning modules, apps, podcasts and online forums, and electronic databases places more junior colleagues at the forefront of an advancing healthcare landscape. Traditional pillars of healthcare are being re-written with the inclusion of new technologies that change the understanding of information exchange as well as core concepts of privacy. For example, the transition to online health records highlights the need for more experienced specialists to be up to date with new technologies in order to access patient information, prescribe medications and

communicate with other clinicians. Less experienced clinicians have a role to play in teaching understanding of these technological developments.

The role of early career clinicians in the reverse mentoring relationship is not limited to the field of technology, however. As outlined by Robinson, junior health professionals can help to drive a workplace culture where "concerns can be raised and learning thrives".[32] Trainees and junior health professionals can provide new perspectives on issues such as clinician health and well-being and exemplify a non-discriminatory approach to patients. In this way, reverse mentoring can assist with the breakdown of the traditionally regimented and hierarchical structure of medicine.[33] In particular, reverse mentoring between senior clinicians and more junior staff from ethnic minority backgrounds can aid in the breakdown of cultural biases and stereotypes, improving diversity.[32] At a societal level, early career staff can enter debate and provide insight into the changing role of healthcare within communities.

Additionally, there is a current emphasis on interdisciplinary teamwork. With increasingly complex healthcare systems, members of the health service delivery team need to collaborate more closely with each other to improve patient safety.[34] Reverse mentoring has the potential to provide a useful means to learn about aspects of others' professions without placing an additional burden on senior clinical staff. Early career staff (resident medical officers, junior physiotherapists, speech therapists, pharmacists and dentists) can provide relevant insights into the organizational structure and learning models of their particular fields and the knowledge, skills and values that are held within their professions. Within medical education, staff usually work across multiple institutions, including hospitals, research centers and universities – here, reverse mentoring affords the opportunity for early career staff, who may have more time, to provide unique insights into other domains.

Reverse mentoring in medical education may also be useful in career transitions across these domains. For example, senior clinicians, who are experts in their medical field, may move into teaching and research roles within medical education. The millennials already working in medical education may provide a closer connection to current trends in the field, have more time, and have a greater enthusiasm than the more experienced medical educationalists. In some regards, reverse mentorship emphasizes the need for continual professional development, where one identifies the gaps in their own knowledge, and seeks to improve specific knowledge and skills.

Introducing reverse mentoring in medical education

The authors (a neurology advanced trainee (AC), two educationalists (AB and CVD) and a pediatric respiratory consultant (CM) all experienced in working across the university and hospital sectors) posit that given the increased use of IT in medical education, there is a place for reverse mentoring in medical education and the health sciences. Often there is a lack of formal relationship between hospital, university and research institutions. Engagement in a reverse mentoring program provides a formal avenue for staff to move between their interests. The development of such a program requires communication and cooperation between senior leaders of all institutions, as well as leadership and input from early career staff to establish a program that functions across institutions, as outlined in Figure 1.

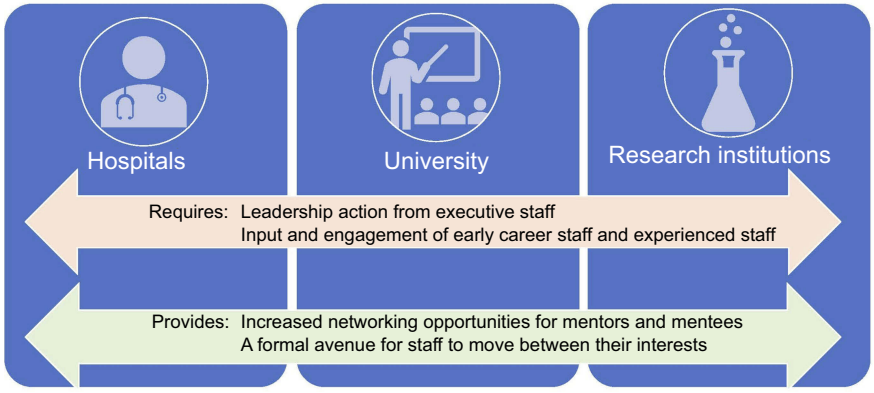

Figure 1 Flowchart illustrating the activities and input required for a reverse mentorship program.

Benefits of reverse mentoring

The benefits of mentorship are widespread and have been evaluated specifically in the field of health sciences.[35] In particular, mentorship is linked to significant mentee benefits, including facilitating specialty choice, career advancement,[36] as well as productivity.[37] The presence of a mentor is associated with higher reports of career satisfaction.[38] Mentoring, in its traditional sense, also holds benefits for the mentor. Through discussion and collaboration, mentors are given the opportunity to share their wisdom and experience, leading to a sense of personal fulfillment and a renewed sense of awareness of their own professional skills and workplace practices.[2] Similarly, a reverse mentoring relationship holds benefits for both parties.

Benefits for mentors

For a less experienced employee in the role of mentor, the benefits relate predominantly to the development of professional skills, improved organizational culture through the opening of communication lines, and enhanced clinical and academic opportunities due to the exchange of new knowledge. The opportunity to work closely with a more experienced colleague facilitates the development of skills necessary to be a good mentor.[30] The mentor can develop his or her professional skills in tandem with the provision of a new set of ideas or knowledge to the mentee. The exchange of ideas can aid in the development of cross-generational leadership, important in a changing healthcare landscape.[39] Thus, a portion of the knowledge sharing provided by mentees fulfills the traditional concept of mentorship.[7] Indeed, Lee et al propose that mentees have an obligation to "return on investment".[30] In the case of reverse mentoring, the return on investment includes the sharing of experience and "role modeling"[40] the professional skills necessary for the development of less experienced colleagues. For example, within medicine, role modeling by clinicians plays a key role in shaping trainees' and students' professional competencies, values and attitudes.[41] In the reverse mentorship relationship, clinical skills and knowledge, teaching skills and personal qualities are areas that may be exhibited by the more experienced mentee, and emulated by the less experienced mentor.

For less experienced mentors, the opportunity to engage in a relationship that is more partnership than apprenticeship facilitates open communication. In the traditionally hierarchical field of health sciences, discussion and exchange of ideas can contribute to a mentor's feeling of empowerment and job satisfaction. Previous studies in traditional mentorship in clinical medicine describe junior employees being afraid to approach a senior colleague about mentorship.[36] The abrogation of traditional learner-teacher models can facilitate an improved organizational culture and workplace.[7] The mentor may feel more like a peer than a junior colleague, an important motivator for millennial employees.[42] Carrying this forward, reverse mentoring can extend mentors social capital, improving access to the resources of others.[43]

The engagement of reverse mentors may guide research selection and involvement in new directions. In traditional mentoring relationships, the mentor acts as a "sponsor" for the mentee.[40] As a sponsor, the mentor gives and shares opportunities in research and provides constructive critique to guide maturity in the research product.[44] In contrast, reverse mentors, armed with new knowledge at the forefront of innovation, may play a more partisan role in the development of ideas.[7] In turn, this can drive a more collaborative and productive mentoring relationship in the field of education and research. Table 4 summarizes the potential benefits for mentors in reverse mentoring.

Benefits for mentees

The more experienced mentee in a reverse mentoring relationship stands to gain benefits, predominantly an exposure to the newest content or technical skills, as well as an enhancement of existing leadership skills[7] and renewed enthusiasm.[40]

It has long been accepted that mentoring is a "two-way street".[2,40,47] A more experienced mentee stands to gain tangible benefits from a successful reverse mentorship. These include improved research output[40] and the inclusion of new ideas in the mentee's work.[30] Mentees may also gain insight into other fields within the healthcare spectrum.[2] In an era dominated by advances in IT, mentees can also benefit from a renewed understanding of practical skills in clinical medicine, particularly the increasing role of e-medicine and online learning tools.

Table 4 Potential benefits for mentors in reverse mentoring

• Increased job satisfaction
• Learning a new professional skill
• Access and links to a wider network, which may include those in leadership roles
• Practice in providing honest feedback to senior colleagues
• Greater opportunities to be included in research
• Opportunity to role model from leaders with qualities you admire

For more experienced mentees, engagement in reverse mentoring can cultivate existing leadership skills, enhancing communication across generations in the workplace.[7] Mentees stand to gain improved social capital through increased intra-organizational support and knowledge exchange. Additionally, Tobin argues that the gain of "youthful energy" from an engaged and contributory young person is a "major benefit" of mentorship.[40] Talented, albeit less experienced, mentors can bring new ideas and renewed enthusiasm to a mentee's existing work.[30] This may renew interest in a more experienced mentee's personal career. The potential benefits for mentees in reverse mentoring are summarized in Table 5.

Disadvantages of reverse mentoring

The disadvantages of reverse mentoring lie in the foundation of the construct. The mentor as a younger or less experienced contributor to the relationship may be plagued by a lack of confidence and experience. This reflects a traditional imbalance in the concepts of power and may be exacerbated by the overlapping roles between mentor and mentee in a reverse mentorship.

In traditional concepts of mentorship, there is an inherent imbalance of power between mentee and mentor which is well recognized,[36,45] particularly in the traditionally hierarchical fields of academic and clinical medicine. Reverse mentoring aims to eliminate these traditional roles by elevating the less experienced colleague to the role of mentor. By contributing new and innovative knowledge to the relationship, the mentor's status is raised, and the mentor and mentee are considered equals and learn from each other.[45] However, the mentor may lack prior experience in the role of mentor,[2] limiting his or her ability to fulfill this role adequately. Where mentors lack confidence in their interaction, information exchange is curtailed.[45] In order to overcome this potential limitation, reverse mentoring relationships must be characterized by mutuality,[7] reciprocity and mutual respect.[37]

Table 5 Potential benefits for mentees in reverse mentoring

- Improve the social capital of the organization
- Renewed enthusiasm and energy for a new topic
- Gain greater insight into the workplace
- Opportunity to provide junior specialists access to a wider network, which may otherwise be difficult for them to enter
- Attainment of new learned knowledge and skills

The view of reverse mentorship as a community of practice, characterized by the sharing of knowledge, can lead to a lack of clarity in the role of the mentor and mentee.[2] Overlapping roles can blur the boundaries of the traditional mentor–mentee exchange.[46] Traditional mentoring relationships have typically advocated for self-identification of mentors by mentees, rather than the formal assigning of mentors.[47] There is a lack of literature regarding the most useful way to assign roles in a reverse mentoring relationship, and whether the engagement of mentors and mentees would also benefit from self-identification.

Conclusion

The importance of mentoring in medical education and the health sciences is well documented. However, as outlined by Sambunjak et al, there is an absence of experimental research about mentorship, particularly with regards to theoretical and conceptual perspectives on mentorship.[44] Sheri et al advocate for further longitudinal reviews of mentoring efficacy.[28] In particular, the relatively contemporary concept of reverse mentoring stands to benefit from further research. In a changing healthcare and medical education landscape, the role of junior colleagues as mentors will increase, particularly with the advent of concepts such as electronic health data and online platforms, and as improved interactions within the workplace and across disciplines are emphasized. More senior colleagues can benefit from their junior colleagues' enhanced understanding of these concepts and involvement in new research. There has been some exploration of these benefits in the IT, business and educational literature. Further investigation and analysis of reverse mentoring in the field of medical education and health sciences is warranted. Research should focus on the role of the mentor and content of mentorship, including the assigning of mentors, as well as adverse outcomes of mentorship.

Disclosure

The authors report no conflicts of interest in this work.

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1.4 Interprofessional education: tips for design and implementation

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Interprofessional education: tips for design and implementation

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Abstract

Interprofessional education (IPE) is a critical approach for preparing students to enter the health workforce, where teamwork and collaboration are important competencies. IPE has been promoted by a number of international health organisations, as part of a redesign of healthcare systems to promote interprofessional teamwork, to enhance the quality of patient care, and improve health outcomes. In response, universities are beginning to create and sustain authentic and inclusive IPE activities, with which students can engage. A growing number of health professionals are expected to support and facilitate interprofessional student groups. Designing interprofessional learning activities, and facilitating interprofessional groups of students requires an additional layer of skills compared with uniprofessional student groups. This article outlines the key points for planning and practicing interprofessional facilitation within the classroom and clinical setting.

Keywords: Interprofessional education, Multidisciplinary, Facilitation, Teamwork, Collaboration

Background

The World Health Organisation (WHO) Framework for Action on Interprofessional Education and Collaborative Practice (2010), states that "*Interprofessional education occurs when two or more professionals learn about, from and with each other to enable effective collaboration and improve health outcomes*" [1]. In an increasingly complex healthcare system, members of the health service delivery team need to collaborate with each other to accomplish common goals to improve the patient's experience and outcomes [2, 3]. There is international agreement that health professional students should be prepared for practice by experiencing Interprofessional Education (IPE). Many international health organisations have promoted IPE in the context of an aging population, limited financial resources, and the recognition of a need to redesign the healthcare system to improve teamwork between disciplines, enhance quality of patient care, and improve health outcomes [2, 4]. Universities have been challenged to create and maintain authentic IPE activities that are inclusive of all cohorts [4]. It is critical for health professional students and graduates to engage with the IPE opportunities that they are presented with across various clinical environments at the level of pre-qualification and pre-registration [5].

Despite the abundance of IPE reviews targeting staff, there is a paucity of guidance for students wishing to actively engage in IPE activities as a facilitator. This paper provides health professional students and junior health professionals with strategies for planning, designing and facilitating interprofessional groups of students within formal classroom and informal clinical settings.

Interprofessional education: what and why?

Most health professional education is uniprofessional, where the goal is developing the depth of disciplinary knowledge necessary for the newly qualified graduate to be prepared for practice. Learning from and with other health professional students can occur in many environments, including

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large classes, small group tutorials, simulation and the clinical setting. Meeting the learning goals of IPE can occur through planned collaborative learning experiences, but also through the unplanned encounters where students are co-located in clinical placements. Institutions that support interprofessional collaboration work on developing and maintaining effective interprofessional working relationships with learners, practitioners, patients/clients, families and communities [6]. The leadership teams working alongside healthcare teams embrace IPE as a requirement of health professional practice, that is key to delivering good healthcare [7, 8].

Interprofessional competency development

The learning goals of any IPE activity are best drawn from existing interprofessional competency frameworks. There are several of these to choose from, including the Canadian Interprofessional Health Collaborative [6] and Interprofessional Education Collaborative (2016) [9]. The core competencies for IPE can be summarised into five themes [9]:

1. Roles and responsibilities
2. Ethical practice
3. Conflict resolution
4. Communication
5. Collaboration and teamwork

One or more of these themes should be considered as an outcome when designing an interprofessional activity and where possible matched to an assessment task [9, 15, 16]. Table 1 summarises some of the key issues underpinning each of these five themes to take into account when designing and/or facilitating or providing feedback on teamwork activities [10–16].

Preparing for Interprofessional learning activities

In IPE, there are opportunities for both formal and informal learning experiences. While informal experiences can assist students in their communication and confidence in their area of expertise, structured formal experiences are more beneficial for beginning students to scaffold their learning [2]. For example, one might compare the medical and pharmacy student experience of participating in a pharmaceutical ward round (informal), with their experience of patient management planning in an interprofessional student-led clinic (formal). Participation in IPE as a formal, planned learning experience works towards the goal of developing students' attitudes, knowledge, skills and professional behaviours [2].

When designing interprofessional activities, constructive alignment ensures learning outcomes are directly aligned with the activity, and to relevant assessment tasks. This must be made evident to the participating students at the start of an activity. Facilitating interprofessional groups of students is similar in theory and practice to that of uniprofessional groups of students, with the fundamentals remaining the same in planning and activity design. However, literature suggests that facilitators need to adjust their

Table 1 Common themes of IPE

Roles and responsibilities	No single health profession is capable of meeting all patient needs, fuelling the desire to collaborate. Many professionals understand that the more they 'know' about other professional's roles, the more they will know how to operate and function as a team [10]. Tension between individuals arises from people stepping on other's toes, as 'role blurring' results in team members risking conflict, team dysfunction, and burnout. Clear boundaries and role descriptions can assist in finding a balance, just as focusing on a patient's needs can reduce many perceived professional boundaries [10].
Ethical practice	Ethical practice within healthcare is classed as the standards of practice and responsibilities professionals hold with their patients and colleagues. Heavily reliant on collaborative, team practice and moral obligation, health professionals are required to make complex ethical decisions as a team [11].
Conflict resolution	Health professionals are encouraged to actively engage with other professionals and patients in a positive manner, addressing disagreements in a constructive manner as they arise. Conflicts can be resolved by identifying and addressing specific areas of disagreement and by establishing safe environments and structures to express differing opinions and viewpoints [6].
Communication	Communication is a central concept to many interprofessional frameworks, functioning as the core process through which collaboration occurs [7]. Poor information transfer is closely linked to poor patient outcomes, and potential harm [10]. Communication exists on individual and group levels and occurs in both formal (meetings, patient records) and informal ways (emails, passing comments). Organisations can foster the use of tools such as ISBAR (a clinical handover design using "Introduction, Situation, Background, Assessment Recommendation"), and protocols to assist in effective workplace communication - particularly patient handover [7, 12]. Skilful communication can enable individuals to overcome differences in opinion and negotiate reaching consensus [12]. It is useful to adjust language and terminology used to suit the intended audience and team members. Questioning should also be adjusted to approach situations from different perspectives [10].
Collaboration and teamwork	Collaborative practice is the central component of IPE, for without this, teams cannot effectively function [13]. Learning which includes regular interactions in interprofessional teams, has been shown to produce positive change in student perceptions towards IPE, regardless of the type of activity [14]. Collaborative practice not only refers to the health professionals working together, but also with the patients, their families and the community to provide effective healthcare [1]. Evidence suggests that collaborative practice can improve access to health-services, health outcomes, patient care and safety [1].

teaching strategies to interact and direct student learning for different professions [17]. In turn this requires more rigorous preparation and guidance [17]. Table 2 displays items to consider when planning learning activities for uniprofessional groups in comparison to interprofessional groups of students [17, 18].

Facilitating interprofessional education

Representatives including students from various disciplines should contribute to IPE programs and activities through joint planning, the investment of time, accountability, and a commitment to the facilitation of interprofessional learning [19]. Role modelling of 'interprofessional leadership' by facilitators, allows students to witness the collaborative nature of joint leadership, promoting trust and acceptance of interprofessional practice. It is important to facilitate the scaffolding of student learning, and support students' 'ownership' of learning. Students should be encouraged to build on their current knowledge and skills, and share the responsibility for shaping their teaching and learning.

The establishment of a supportive and inclusive learning environment should be evident from the onset of any teaching activity [20, 21]. Without it, students are less willing to participate and actively engage in the learning experiences offered. Small group teaching offers an effective mechanism to facilitate IPE in the classroom. The benefits of small group teaching include increased teaching flexibility, differentiation for student learning, increased student engagement, and active student involvement [20, 21], providing a more independent approach to learning. Close interaction of group members provides a community like environment, social interaction, and a shared sense of identity, leading to a more meaningful learning experience [20, 21].

Facilitating interprofessional groups of students can be rewarding as well as challenging, as the diverse group of students look to the facilitator for guidance. While advice and guidance may be offered it can be difficult to remove the discipline specific 'hat', and consider all health professional responses. Key to good facilitation is a shared depth of disciplinary knowledge around student learning outcomes, and a focus on the interprofessional collaborative outcomes. Other elements essential to facilitation of IPE activities include demonstration of appreciation and respect for the roles of other health professionals, promotion of team formation and conflict resolution, and insight into one's own professional practice [17]. Additionally, the use of online media to deliver IPE is becoming increasingly prevalent [22, 23]. This reflects the adjustment needed to overcome a range of timetabling and geographical difficulties associated with the face-to-face delivery of IPE [22, 23]. Although there is much research needed in this area, a recent review highlighted the need for facilitators to be proactive in guiding learners to share their professional perspectives on the online IPE discussion boards [22].

Facilitating IPE in the clinical setting

Facilitators often feel they are capable and well prepared to teach students of their own profession, but not those of other health professions. Egan-Lee et al. (2011) state that facilitating interprofessional groups of students in the clinical setting requires a specific skill set, and incorporates a range of attributes, including: confidence, flexibility in managing professional conflict, and a commitment to IPE [24]. Tips to encourage trust between health professions [25–27]:

- Trust develops over time, be patient and work on the development of interpersonal relationships
- Use students' names, not role or location

Table 2 Comparison of student group activities

	Uniprofessional student group	Interprofessional student group
Environment	Various settings e.g. lecture theatres, classrooms, clinical settings, informal conversation.	Various settings e.g. lecture theatres, classrooms, clinical settings, informal conversation.
Team dynamics	Students may have pre-existing friendships, and an understanding of each others' knowledge and skill levels.	Increased chance of miscommunication due to different disciplines and terminology being involved. Possibility of hierarchical issues.
Grouping	Grouped according to experience, mixed or random grouping. Often pre-determined grouping by the facilitator is preferable.	Ensure a mixed student group i.e. students should work with students from different disciplines in their groups. Pre-determined grouping by the facilitator is preferable.
Facilitators	Most often a professional of the discipline being taught e.g. Nurse educating nursing students.	Should represent the various disciplines of students being taught e.g. if nursing, medical and pharmacy students are present, facilitators should be from those disciplines.
Activity design	Individual and group activities should be included.	Majority of activities should be group based to ensure students are gaining the most of the interprofessional experience.
Assessment	Assessed well and often. Assessment types include exams, Objective Structured Clinical Examinations (OSCEs), teamwork, Team-based learning (TBL), essays, etc.	Professional skills based assessment e.g. communication. Peer Assessment.

- A disagreement should not be interpreted as disrespect, just differing opinion
- Offer your skills and knowledge, with trust developing through your successes.

Table 3 provides 'ten tips' to assist facilitation of interprofessional learning and the building of positive team function' [7, 13, 20, 21, 26–33].

Key challenges of IPE facilitation

The role of the facilitator is central in mediating group dynamics, although team members also have opportunities to influence and diffuse potential issues that may arise in small teams. Facilitators often find it a challenge to support 'teamwork', as with student centred learning, facilitators are required to support the team, but also need to allow them to work independently [26]. Common barriers to effective teamwork include [33]:

- Lack of communication skills
- Differing professional cultures
- Traditional hierarchies and assumed leadership
- 'Role blurring', confusion over boundaries and responsibilities.

Planned IPE activities

Some activity designs are more effective and better suited to the delivery of IPE. Small group teaching is an effective method for facilitating interprofessional student groups and preparation is essential for effective student learning [34]. Examples of methods of teaching used in design of interprofessional activities include Team-based learning (TBL), simulation and student led interprofessional clinics [35, 36]. In particular, in the junior years, TBL has the capacity to draw participants' attention to the process of learning, and has been correlated with encouraging better teamwork skills and improved communication [35].

Peer teaching in IPE

Within IPE activities, peer teaching provides a form of student interaction facilitated within formal professional contexts [20, 21]. Learning in this context provides a process of socialisation, where students have the opportunity to share their experiences within their own discipline, with students from other disciplines. The social and cognitive congruence of students provides a quality that is difficult to emulate, as they learn from each other. IPE activities provide students with opportunities to familiarise themselves with the different language and tasks of each others' professions. Concurrently, this process contributes to the development of students' own professional identity, and

Table 3 Ten tips to assist facilitation of interprofessional learning and the building of positive team function

Structured, early orientation to IPL	Early participation in IPE activities promotes recognition of the need for effective communication within healthcare teams, and better prepares students for interprofessional practice.
Role of other professions	Ensure you have a good understanding of the role of each profession.
Questioning	Allow discussion time, and elicit answers from the students, rather than giving answers yourself. For example, *"What evidence supports your claim?"* Use a reflective approach, with probing questions that enable the development of students' problem solving and clinical reasoning skills.
Focus on the needs of patients	Assist in the breakdown of hierarchical barriers by focussing on patient needs and patient safety.
Trust	Encourage the building of relationships and trust, between both the facilitator and students, and also within student teams. Trust is established through ongoing professional and personal interactions [25].
Flipped classroom approach	The flipped classroom approach to interprofessional education has many benefits. It encourages a 'level playing field', where all students are provided with the same pre-class information, and attend class with this assumed knowledge. This frees up in-class time for student-centred learning, where the facilitator is free to support the knowledge and skills development of students.
Be a facilitator, not a lecturer	You are not a content expert in every discipline. Although you may be more accustomed to delivering content, rather than facilitating discussion, it is important to facilitate, and not lecture. Try to follow the 90:10 rule: listen for 90% of the time, and talk for 10% [26].
Peer learning	Encourage peer teaching and learning. Students are closer to each other in terms of knowledge and skills, and are likely to have a greater understanding than tutors regarding concepts their peers are struggling with. They are sometimes better than faculty at teaching concepts to one another [27].
Review and reflect	Since interprofessional activities are normally focussed on a health topic, or patient case, students may not realise how much they have learnt about each other's professions. For this reason, it is recommended that you review and make the interprofessional concepts explicit at the end of class, to help students recognise the outcomes, and their achievements.
Assessment and Feedback	There are many available interprofessional competency frameworks to draw from in designing assessment activities [5, 8, 28]. The use of peer assessment and peer feedback is well suited to interprofessional activities, promoting self-assessment and reflection on one's own work. However, peer assessment may be viewed negatively if the process is not transparent, with clear assessment criteria [29].

their understanding of different professional responsibilities [29].

Assessment and feedback during IPE activities

The provision of accurate, timely feedback to learners on their progress towards achievement of IPE outcomes is a critical component of health professional education programs [37]. Feedback should be seen as an active process that emphasises the agency of the learner as an active seeker of feedback on the basis of which they can improve their performance. Giving and receiving peer feedback within the interprofessional context can be powerful. The views of health professionals outside of one's own discipline is often meaningful, increasing self-reflection. Multidisciplinary feedback has the ability to promote reflection on communication and the use of terminology [24].

Evaluating the implementation of IPE activities

A Cochrane systematic review provides evidence that IPE evaluation and research lacks rigorous design, and to date has not effectively provided insight into how IPE affects change in healthcare processes and patient outcomes [38]. The authors suggest research be explicitly focused on IPE, include comparative studies, and large sample sizes. Reeves et al. (2015) suggest that high quality evaluations of interprofessional education include the following steps [38]:

1. Plan and consider the evaluation early on during curriculum development
2. Have a clear purpose for the evaluation and form concise evaluation questions
3. Have an understanding of the intended stakeholders and the learning outcomes
4. Consider the use of a theoretical perspective to strengthen the evaluation
5. Use an evaluation model that adopts a comprehensive approach, and explores the processes related to the learning activity
6. Select an evaluation design that reflects the research question, considering whether quantitative or qualitative evaluation design, or a mixed methods evaluation is required.

Conclusion

Although IPE is an integral feature of forward thinking university health education programs, it is often raised as deficit, with many existing challenges, including adequate curriculum space and funding [39]. Planning, design and facilitation of interprofessional learning is challenging, but achievable through the creation of authentic IPE activities for health professional students. Early training and experiences of IPE have the potential to lead to improved leadership, collaboration and communication between healthcare teams, ultimately improving patient safety [39–41].

Take-home message

- Early participation in IPE activities promotes recognition of the need for effective communication between different health professionals, and helps prepare students for professional practice
- Facilitation of interprofessional student groups often requires more rigorous preparation and guidance
- The 'flipped classroom' approach to interprofessional education helps to ensure a 'level playing field' for students from different disciplines, and helps free up in-class time

Abbreviations

IPE: Interprofessional education; WHO: World Health Organisation; TBL: Team-based learning; OSCE: Objective Structured Clinical Examinations

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1.5 Leadership in healthcare education

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REVIEW Open Access

Leadership in healthcare education

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Abstract

Effective leadership is a complex and highly valued component of healthcare education, increasingly recognised as essential to the delivery of high standards of education, research and clinical practice. To meet the needs of healthcare in the twenty-first century, competent leaders will be increasingly important across all health professions, including allied health, nursing, pharmacy, dentistry, and medicine. Consequently, incorporation of leadership training and development should be part of all health professional curricula. A new type of leader is emerging: one who role models the balance between autonomy and accountability, emphasises teamwork, and focuses on improving patient outcomes. Healthcare education leaders are required to work effectively and collaboratively across discipline and organisational boundaries, where titles are not always linked to leadership roles. This paper briefly considers the current theories of leadership, and explores leadership skills and roles within the context of healthcare education.

Keywords: Leadership, Leadership theory, Teamwork, Role models, Management, Organisational goals

Background

Leadership has many interpretations, and has been likened to *"the abominable snowman whose footprints are everywhere but who is nowhere to be seen"* [1]. It is an influential process, through which groups of people work towards the achievement of a common goal [2]. Leaders have the ability to shape and influence their followers' values, attitudes and behaviours through a dyadic relationship. They are able to gain and enlist the support of others in order to achieve shared goals [3, 4]. Effective leadership is a complex and highly valued component of healthcare education, increasingly recognised as essential to the delivery of high standards of education, research and clinical practice [3]. In order to achieve more effective outcomes, leadership and management skills are now an expectation and requirement in the healthcare education setting [5]. However, leaders within healthcare education should not rely on formal positions of authority, but instead, utilise their own appropriate leadership qualities irrespective of their level within the organisation [3]. A new type of leader is emerging: one who role models the balance between autonomy and accountability, emphasises teamwork, and focuses on improving patient outcomes [3]. This paper briefly considers the theories of leadership, and explores leadership skills and roles within the context of healthcare education.

Management versus leadership

Management and leadership are considered just as important as each other in accomplishing organisational goals. However, there are differences in the functions of the two roles. Management produces order and consistency, while leadership produces change and movement [2]. Management has the responsibility of organising all elements within the organisation, so that the leader's vision and goals are successfully achieved. If poor management is in place, then goals cannot be achieved; and if poor leadership is in place, then there is no clear goal or vision to work towards. Leadership is seen as *"setting direction, influencing others and managing change: with management concerned with the marshalling and*

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organisation of resources and maintaining stability" [6]. These differences are summarised in Table 1 [6, 7].

Transactional and transformational leadership

Leadership is a social construct, and there are many different leadership models [6]. Two broad types of leadership are identifiable: *"transactional"* and *"transformational"*. And their respective features are a useful way to think about the many types of leadership. Transactional and transformational leadership models are normally amalgamated within organisations to "empower others" (transformational) while holding individuals "accountable" (transactional) for their actions [7–9]. While it is clear that both transformational and transactional leadership paradigms are needed for an organisation to be effective, the optimal leader predominantly practices the transformational aspects of leadership, rather than transactional [10].

Transactional leadership

The transactional model is seen as an authoritative relationship that is transaction based, where exchanges occur between a leader and follower, once specific goals are identified or decided upon. Transactional leaders value order and structure, and have formal authority, with positions of responsibility within organisations. They achieve organisational goals through a rewards system and through positive reinforcement. A weakness of this model is the lack of innovation, as individuals are driven by predetermined outcomes, and there is lack of incentive and motivation to perform beyond what is expected [6].

Table 1 Leadership versus Management (adapted from Swanwick & McKimm, 2011) [6]

Leadership	Management
• **Establishes direction**	• **Plan and Budget**
- Creates a shared vision	- Resource allocation
- Identifies the bigger picture	- Time management and process steps
- Sets goals and strategies in place	- Establish agendas
• **Connecting people**	• **Employment and organising**
- Communication of goals	- Maintain structure
- Team building and networking	- Staffing placements
- Aims for commitment	- Enforce rules and procedures
• **Motivate and Drive**	• **Control and Problem solve**
- Inspire and motivate	- Reward systems
- Empower followers	- Identifies problems
- Identify and work towards needs	- Solves problems/takes corrective actions

Transformational leadership

Since the introduction of transformational leadership, the concept of leadership has undergone a major shift from representing an authoritative relationship (transactional), to a process of influencing individuals (transformational). Transformational leadership involves leadership through the transformation of individuals or 'followers', to work towards a common organisational goal [9–11]. This contemporary form of leadership is based on inspiring individuals, and forming teams to achieve goals. *Transformational* leaders define organisations through the articulation of a clear vision and clear values. The four "I"s of transformational leadership are outlined in Table 2 [9].

Team leadership

More recently, the focus has shifted towards *"team leadership"*, with distributed leadership becoming more prevalent within healthcare education, where different professions share influence [12, 13]. Increasingly, leadership involves a collaborative role, with an emphasis on shared leadership and thoughtful allocation of responsibilities. Team-based organisations shift central control from the one leader, to the team. Teams are comprised of members who are interdependent, needing to coordinate their activities in order to accomplish their shared goals [14, 15]. Personal autonomy, accountability, appropriate recognition, and clarity of roles, are all elements that contribute to optimal team performance. However, to ensure success, the organisational culture needs to support the involvement of individuals in these teams, and encourage leadership qualities [15]. Teams often fail when they exist in a traditional authority structure, where organisational culture is not supportive of collaborative work, and lower level decision making. Distributed leadership entails sharing of influence by team members, who step forward, or take a step back as needed. Leadership is provided by the person who meets the specific needs of the team at the time, hence providing faster responses to more complex issues in today's organisations [15–17]. Effective leaders have an

Table 2 The four "I"s of transformational leadership (adapted from Bass & Aviolo, 1994) [9]

Idealised influence
Pride, respect and trust is stimulated through the development of a vision
Inspirational motivation
High expectations are created through role modelling
Individualised consideration
Respect and responsibility is fostered through personal attention to followers
Intellectual stimulation
New ideas and approaches are used to challenge followers

understanding of the conditions needed for teams to function well. For a team to achieve its potential, the operational roles of its members should be matched to their members' abilities [18]. Belbin (1991) classified nine roles of team members that contribute to its process and function [19], outlined in Table 3. Importantly, within team leadership, no single team role should be regarded as more important than another. Successful teams thrive on their diversity, drawing from the strengths of each member [13].

Effective leadership

Leaders need to have good time management and organisational skills, the ability to network professionally, display political nous and most importantly, they need to have strong communication skills [4, 20, 21]. Ready acceptance of feedback and self-awareness are important in development of leadership skills [20, 21]. Behaviour, habits and biases can be deliberately corrected by utilising received feedback. Although there is not one set of qualities that apply to being an effective leader, certain competencies are valued and contribute to the leadership model in different ways [5]. Leadership competencies relevant for all health professional educators are outlined in Table 4 [3].

Language of leadership

Just as education and healthcare organisations have evolved, so too has the team leader. The role of the modern leader reinforces the tenets of stepping forward, collaborating and contributing. This role involves encouraging others by practising followership, and lending meaningful support to other leaders. As already stated, when it comes to leadership, excellent communication skills are a must. In order for successful communication to occur, both the sender and receiver must understand the message. This means that active listening is just as important as active talking [22]. Language used needs to be [22]:

Clear

- Communicate with clarity of your purpose and the role of others

Stimulating

- Deliver messages in a powerful, inspiring and dramatic way

Congruent

- Lead by example and walk the talk

Include active listening

- Acknowledge what has been communicated, and use questioning skills
- Show that you value others and their contributions

Challenges for leaders in healthcare education

There are a number of unique challenges in healthcare education. Healthcare education is delivered across professional disciplines, and notably, across organisational boundaries, involving universities, hospitals, and healthcare services. In turn, these organisations are bound by their own systems, structures, policies, cultures and values. At some point, most leaders in healthcare education need to make a decision about their leadership direction, and whether it lies predominantly in higher education or the clinical setting; and whether it lies in undergraduate education or postgraduate education. It can be difficult to merge roles between organisations, and McKimm (2004) has identified a number of issues and challenges specific to health education leaders, outlined in Table 5 [22, 23]. Throughout a career, it may be necessary to maintain an awareness of available opportunities within organisations, and match these to the required experiences and capabilities [22, 23] (see Fig. 1).

Development of leadership skills

Workforce data indicates that many experienced clinicians and healthcare educators will retire over the next

Table 3 Roles of team members that contribute to its process and function (adapted from Belbin, 1991) [19]

ROLE	DESCRIPTION
Plant: the 'ideas' person	Thoughtful and creative, but may lack communication skills, and attention to required detail.
Co-ordinator: the 'chairperson'	Co-ordinates the work, rather than undertaking the work. Involves all team-members, and mediates discussion.
Monitor evaluator: the 'critic'	Objectively evaluates everything, and may be perceived as negative.
Implementer: the 'doer'	A reliable worker who puts the ideas into action, although they may lack flexibility.
Completer finisher: the 'details' person	Is conscientious in completing the job, and pays attention to detail.
Resource investigator: the 'networker'	Sources information and resources, acts as the group's 'ambassador', although enthusiasm may fade during the project.
Shaper: the 'driver'	Keeps the project moving, enjoys the action, but can upset others as they push through the ideas.
Teamworker: the 'peacemaker'	Assists with diplomacy and helps keep the team working effectively, although they can be indecisive.
Specialist: the 'expert'	Provides expert knowledge, although their input may be restricted to their own specialised area.

Table 4 Leadership competencies for health professional educators (adapted from Oates, 2012) [3]

Knowledge of leadership concepts

- This includes theoretical background, organisational structure, and leadership development of others.

Motivator, mentor and facilitator

- Integrity should be shown in motivating and encouraging others instead of controlling situations.
- Through excellence in role modelling, and careful delegation, future leaders are developed, and succession planning can occur.

Communicator

- Good communication entails consistent messages through various methods over time.
- Communication by leaders is required at all levels: to senior management, administrators, team members, and to patients.
- Communication should always be respectful, and acknowledge the input and achievements of others.
- Networking, facilitating groups, effective listening and feedback skills.

Ability to set direction and lead change

- Understand the environment, set goals, change management, decision making.

Leadership presence

- The ability to assume a leadership role in various settings, share your opinion with confidence, and communicate and engage with others.

Team leader, team player, team-building

- A good leader is not only a team leader, but also a team player, who values and seeks the opinions of others.
- Leaders are involved in teaching, coaching and mentoring, holding team members accountable, and undertaking performance appraisals.
- Conflict resolution skills are needed in leadership roles. The views and abilities of all parties should be respected.
- Group problem-solving, conflict management, contributions to team processes and development.

Healthcare education research skills

- Although time may not permit involvement in educational research, a good leader will have the ability to critically appraise research, and an understanding of the value of research.

Business skills

- Human Resource management, work flow, budgeting, effectiveness evaluation, business plan development.
- Reduction of waste and inefficiencies.
- Financial management skills, including resource allocation, reduction in variation of clinical practice to reduce costs, and increase provisions for clinical care.

Self-management

- Time management, work-life balance.

Ability to develop others

- Coaching, motivating, interpersonal effectiveness.

ten years [24, 25]. The need for effective succession planning and leadership training is well recognised [25–27], with a current shortage of emerging leaders moving into leadership roles. Effective leaders need to be nurtured and supported by the organisations in which they are educated, train and work [6]. As a learned skill, the topic of leadership is gathering momentum as a key curriculum area. Leadership development, assessment and feedback are necessary throughout the education and training of health professionals. Aspiring and current leaders can be identified, trained and assessed through formal leadership development programs, and through supportive organisational cultures. This requires embedding leadership training programs, opportunities for leadership practice, and promotion of professional networks within and beyond the organisation. The importance of mentorship within healthcare education is well recognised, offering a means to further enhance leadership and engagement within the workforce [28].

While many are *assigned* as leaders through their job title, it is important to identify, support and develop *emerging* leaders [2]. Leadership consists of a learnable set of practices and skills that can be developed by reading literature and attending leadership courses [29]. Additionally, investment in the social capital of organisations, fostering interprofessional learning and communication in the work setting, and collaboration across organisations assists in leadership development. Developing leadership skills is a life-long process [21]. Resources and opportunities should be considered to assist in the development of leadership skills. Some examples include:

- Reading about leadership e.g. theories on leadership styles
- Attending leadership training workshops

Table 5 Issues and challenges of health education leaders (adapted from McKimm, 2004) [22, 23]

Personal issues

- It can be difficult to maintain an appropriate work-life balance, particularly for those with family responsibilities.
- Managing both clinical and academic careers is difficult.

Organisational and cultural issues

- In order to succeed, leaders need to understand the culture of their own organisation.
- Some healthcare disciplines may better facilitate the demands of both clinical and academic life.

Balancing competing agendas

- Dual demands of the higher education sector, which is highly accountable, and healthcare systems, with rapid change, may be stressful for healthcare education leaders.

The wider agenda

- Education leaders need to have an awareness of the wider healthcare and education agendas, and help drive new issues, such as interprofessional learning and collaboration. They need to help promote diversity and innovation in leadership.

Organisational leadership
Reflect on models of leadership in your current workplace and educational institutions you have been part of. What stood out to you the most? What did most people respond to well? How were the organisational goals best achieved?
Individual leadership
What leadership competencies do you believe you already possess? What qualities do you need to further develop?

Fig. 1 Reflection task

- Participating in mentorship programs either as mentee or mentor
- Joining small group seminars on leadership development
- Accepting more responsibilities when required, or when opportunities arise.

Process for effective leadership

A title is not required to enable effective leadership. Leadership may occur in everyday work, and occurs in collaboration with other professionals within the education and healthcare systems. For example, leadership in teaching, administration, research, and/or excellence in clinical practice.

Leadership roles include the important concept of management of both personal and professional practice. Priorities need to be set and time managed to integrate work and personal life. Tools can be used to stay organised, and deliberately manage busy schedules. Effective delegation may be used to share the work of new projects:

- Organisation to ensure an understanding of tasks, priorities and deadlines
- Establish steps and a sequence to achieve the desired outcomes
- List required resources, considering the competencies of individual team members, and match tasks appropriately (also consider skill development needs)
- Communicate with team members, monitor progress in activities and provide guidance to team members.

Conclusion

Leadership competencies, and the incorporation of leadership development as part of curricula, are identified as important across all health professions, including allied health, nursing, pharmacy, dentistry, and medicine, in meeting the needs of healthcare in the twenty-first century [30]. With an increase in interprofessional teams and an emphasis on collaboration, more effective outcomes are achieved [5]. Healthcare education leaders are required to work effectively and collaboratively across discipline and organisational boundaries, where titles are not always linked to leadership roles, but may occur in everyday work. Good leadership also means knowing when, and how to support others in their endeavours. Provision of opportunities for leadership development is crucial in improving education sectors and health services, and effecting change. The future belongs to healthcare education leaders who demonstrate excellence in teamwork, clinical skills, patient centred care [3], and responsibly balance accountability with autonomy.

Take-home message

- Titles are not always linked to leadership roles.
- The role of today's leader requires stepping forward, collaborating and contributing.
- A good leader is a good team player who values and seeks the opinions of others.
- Leadership requires clear, respectful communication that acknowledges the input and achievements of others.

Abbreviation

HR: Human Resources

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Publisher's Note

1.6 Clinical Teacher Training for health professionals: From blended to online and (maybe) back again?

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INNOVATION, IMPLEMENTATION, IMPROVEMENT

THE CLINICAL TEACHER

Clinical Teacher Training for health professionals: From blended to online and (maybe) back again?

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Abstract

Background: The Clinical Teacher Training (CTT) programme was originally developed as an interprofessional, blended learning programme, to support health professionals working across health services within Australia, although it has also been delivered internationally. With the disruption of COVID-19, we rapidly moved to 'online only' delivery. We sought to modify the programme, ensuring that the constructivist paradigms important for our learner experience through the original blended format were maintained in the online platform.

Approach: Consisting of 10 modules on a range of topics, the new CTT online only programme was facilitated online across 6 weeks with asynchronous and synchronous assessable activities, and provision of peer and facilitator feedback. The learning outcomes for each module were similar to the 'blended learning' format. The new programme was delivered three times throughout 2020 and completed by a total of 208 health professionals from across 10 metropolitan and rural health districts.

Evaluation: The focus of our evaluation was on the programme's final 2020 iteration, for which we had ethics approval. Participants ($n = 59$) were from diverse health professions, across five metropolitan and rural health districts. We prioritised the learner experience in constructing our evaluation strategy. Quantitative and qualitative data were collected by post-course questionnaire and analysed using descriptive statistics and thematic analysis. Twenty participants (34%) responded to the post-course questionnaire. Participants valued the structure, topics, clear outcomes, timeframe, online resources, small group activities, feedback and the flexibility and accessibility afforded by online only delivery. However, participants identified a need for additional 'real-time' engagement in activities. Faculty were surprised by the time required to adequately facilitate online learning, and similarly, valued the real-time interactions.

Implications: The online only CTT programme provided an excellent, scalable framework to ensure continued provision of a relevant and accessible training resource for clinicians working in metropolitan and regional/rural health services. Learner-reported achievement of programme learning outcomes was not negatively impacted by online only delivery. Balancing these resource advantages with learner preferences

and our desire to build active teaching networks, we will continue to host the majority of the programme online, while offering short face-to-face sessions within local contexts.

1 | BACKGROUND

The future of health care education depends on the implementation of effective faculty development programmes designed to sustain a vibrant workforce of education-focused health professionals.[1] The number and variety of faculty development programmes have increased rapidly in recent years, highlighting a need to upskill clinicians in new teaching methods.[2] However, the development of sustainable and scalable programmes that are able to engage clinicians across health care systems and sites remains an important challenge.[3] The Clinical Teacher Training (CTT) programme, established in 2017 at the University of Sydney as an inter-professional, modular, blended learning (online and face-to-face) programme designed to support clinicians to develop teaching skills, has been previously reported.[4] Adopting a 'flipped classroom' model, participants were provided with education literature, online activities and videos and were required to attend a 4-h 'face-to-face' session to participate in active small and large group sessions. Following a successful pilot at one hospital site with 15 participants,[4] the CTT programme has subsequently been successfully delivered multiple times across teaching hospitals, and the modular content has been published.[5–7] Participating clinicians have various responsibilities for teaching health professional students and peers. During 2019, 233 clinicians from across six metropolitan and rural health districts completed the programme.[8]

In 2020, in response to COVID-19 social distancing restrictions, the CTT programme was rapidly moved to 'online only' format. Our content remained unchanged, and delivery, guided by constructivist theory, sought to maintain meaningful opportunities for reflection, active construction of knowledge, and encourage social interaction and collaboration.[9] Fortunately, we had already developed multiple short videos (2–3 min each in duration), images and figures, to help explain and reinforce theoretical concepts and models to use in teaching activities, such as teaching a skill, bedside teaching, role modelling, small group teaching and feedback. However, a highlight of the traditional 'blended learning' programme had been the face-to-face session, with extensive opportunities to build rapport among participants and facilitators from different disciplines, with multiple small group learning activities. These activities, which were formatively assessed, included the following: preparation of a teaching plan, teaching a health care topic, teaching a skill and teaching clinical handover using ISBAR. Critical appraisal and mentorship were discussed in the large group sessions. Peer and facilitator feedback were practiced throughout the face-to-face session. An anticipated challenge of online only delivery was in realising how to supplement the active participation and multidisciplinary interactions that had proven valuable in developing communication skills between different health professions.[4]

In 2020, in response to COVID-19 social distancing restrictions, the CTT programme was rapidly moved to 'online only' format.

2 | APPROACH

Four academics and clinicians facilitated the programme asynchronously online across 6 weeks, and 12 facilitated a 1.5 h synchronous Zoom session. Facilitators were experienced academics or outstanding alumni from previous CTT programmes. The online only CTT programme consisted of 10 modules (Table 1), each requiring approximately 2 h for completion. In the online only format, participants were required to upload a set of completed activities to the Learning Management System (LMS). These included a written teaching plan, a video of themselves teaching a skill to a peer and a written journal club presentation. Participants were required to give and receive peer feedback on each of these activities. Some activities, however, were self-directed and optional, such as teaching clinical handover using ISBAR, 'Using the tools provided, find an opportunity to teach clinical handover using ISBAR to students'. Additionally, participation in online discussion boards for each module was encouraged and carefully monitored by the facilitators. Many of the discussions required reflection, for example, 'Think about someone who you consider to be a good role model. What qualities did/do they display?' During the Zoom session, a short lecture was provided on delivery and facilitation of teaching, and then in small 'break out rooms' (each with four or five participants and one facilitator), participants were assessed on their ability to teach a pre-prepared health care topic and give and receive feedback to their peers. On successful completion of all modules, participants received a certificate of completion. During 2020, 208 participants from across 10 metropolitan and rural health districts completed the new CTT online only programme, which was delivered three times throughout the year.[10]

TABLE 1 Clinical Teacher Training (CTT) programme module titles, topics, outcomes and activities for 'online only' and 'blended learning' delivery

Module title	Outcomes	Activities **Note: Relevant literature and example videos of requirements and teaching methods were provided online for each module, regardless of delivery method.**
Module 1: Introduction to the Clinical Teacher Training Program	This module provides a brief introduction to the Clinical Teacher Training programme. It also provides the foundation for skill development in effective feedback in the clinical setting. It provides participants with the opportunity to: • Critically reflect on past and current 'good' and 'bad' teaching experiences • Consider qualities of effective teachers	'online only' format: Mandatory online discussion boards included: ◦ Introductions ◦ Teaching and learning experiences 'blended learning' format: The introduction module was available online and covered in class through Powerpoint and verbal interaction
Module 2: Feedback in the clinical setting	This module explores the role of feedback within the learning process, the barriers to the feedback process and practical guidelines for facilitating feedback. It provides participants with the opportunity to: • Understand the meaning and purpose of feedback in the clinical setting • Recognise the role and placement of feedback and assessment in the learning cycle	'online only' format: Mandatory online discussion boards included: ◦ Feedback experience (reflective) ◦ Commenting on video examples of feedback. ◦ Giving feedback (practice & reflection/comment). 'blended learning' format: In-class, Powerpoints, videos, role play in large groups, with small group activities requiring the giving and receiving of feedback throughout
Module 3: Planning and delivering a teaching session	This module introduces the central concepts of teaching plan development and delivery. It provides participants with the opportunity to: • Demonstrate the use of key theoretical principles to plan and deliver a teaching session • Demonstrate the provision of effective feedback to peers • Develop confidence in personal teaching ability	'online only' format: Mandatory requirement to submit a teaching plan, and give feedback on an allocated peer's teaching plan. 'blended learning' format: Teaching plans completed and presented in small groups, with teacher and peer feedback provided.
Module 4: Facilitating small group teaching in the health professions	This module provides participants with an overview of approaches and tips to improve learner engagement when facilitating small groups. It provides participants with the opportunity to: • Identify and utilise core skills and strategies needed for small group teaching and interprofessional facilitation • Reflect and evaluate their own teaching practice • Gain an understanding of bedside teaching techniques	'online only' format: ◦ Mandatory discussion boards included reflections on small group facilitation and interprofessional education ◦ Participants attended an online Zoom session, where a short lecture was provided, followed by small group sessions. In small groups each participant taught a health care topic & provided feedback to peers. ◦ A marking rubric was used by the facilitator to formatively assess students' ability to teach and provide feedback. 'blended learning' format: ◦ Students were provided with a short, large group lecture. In small groups each participant taught a health care topic & provided feedback to peers.
Module 5:		'online only' format:

(Continues)

TABLE 1 (Continued)

Module title	Outcomes	Activities Note: Relevant literature and example videos of requirements and teaching methods were provided online for each module, regardless of delivery method.
Key tips for teaching in the clinical setting	This module provides participants with an overview of approaches and key tips for teaching, assessment and feedback in the clinical setting. It provides participants with the opportunity to: • Consider and evaluate the needs of patients in teaching in the clinical setting • Identify the attributes and qualities of clinical teachers as role models • Apply and encourage clinical reasoning as a teaching strategy • Recognise and apply effective teaching, assessment and feedback strategies in the clinical setting	Mandatory discussion boards included watching a video and reflecting on good role models. 'blended learning' format: Large group interactive short lectures were provided on clinical reasoning and bedside teaching methods.
Module 6: Teaching a skill	This module explores how skills are learned; ways to improve skills performance; determining competency; and the provision of effective feedback. It provides participants with the opportunity to: • Recognise and describe Peyton's four step approach in skills teaching • Apply and demonstrate the use of Peyton's four step approach in teaching a skill • Demonstrate the provision of effective feedback to a peer on a skills teaching session • Recognise the importance of deliberate practice in improving performance	'online only' format: Mandatory discussion board on Teaching a clinical or procedural skill. Students were required to video themselves teaching a non-health care skill, peer feedback, upload the video and provide formative feedback to their peers using marking rubrics. 'blended learning' format: Large group interactive short lecture was provided. In small groups, students were then required to teach a non-health care skill to their peers, and give and receive feedback. A marking rubric was used by the facilitator to formatively assess students' ability to teach and provide feedback.
Module 7: Teaching Clinical handover with ISBAR	This module considers the use of ISBAR as a framework for teaching effective clinical handover. It emphasises key skills and strategies needed for effective clinical handover. It provides participants with the opportunity to: • Identify and use the ISBAR framework for effective communication during handover • Practice teaching clinical handover using ISBAR	'online only' format: Non-mandatory discussion board, where students had the opportunity to practice teaching ISBAR and reflect on their experience. 'blended learning' format: Large group short lecture was provided. Participants practiced teaching clinical handover using ISBAR and provided peer feedback.
Module 8: Team-based learning (TBL): design, facilitation and participation	This module provides an overview of TBL and guidance for teachers towards successful TBL design and implementation within health professional education. It also offers guidance for students participating in TBL. This module provides participants with the opportunity to: • Identify the steps of Team-based learning (TBL) • Describe the core elements of TBL (and what makes it work).	'online only' format: Participants were asked to read material and view TBL videos. 'blended learning' format: The principles of team-based learning were itself taught using a TBL format, requiring active participation (short lecture, video, multiple choice questions, problem-solving and feedback).

(Continues)

TABLE 1 (Continued)

Module title	Outcomes	Activities Note: Relevant literature and example videos of requirements and teaching methods were provided online for each module, regardless of delivery method.
	• Discuss the process and role of student peer-review in group work • Discuss group formation and student engagement in group work • Discuss promotion of clinical reasoning and collaborative learning in small groups • Discuss student motivation for group work • Discuss assessment and provision of feedback on small group work	
Module 9: Journal Club and Critical Appraisal	This module considers the key features to a successful Journal Club, selection of manuscripts, presentation requirements, and the essential skills in critical appraisal. It provides participants with the opportunity to: • Reflect on positive past experiences in participating in Journal Clubs • Understand the purpose of Journal Clubs • Practice and understand effective methods of presenting at Journal Clubs • Practice and understand effective methods of critical appraisal	'online only' format: Participants were required to prepare a journal club presentation, using a provided format, upload this and provide feedback to an allocated peer's journal club presented. 'blended learning' format: Open discussion and questions regarding Journal Club presentation
Module 10: Mentorship	This module provides an overview of current trends to assist those considering implementation of mentorship programmes within their institutions, and the key elements of effective mentoring. It provides participants with opportunities to consider: • the benefits of mentorship for mentees, mentors and organisations • the various phases and styles of mentorship • key elements of effective mentorship • ethical issues and potential difficulties in mentorship	'online only' format: Mandatory discussion boards on the characteristics of good mentors and mentees, and reflection on a provided case scenario regarding the Ethical issues in mentorship. 'blended learning' format: A large group discussion took place on Mentorship

3 | EVALUATION

Fifty-nine health professionals completed the final iteration of the CTT programme in October 2020, for which we had ethics approval for evaluation. Participants were from the disciplines of Medicine (49/59, 83%), Nursing (5/59, 8%), Physiotherapy (3/59, 5%) Dentistry (1/59, 2%) and Basic Science (1/59, 2%). Participants were from five metropolitan and rural health districts. Of these, 29 (49%) were from a rural health district.

Quantitative and qualitative data were collected from participants by a post-course questionnaire, reflecting on participants':

1. Perceived achievement of learning outcomes;
2. Intention to participate in teaching activities;
3. Attitudes towards interprofessional learning; and
4. Perception of the online only delivery.

Participants were asked to respond to 27 closed items, using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Participants were also asked to respond to five open-ended questions. Our questions were based on a previously published study using blended learning delivery,[4] with the addition of questions pertaining to online only delivery. Quantitative data were analysed using descriptive statistics, and qualitative data were analysed using thematic analysis.[11]

3.1 | Ethics approval

The University of Sydney Human Research Ethics Committee approved the evaluation.

4 | RESULTS

4.1 | Questionnaire

In total, 20/59 (34%) of online participants completed the questionnaire. Eleven respondents were female. The age of respondents ranged from 25 to 72 years. The professions of respondents were represented as follows: Medicine (16/20, 80%), Physiotherapy (3/20, 15%) and Basic sciences (1/20, 5%). Nineteen respondents reported previous teaching experience, and eight reported having prior teacher training.

Participants found the delivery to be well-structured, with appropriate timelines for completion across the 6 weeks. Participants reported good levels of confidence in their ability to plan, prepare and facilitate a small group learning activity, teach and assess students, and provide constructive feedback. They valued provision of educational theory and frameworks, such as Pendleton's model for giving feedback, that could be recalled for future practice.

Participants found the delivery to be well-structured, with appropriate timelines for completion across the 6 weeks.

4.2 | Closed-item responses

Participant responses to closed items regarding programme outcomes (items 1–15), interprofessional learning (16–18), teaching and

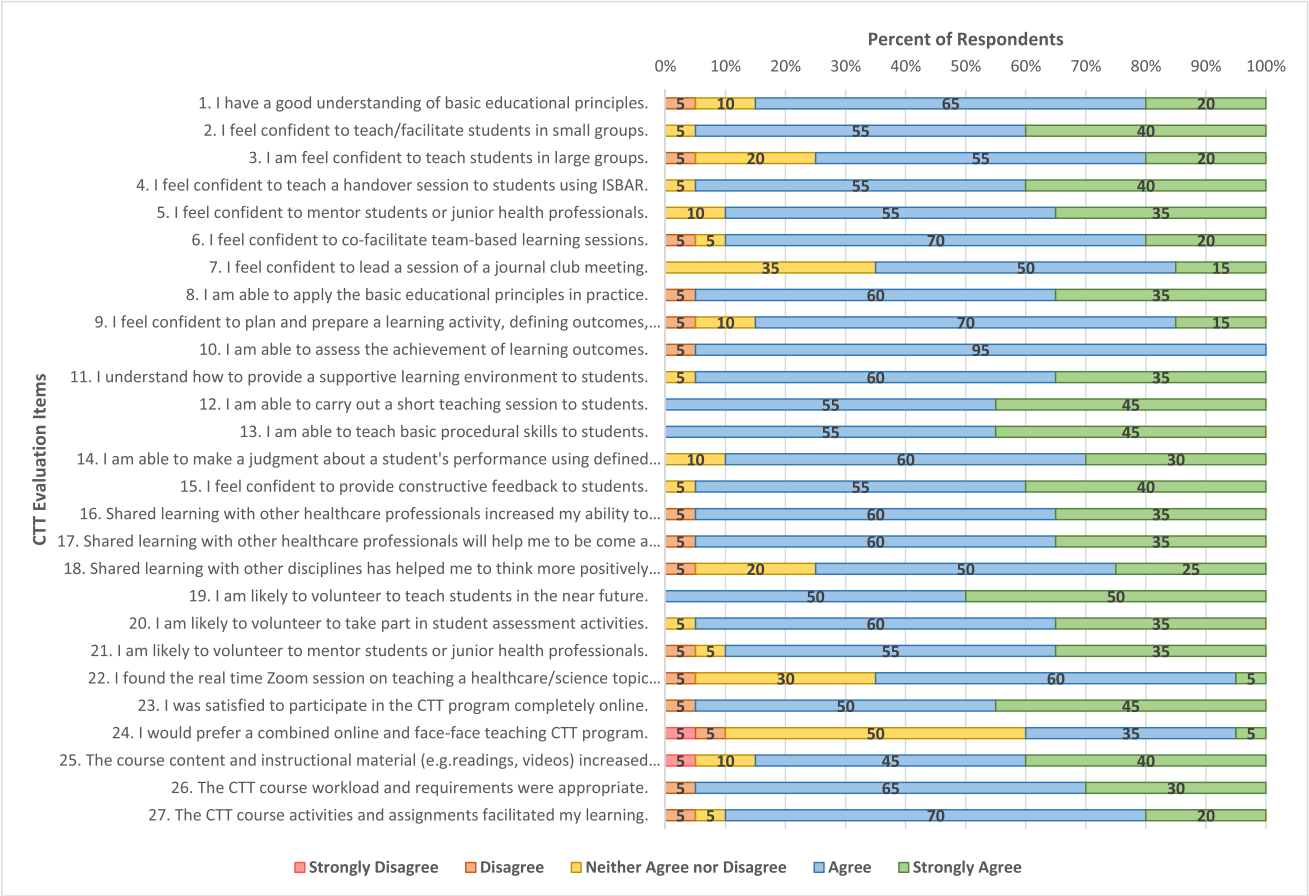

FIGURE 1 Clinical Teacher Training (CTT) participant experience ($n = 20$): participants' perceived ability with respect to the programme outcomes (items 1–15), interprofessional learning (16–18), teaching and preparedness to practice (19–21), online delivery (22–24) and course content and material (25–27)

preparedness to practice (19–21), online delivery (22–24), and course content and material (25–27) are provided in Figure 1.

4.3 | Responses to open-ended questions

Participants' responses to open-ended questions are illustrated in Tables 2 and 3. Table 2 presents participants' perceived 'most useful aspect of the CTT program' and 'suggested improvements'; Table 3 presents 'most positive aspects' and 'any negative aspects' of working with other health professionals, and perceptions of 'participating in the CTT programme completely online'.

5 | IMPLICATIONS

The benefits of flexibility and accessibility of the new online only format were reinforced by the large number of clinicians participating from across both metropolitan and rural locations. Although literature indicates that health professionals generally enjoy face-to-face experiences and opportunities to build professional networks,[12] the new online only programme appeared to provide a successful alternative, evidencing negligible difference based on participant perception of learning outcomes.[4] Participants found the small group sessions to be a highlight, with opportunities to practice teaching and feedback skills, indicating the need for additional 'real-time' engagement in activities.

TABLE 2 Participant responses regarding the 'most useful aspects' and 'suggested improvements'

Theme	Example of comments relating to the theme
What did you find to be the most useful aspects of the 'Clinical Teacher Training' programme?	
Provision of a systematic course, with clear outlines of each module	• *The clear structure of the course, access to a few modules at a time to allow you to work around own schedule. Sufficient lead time for assignments.* • *Was a great, systematic course which brought teaching and mentoring concepts consciously into my mind.*
The use of frameworks to plan teaching, provide feedback and teach clinical handover	• *Peyton's 4 step approach to teaching a skill, planning a lesson* • *I particularly liked being able to use Peyton's four step approach to teaching as well as Pendleton's feedback model. These were practical aspects that I now try to implement during my teaching sessions.*
The synchronous zoom session to practice teaching a health care topic in small groups with facilitators	• *The Zoom session. I liked observing how other people deliver constructive criticism. The facilitator also did a good job of making it feel like a safe environment.* • *The zoom practical session was interesting and useful and added to my understanding of how to make teaching more effective*
Reinforcement of education theory, and the variety of topics covered.	• *Good refresher on many aspects plus new material which was good too* • *The variety of topics taught in the CTT—I think the most valuable was about giving feedback, planning a learning session, teaching a health care skill. I do not have much experience with journal clubs and mentorship so I found those sections particularly interesting to learn about and consider.*
Required peer evaluation	• *Peer evaluation of learning plans was particularly useful* • *Interaction with other professionals and ongoing feedback on performance*
Required submission of assessment tasks kept learners focussed	• *Having to submit assignments really keeps you focused and engaged in the course, rather than just reading through something.* • *I enjoyed the video based assignments where we were able to put our skills into practise and teach another person.*
Participation in online discussion boards helped self reflection	• *Sharing uploaded comments from other course participants and comparing them to my own thoughts* • *It was interesting to see different points of view depending on varying past experiences depending on the discipline especially in discussion board posts*
The theory and practical examples provided online	• *The literature was easy to understand and the short videos definitely helped to demonstrate the principles in action.* • *The online modules, materials and resources*
What suggestions would you make for improvement in the 'Clinical Teacher Training' programme?	
The inclusion of a face-to face session to increase networking and collaboration	• *I'd still have liked to attend face-to-face workshop if it was available.* • *Any opportunity for a face-to-face interaction would have increased the collegiality of the course.*
More balanced interprofessional groups	• *Try to encourage participation from a wider group of allied health professionals. My group was very heavily medical, so I felt a bit of an outsider, but also think the doctors would have benefited from more non-medical perspectives.*
Retention of an 'online only' option	• *Perhaps even when face-to-face sessions are able to return, the option of online learning can be retained.*

TABLE 3 Participant responses regarding the 'most positive aspects' and 'any negative aspects' of working with other health professionals, and their impression of 'online only' learning

Theme	Example of comments relating to the theme
What did you find to be the most positive aspects of working with other health professionals?	
Ideas and experiences of other health professionals and different approaches to teaching	• *The collaboration and sharing teaching strategies applicable to a range of scenarios.* • *It was really good to read about other health care professionals' learning experiences and how their professions approach ongoing professional development.*
Sharing knowledge and perspectives	• *Wealth of knowledge and experience to share from different perspectives.* • *Shared learning across the board, getting range of views from people with different special areas of interest.*
Working in interdisciplinary teams reflected the requirements of the clinical workplace	• *The feeling of working in a multidisciplinary team is great as it feels you are bouncing ideas off each other and learning about a whole other aspect of a patient's care and wellbeing. It makes working in healthcare more interesting and enjoyable as well. It makes you feel like you are doing the best for a patient.* • *Variety of opinions and viewpoints all working toward a common goal - patient care.*
Were there any negative aspects to working with other health professional?	
Would like to increase the interprofessional mix	• *No. Perhaps encouraging other health care professionals such as nurses and allied health professionals to even up the background would have provided more diversification and other perspectives.*
How did you find participating in the 'Clinical Teacher Training' programme completely online?	
With busy clinical schedules, the online format was convenient and flexibility	• *Very easy as I could work at my own pace and in my different work areas, a very convenient and flexible way to learn.* • *It was fantastic. I do not think I could have participated if it was fully or mostly face to face given the constraints on my time at present and the practicalities of having to attend tutorials or lectures.*
For many, the CTT programme would not have been accessible unless it was available in an online only format	• *I think it worked well. It was accessible and we could connect anywhere. I think this online interface was better than if it were face to face as I know during my clinical rotations, I would not have been able to make time to come to the program.* • *Would not have been possible if not wholly online.*
While the time estimated to complete the modules was considered accurate, some participants would like longer again to review content	• *The time required was reasonably estimated and extra time put into the CTT Program was in pursuit of extending the information framework offered.* • *I wonder whether making the CTT program last 1 week longer (i.e. "closing" the program 1 week after the last week) would give an opportunity for participants of the CTT program a chance to review online content.*
More 'real-time' interaction needed	• *It was fine to complete online. Perhaps would have been more interactive if face to face but I do not think it detracted from the content.* • *I would have preferred a combination of both online with a small F2F component to solidify the practical components.*

Abbreviation: CTT, Clinical Teacher Training.

The benefits of flexibility and accessibility of the new online only format were reinforced by the large number of clinicians participating from across both metropolitan and rural locations.

Participants valued learning about the perspectives of each discipline, and their differences in knowledge and skills, including a cross-pollination of teaching pedagogies. However, responses were less positive when compared with the blended learning study.[4] Although this is a problem common to interprofessional education, literature suggests that when online interaction replaces face-to-face interaction, careful structure is important to maintaining engagement.[13] Based on this feedback, we intend to provide greater opportunity for interdisciplinary collaboration through more careful grouping of participants in online activities and increased teamwork activities.

Participants valued learning about the perspectives of each discipline, and their differences in knowledge and skills, including a crosspollination of teaching pedagogies.

Encouragingly, online only programme participants were more positive in their responses than previous blended learning participants regarding their intention to teach students, particularly regarding assessment. This may be due to regular online formative assessment and peer feedback requirements, such as revision and feedback on peers' teaching plans, skills videos and journal club presentations. Current research suggests that the provision of online faculty development may work to increase knowledge but may be less successful in developing skills.[13] Additionally, participants were very positive regarding their intentions towards mentoring, the importance of which is well recognised across the health professions.[7] In a recent systematic review of online faculty development programmes, Cook and Steinert found that perceived immediate relevance, as well as institutional expectation and support are important to encourage participation.[13] To ensure future engagement and further development of skills, it will be important to provide contemporaneous linkage to teaching, assessment and mentorship opportunities that are available in participants' local environments.

It will be important to provide contemporaneous linkage to teaching, assessment and mentorship opportunities that are available in participants' local environments.

Given the busy schedule of full-time health professionals, and limited protected time for face-to-face attendance, online learning may be particularly well suited for faculty development. Additionally, geographical barriers to participation are mitigated by online learning.[13] A number of participants in our programme, however, suggested the inclusion of an optional face-to-face session. Previous studies considering Australian clinicians' experience of online training in clinical education found that while clinicians value the convenience and accessibility of online participation, optional face-to-face sessions had an important role in developing relationships with fellow students and teachers.[14] Although participants found the discussion boards and assessments helped to focus their learning, their success is reliant on active facilitator moderation,[13] highlighting resource requirements.

The shift to an online only format for this programme presents a new perspective for both participants and facilitators, who are essential to successful implementation. Table 4 summarises the challenges and benefits of online only and blended learning formats that we experienced as a programme team. We found that delivery via online only had similar facilitator resource requirements to blended learning delivery, without the burden of facilitator travel or room resources for delivery. Additionally, a further advantage of online only delivery is its scalability and broad access to participants across health districts and geographical areas. This is particularly important to the Australian context, where the health care system is dispersed across vast regional and rural areas. As a means to offset resource requirements while increasing outreach, we will provide leadership/professional development opportunities to our CTT alumni to co-facilitate the programme.

As a means to offset resource requirements while increasing outreach, we will provide leadership/ professional development opportunities to our CTT alumni to co-facilitate the programme.

Changing health service environments and rapidly changing pedagogies raise questions around how to prepare clinicians to teach when there are physical limitations around participation.[3] The online only CTT programme provided an effective scalable framework to ensure continued provision of an up-to-date, relevant, and accessible training resource for clinicians working in metropolitan and regional/rural health service settings, assisting development of a range of teaching skills. Although we acknowledge the limitations placed on social interactions through online only delivery, we rapidly and successfully transitioned delivery to fit the contextual circumstances, improving our readiness for long-term disruption. Our results indicate that online only delivery provides a valuable alternative to blended learning, with the capacity to expand our reach across regions. In future delivery, we will offer additional real-time small group sessions and

TABLE 4 Benefits and challenges of 'online only' Clinical Teacher Training (CTT) programme delivery

Benefits of online delivery	
• Engagement between metropolitan and rural health professionals • Remote access to regional and rural regions • Increased flexibility in the completion of modules and tasks • No room bookings & associated resources required, including marker pens, catering • Facilitator and participant ability to join online from any location • Reduced 'real-time' workshop duration	
Challenges of online delivery	Overcoming challenges
• Clarity of course requirements and meeting learner expectations	• Clear modules, with specific learning outcomes • Clearly defined and appropriate timeframes for completion of learning activities
• Social interaction, particularly interprofessional	• Small group discussion boards, with allocations based on disciplines • Use of breakout rooms during Zoom sessions for small group discussion and interaction
• Completion of required tasks and assessments	• Monitoring of participant completion of activities • Reminders can be sent as announcements
• Maintained participant engagement in course content and activities	• Hold short interactive sessions rather than lecture style delivery of content • Provide a variety online learning and teaching tools, such as short 2-min videos, images and diagrams to explain concepts • Use quizzes and formative assessment to reinforce learning
• Development of communication and professionalism skills	• Provision of written and verbal peer feedback to provide practice in giving and receiving feedback • Facilitator feedback on activities, and regular interaction with discussion boards
• Participant ability to use technologies and online tools	• Offer technical support, online tips • Send instructions 1 week prior to 'Zoom' sessions
• Internet connection	• Encourage participants to connect from a location with a stable connection

carefully group online activities to maximise the interprofessional mix. A challenge is to ensure that all CTT programme alumni are provided with local student teaching opportunities to reinforce learning outcomes, and to engage 'local champions' as co-facilitators of our programme. When social distancing restrictions are reduced, we will maintain the resource advantages of hosting the majority of the programme online, while offering short face-to-face sessions within local contexts.

The online only CTT programme provided an effective scalable framework to ensure continued provision of an up-to-date, relevant, and accessible training resource.

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The authors have no acknowledgement to disclose.

ETHICS APPROVAL

This study was approved by the University of Sydney Human Research Ethics Committee.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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1.7 Improving Patient Safety: Engaging Students in Interprofessional Team-based Learning (TBL)

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Improving Patient Safety: Engaging Students in Interprofessional Team-Based Learning (TBL)

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Improving Patient Safety: Engaging Students in Interprofessional Team-Based Learning (TBL)

Abstract

Complex healthcare systems and ambiguous clinical decisions can result in medical errors which threaten patient safety. There is a need for improved awareness of medical errors across healthcare disciplines. We utilised team-based learning (TBL) to pilot an interprofessional patient safety module for senior health professional students. We evaluated the use of TBL within the interprofessional context to achieve student learning outcomes. Twenty-seven students from pharmacy (n=11), nursing (n=8) and medicine (n=8) faculties participated. Data were collected via questionnaires, focus groups, class observation and student test scores. Quantitative data were analysed using descriptive statistics. Framework analysis was used to code qualitative data using social capital as a conceptual framework. In total, 26/27 (96%) of participants completed the questionnaire and 20/27 (70%) attended focus groups. There was no significant difference in prior knowledge between the disciplines. The TBL module enriched the learning environment and enabled students to prepare, problem-solve and interact with facilitators. The TBL pedagogy and interprofessional framework enabled the development of social capital among students. The module demonstrated the potential of interprofessional education to shift knowledge and attitudes towards a greater appreciation of patient safety issues and better prepare health professional students for the workforce. The TBL pedagogy strengthened knowledge sharing and fostered collaboration across disciplines.

Practitioner Notes

1. Dedicated interprofessional training at the university education level can improve patient safety.
2. The TBL framework enables student learning through preparation, practice, and problem-solving with intra- and inter-team discussion.
3. This patient safety module promoted interprofessional collaboration and examined existing roles, practices, and biases of other disciplines.
4. Social capital is used to describe and understand how individuals benefit from participating in a social network and offers a valuable lens to analyse educational methods.
5. When designing interprofessional case-based activities, care must be taken to ensure the clinical case is relevant to all disciplines.

Keywords

Patient safety, interprofessional, Team-based learning, collaboration, social capital, pharmacy, nursing, medicine

Authors

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Introduction

Globally, avoidable adverse events in hospital result in patient death or long-term pain and disability. In a landmark study evaluating the safety of hospital care for over 14,000 admissions, Wilson et. al. identified that 16.6% of admissions were associated with an “adverse event” resulting in disability or extended stay for the patient.[1] Over half (51%) of the adverse events were preventable, including 4.9% of patient deaths.[1] In Australia, rates of adverse events have remained static or increased.[2] Errors are rarely associated with incompetent healthcare professionals or with inadequate technical knowledge.[1] Situational awareness (human factors), risk communication (information exchange), cultural awareness and poor teamwork are associated with unintentional harm to patients. Understanding the role these factors play in patient care is essential to health professional education.

Healthcare is an inherently interprofessional endeavor and relies on health professionals effectively interacting and communicating with others and the patient. However, interprofessional teamwork remains undervalued in most health professional curricula, resulting in limited shared learning among the different health professions.[3] The journey to competence (fitness to practice) requires students to understand the key pillars of patient safety as outlined in the WHO Patient Safety Curriculum Guide for Health Professionals: teamwork, managing and avoiding error, engaging patients as partners, and leading reform through patient-centered decisions.[4] These principles represent the foundational knowledge and requisite performance necessary for students to practice safe patient care.

With increasing complexity of healthcare systems, there is a need to consider the design and efficacy of interprofessional patient safety education activities. Evidence supports the value of small group peer learning, where participants are engaged and involved.[5,6] Team-based learning (TBL) is a widely utilised educational method across medicine and health education.[6-8] TBL provides an instructional approach for large classes of students to learn in small teams of five to seven students using a student-centred, active learning approach. As a pedagogy, TBL utilises a ‘flipped classroom’ approach, where students attend class prepared to work in teams to solve clinically relevant problems, with learning occurring within and across all teams.[6] TBL is increasingly used as an interprofessional educational platform to strengthen the sharing of knowledge and foster collaboration across disciplines, although challenges remain in its implementation.[9-15]

The current literature suggests that student experiences of interprofessional TBL are generally positive and may help prepare students for future collaborative practice.[10-14] However, there is limited research outlining whether the key elements of TBL can be utilised to support ‘one off’ interprofessional activities within healthcare curricula and the optimal number of disciplines to include.

Our study piloted an interprofessional TBL module on the topic of patient safety: “Understanding and learning from errors” utilising the World Health Organisation Patient Safety Curriculum Guide: Multi-Professional Edition.[4] The module was implemented in 2019 for senior health professional students studying pharmacy, nursing, and medicine within the Faculty of Medicine and Health at The University of Sydney, Australia. During their first two years of their respective programs, all students attended a one-day, large-scale ‘Health Care Collaboration’ event which

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involved working through a patient-based case in teams.

The facilitation of the TBL session within a social network of health professional students prompted us to apply social capital theory to analyse our educational method.[16] Social capital is used to describe and understand how individuals benefit from participating within a social network.[17] By learning ways in which to build social capital within interprofessional learning activities, students may be better prepared to collaborate and invest in real-world interprofessional teams on entering the workforce as health professionals. The characteristics of social capital within the context of an interprofessional TBL include three key attributes:

- **Trust** – the trust that is constructed between learners in interprofessional education groups, as they problem-solve together.
- **Resources** – the clinical cases and relevance across disciplines; the resources that the learners in interprofessional education provide to each other, including individual professional knowledge and skills. [18]
- **Norms and Rules** – the unstated standards that govern actions during the interprofessional education activities, such as individual student contributions to teamwork, and respecting the opinions of all team members.

The purpose of our study was to develop, implement and evaluate an interprofessional patient safety TBL session for senior health professional students. Further, we aimed to explore participants' perceptions of the structure, processes, and outcomes of the session using the conceptual framework of social capital theory.

Method

Course Design

Implemented as an optional component to health sciences curricula, the Patient Safety TBL session was 1.5 hours in duration and delivered on a weekend day to minimise scheduling conflicts. The learning topic was "Understanding and learning from errors", based on Topic 5 of the World Health Organisation Patient Safety Curriculum Guide Multi-Professional Edition. [4] The specific student learning outcomes were to:

- Understand the nature of error within healthcare;
- Understand the ways to learn from error to improve patient safety;
- Explain the terms error, violation, near miss and hindsight bias; and
- Demonstrate the use of "graded assertiveness".

The key principles of our TBL design included: pre-reading (prior to the face-to-face class), an in-class individual test, an in-class team test, immediate feedback and clarification of concepts, and clinical problem-solving activities based around a clinical case.[6]

Compulsory pre-class reading ('internal resources'), with an estimated reading time of two hours, was distributed via email to all students two weeks prior to the session to ensure a similar foundational knowledge prior to the session. The pre-reading included materials relating to patient safety and graded assertiveness[19-21]. Each student also brought their own understanding and knowledge of patient safety, gained through individual and clinical experience, to the session ('external resources').

The in-class schedule included two readiness assurance tests and clinical problem-solving activities. All students were required to complete an *Individual Readiness Assurance Test (IRAT)* at the beginning of class. The IRAT consisted of 10 multiple choice questions (MCQs), with one single best answer for each question. The test was based on the prescribed pre-reading and designed to assess each students

understanding of patient safety. Students were provided with 10 minutes to complete the quiz on paper by circling the correct answer. The quizzes were collected at the end of the session. Students were not shown the correct or incorrect responses to the questions.

The same 10 MCQs were then repeated in the *Team Readiness Assurance Test* (TRAT) undertaken by students in their teams. The test was administered using one scratch card per team, with the intent of promoting discussion to establish team consensus. If a team answered the question correctly on the first attempt, they received a score of four, and each time they reattempted an answer, they would lose one mark. The scores for each question were summed to obtain a total score ranging from 0 to 40. The correct answers were then explained after each question, giving immediate feedback on team responses. The facilitators offered clarification, particularly where individuals or teams had experienced difficulty answering the questions. Students had the opportunity to interact with the facilitators and challenge answers.

Students were then provided with a clinical scenario which highlighted errors in patient care, including errors in communication, teamwork, supervision, workplace culture and the hospital environment. The case was conceptualised by a clinician, an expert in patient safety, and an educationalist. It was reviewed by two clinical academics from nursing and pharmacy. The case formed the basis of further problem-solving activities within the TBL session. Students consolidated the knowledge obtained in the previous steps to create a mechanistic flow chart of the errors in patient safety in their teams. Team members were selected by the facilitators to ensure an even distribution of students from each discipline within a team. In the class of 27 students, there were five teams, with five to six students per team. The TBL was co-facilitated by two academics: a Physician-in-Training, and a Professor of Medical Education, Patient Safety. Facilitators provided immediate and accurate feedback to individuals, teams, and the class. Figure 1 outlines the structure of the TBL.

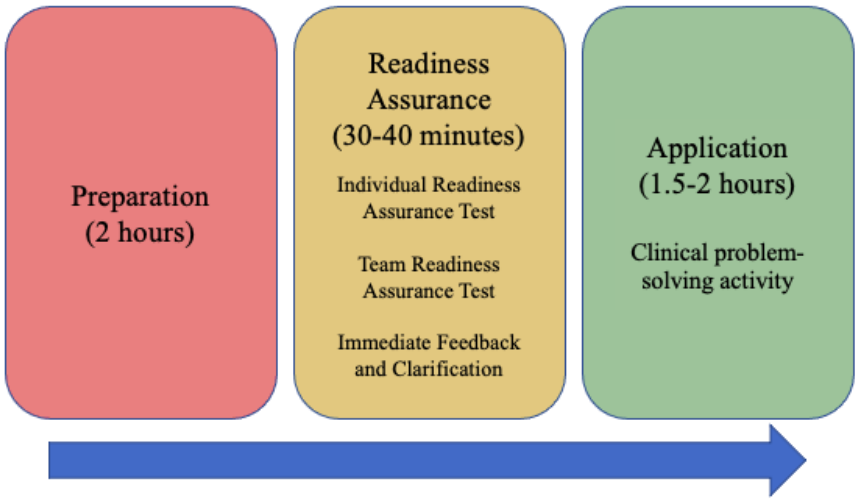

Figure 1*: The specific steps of the TBL with suggested time frames, adapted from Burgess et al., 2020* [22].

On completion of the module, participants received a certificate of completion.

Study design

Recruitment

All senior health professional students from pharmacy, nursing, and medicine already engaged in an optional peer teaching course were invited via email to participate in the patient safety TBL session.

Data collection and analysis

Questionnaire

Students were asked to complete a questionnaire immediately after the TBL session (see supplementary material). The questionnaire included 18 closed items, using a five-point Likert-scale, ranging from 'strongly disagree' (1) to 'strongly agree' (5). The quality of team processes was measured using items adapted from a validated questionnaire designed by Thompson et. al.[23] In addition, attitudes towards interprofessional learning were measured using items from the Readiness for Interprofessional Learning Scale (RIPLS).[24] Quantitative data were analysed using descriptive statistics.

Focus groups

All students were invited to attend focus group sessions at the end of the TBL session. The focus groups were facilitated by two educationalists (AB & CvD) and took the form of semi-structured interviews around a set of pre-determined questions (see supplementary material). The transcript was recorded and transcribed verbatim. Following consultation with all authors, the first and second authors (AJC and AB) used framework analysis[25] to code the dataset using social capital theory as a conceptual framework.[25]

Observation

Observation of the teaching session was undertaken by two senior academics JB (a Registered Nurse), and CS (both a Pharmacist and Registered Nurse). They observed student engagement throughout the TBL session, including intra- and inter-team engagement (team test, feedback, problem-solving activities), and student interactions with the facilitators.[26]

Test scores

Test scores from the IRAT and TRAT were recorded. The scores for questions within the TRAT were summed to obtain a total score ranging from 0 to 40 for each team. The mean IRAT scores between disciplines were compared using one-way analysis of variance (ANOVA). Data were analysed using IBM SPSS Statistics, version 27.0 (SPSS Inc., Chicago, Ill., USA).

Ethical considerations

Ethics approval for the study was granted by The University of Sydney Human Research Ethics Committee.

Results

Twenty-seven senior students from pharmacy (n=11), nursing (n=8) and medicine (n=8) voluntarily participated in the interprofessional patient safety TBL session.

Questionnaire

In total, 26/27 (96%) of participants completed the questionnaire, 10 pharmacy students, eight nursing students and eight medicine students (10 male, 15 female and one unstated). Student responses to closed items regarding their experience of the TBL are displayed in Figure 2. Overall, students responded positively to items relating to the quality of team processes and contribution of team members (items 1-5). Responses also indicate that the steps in TBL were valued by the students, including pre-preparation, IRAT, TRAT, problem-solving (items 7,11,12); as well as the feedback and interactions with the facilitators (items 6,9,10). All students valued the interdisciplinary context of learning, with 100% of students strongly agreeing or agreeing that "*[h]aving team members from different disciplines enhanced my experience of peer learning"* (Q8), "*[s]hared learning with other*

healthcare students increased my ability to understand the concepts of this topic" (Q13), and "*I would welcome the opportunity to again learn with other healthcare students*" (Q17). Almost all students disagreed with the statement that "*[i]t is not necessary for healthcare students to learn together for this topic*" (Q14).

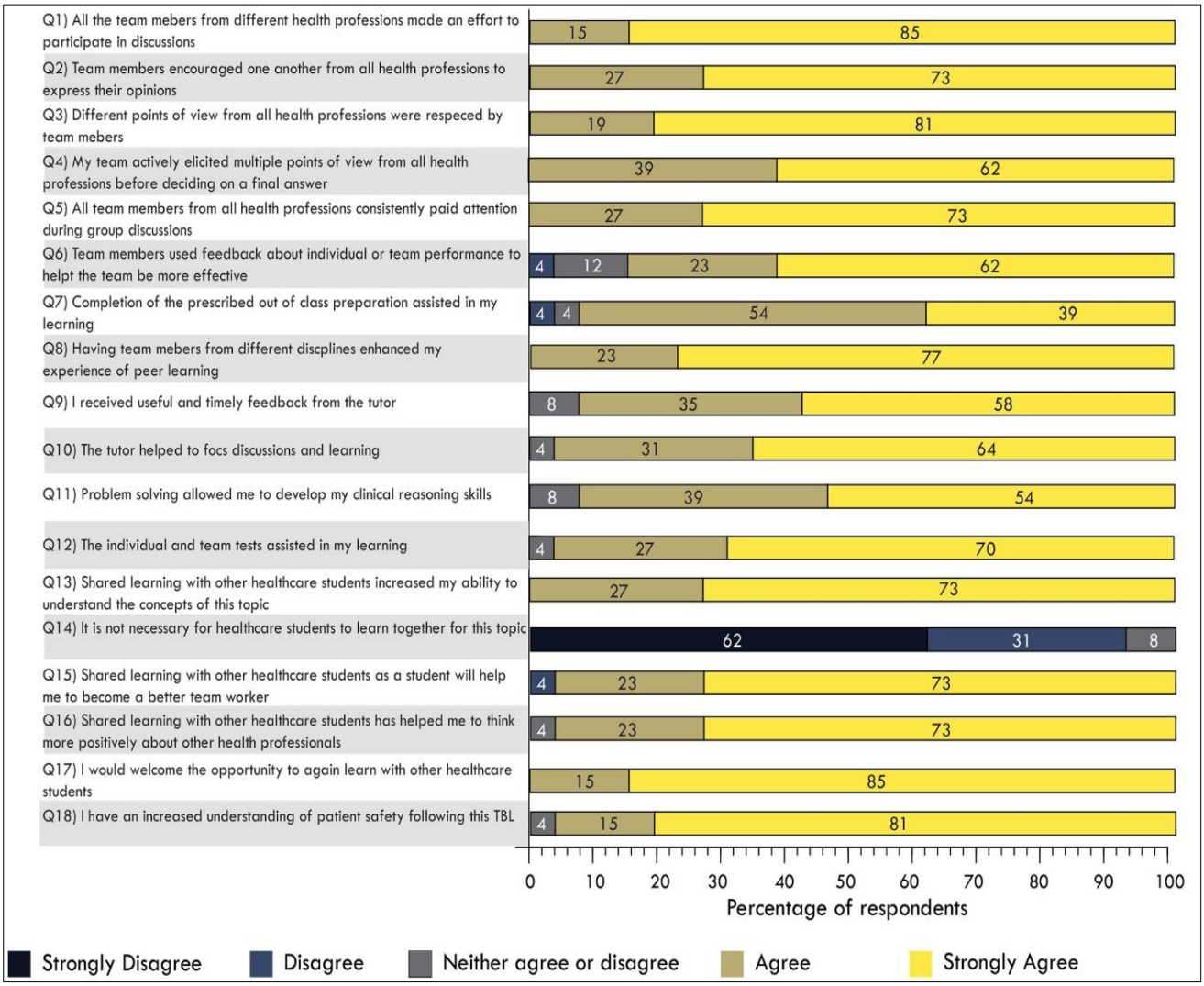

Figure 2: *Student responses to closed items regarding their experience of the TBL.*

Focus groups

Twenty students (74%), including eight medical students, six pharmacy students and six nursing students, attended one of two focus groups sessions. Qualitative focus group data is presented in Tables 1, 2, and 3. The results are presented within the conceptual framework of social capital theory. Whilst there is overlap in the three key attributes of social capital, each theme reflects different stages of social interaction and learning within the interprofessional TBL context. The theme of 'Trust' is presented in Table 1; notably, students felt the session emphasised the need for shared patient care and helped them to develop an appreciation and understanding of the roles of other disciplines. The theme of 'Resources' is presented in Table 2; students valued the knowledge and skills that individuals from each discipline brought to the session and the structured frameworks provided. The theme of

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'Norms and Rules' is presented in Table 3; students found the TBL format helped to promote respectful inter-disciplinary discussion among students.

Table 1. *Participants' perspectives in relation to the theme of 'Trust': the trust that builds within a social network.*

Theme: Trust	**Example quotation**
The session helped to develop rapport and respect for other professions.	*I definitely think this helps to build respect for other professions, and rapport as well.*
The session emphasised the importance of shared care patient care.	*Not just that respect for other professions, but also better care for the patient because it's, like I'm not the only one responsible for this patient, there are so many other people working together collaboratively … to increase their care and their outcome.*
Students developed their appreciation and understanding of the roles of other disciplines.	*When you're doing… a four-year degree (pharmacy), you kind of get stuck in it and you think, you're solely responsible for that patient, but then you come to group meetings like this and you see what everyone else does and what they've learned, what they bring to the table.* *I personally really like [working with different disciplines] just to see… the different opinions and how we … we know about the topics but we tackle it in different ways and I thought that was …really interesting…. Pretty cool.* *I always think that it's good to actually get these sorts of interdisciplinary activities in the degrees because if everyone's doing their own thing and we all graduate, it's harder once we all reach the workforce and then we're all like…. I didn't know you do that, didn't know nurses do that, I didn't know pharmacists do that. But it's so much easier when you start it early in the degree… and so then everyone is already prepared and everyone already has… a respect for each other and that will just keep going out of the degree and into when everyone just starts working together.*
The TBL format helped to develop promote discussion and trust among the disciplines. During the tests and problem-solving activities, students were respectful of others' opinions.	*Everyone voiced their opinions (during the test) and I feel like everyone was very receptive to each other's perspectives because being from different fields we would have different experiences in the workplace so I think it was good that we were all able to share that and go, I wasn't aware that your role involves this or from the perspective of that so, I feel like everyone was very open to listening.*

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Table 2. *Participants' perspectives in relation to the theme of 'Resources': the resources that a social network offers to its members.*

Theme: Resources	**Example quotation**
Students valued the knowledge and skills that each discipline brought to the group. Gaining a better understanding of other disciplines helped students to understand how they can work together as a team.	*I think it was an eye opener because when you're studying within your degree you're only learning from one perspective so for me I'm only learning from the pharmacy perspective, then when we all came together it was an eye opener in that, oh, this is what the medicine people do, this is what the nursing staff do, and it just brought all the theory that we've learnt over the degree into the one place – I thought that was pretty interesting, so we can tackle the patient care all as a team rather than – on your own, you're always together, you can bounce ideas off other people with other educational backgrounds.*
Students found it useful to be provided with resources about the theory and evidence behind patient safety prior to engagement in the TBL session.	*The theory was helpful in terms of what's an error, what's a violation, what's a slip, what's a lapse. I think when we did it in the – in the context of what are factors that lead towards these issues, like, we talked about I think it was HALT – Hungry, Angry, Late, Tired… the 'I am safe acronym' – when you are in those states you might also think I – I'm more prone to forgetting things or I'm more prone to, maybe doing something in the heat of the moment especially when I know it's wrong….The first type of solving problems when you actually realise that you have a problem, or admitting it.*
Students valued understanding structured frameworks offered that may be applied in the workplace, such as graded assertiveness.	*I think the format that you did provide, the CUSS [acronym] …. For graded assertion …. That helps because there's a little bit of …. Structure for if you go ahead and say to a consultant, "Hey, I think you're making a mistake." So, I guess, it, kind of works that way but there's still that, sort of, hierarchy.*
Through use of an authentic patient case, students felt they gained an insight into other disciplines that was relevant for the workplace.	*I feel like I got to gain a lot more insight into the other fields, for example, that it actually takes a while for a doctor to write down the dosage regimen and so I feel like I could take that into the workplace and be able to understand the other fields a lot better.*

Table 3. *Participants' perspectives in relation to the theme of 'Norms and Rules': the implicit values that govern members of a network.*

Theme: Norms and Rules	**Example quotation**
The session gave students an awareness of patient safety in the workplace, and how to be compliant with the systems and rules.	*I think it helped me understand that you're now more aware where errors can go wrong because it is such a long process, you're more aware of how you can actually help to prevent that.*
Students felt they were more aware of how to minimise error, and think prospectively, and importantly, how to learn from mistakes to improve future outcomes.	*It's important that we look at things prospectively and try to minimise as many things as possible, but it's also a matter of, if something does happen, that we do know, what to do in regard to that particular error and how can we possibly add things to the system or amend things in the system to make sure it doesn't happen again.*
Students also felt the TBL session provided them with knowledge and communication techniques to better prepare them for the workplace.	*When I start working next year it'll … give me an idea of points in a particular process … where there might be issues and maybe checking up on those points. So even if it's with charting medication, especially if it's medications that I'm not normally charting, then what can be the issues with that in terms of the actual dose, but then also the patient to whom I'm applying it, and then as it goes through nursing and then if pharmacy gets involved as well, what are the pressure points there and so going from …me charting it to the patient receiving it, just checking those points, prospectively rather than retrospectively when the damage can potentially have already been done.*
Students emphasised the need for embedding interprofessional team activities within the healthcare curricula rather than as additional, voluntary activities.	*Because most of this stuff [interprofessional activities] is usually voluntary… we don't get a lot of team building things. I think it should be integrated… in all health care degrees because I feel like a lot of people can get so stuck in their own occupation that they forget that… you've got all these other people that you're meant to be working with and then, it's almost a lack of respect with some people and I think by doing this sort of exercise you do get to see people other than those from your own occupation because in the real world you do have to get along with everyone else.*

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Observation

The students' positive perception of the structured TBL method as a learning tool was cross validated by the observations. Student engagement demonstrably increased when completing the TRAT within their teams. The use of scratch-cards introduced a degree of competition, aiding further discussion. Students also appeared to derive confidence from their consensus decision-making, which stimulated student dialogue with facilitators when the appropriate answers were provided during the feedback stage. Facilitators were able to clarify patient safety concepts as they arose directly from students and teams. Observers noted that students were most engaged when facilitators provided real clinical examples and anecdotes from their personal experiences during the clinical problem-solving sessions, including both negative and positive outcomes. Openly sharing examples of practices within the clinical and hospital environment was another way facilitators engaged student interest. The observers noted that students enjoyed interacting with others within their team, as evidenced by the level of conversation, enthusiasm to participate and collective focus on the required tasks. Students were noted to particularly value the opportunity to participate in the clinical scenario tasks, and a willingness for each team member to take turns to provide input was observed. Notably, students demonstrated respect and positively framed critique when providing individual feedback about each team member's performance and contribution.

Test scores

Mean IRAT scores for the disciplines were 60.00% (nursing, n=8), 60.27% (pharmacy, n=11), and 70.00% (medicine, n=8). A one-way ANOVA found no evidence of a significant difference in mean scores between disciplines ($F=0.865$, $df=2$, $p=0.43$), suggesting that the knowledge base was similar across attendees. Across the mixed discipline teams, TRAT scores ranged from 31 to 35 out of 40.

Discussion

We sought to explore senior health professional (pharmacy, nursing, medicine) students' perceptions of their learning experience of the Patient Safety topic: *"*Understanding and learning from errors*"*, delivered using TBL format. Both quantitative and qualitative data indicate that participants found the interprofessional delivery of the patient safety session key to its success. Student understanding of patient safety was facilitated by the TBL framework; it enabled students to prepare, practice through testing, problem-solve through intra and inter-team discussions and interact with the facilitators. We used social capital theory to further characterise students' learning experience within the interprofessional TBL.[17] These key elements have been summarised in Figure 3 and are discussed below.

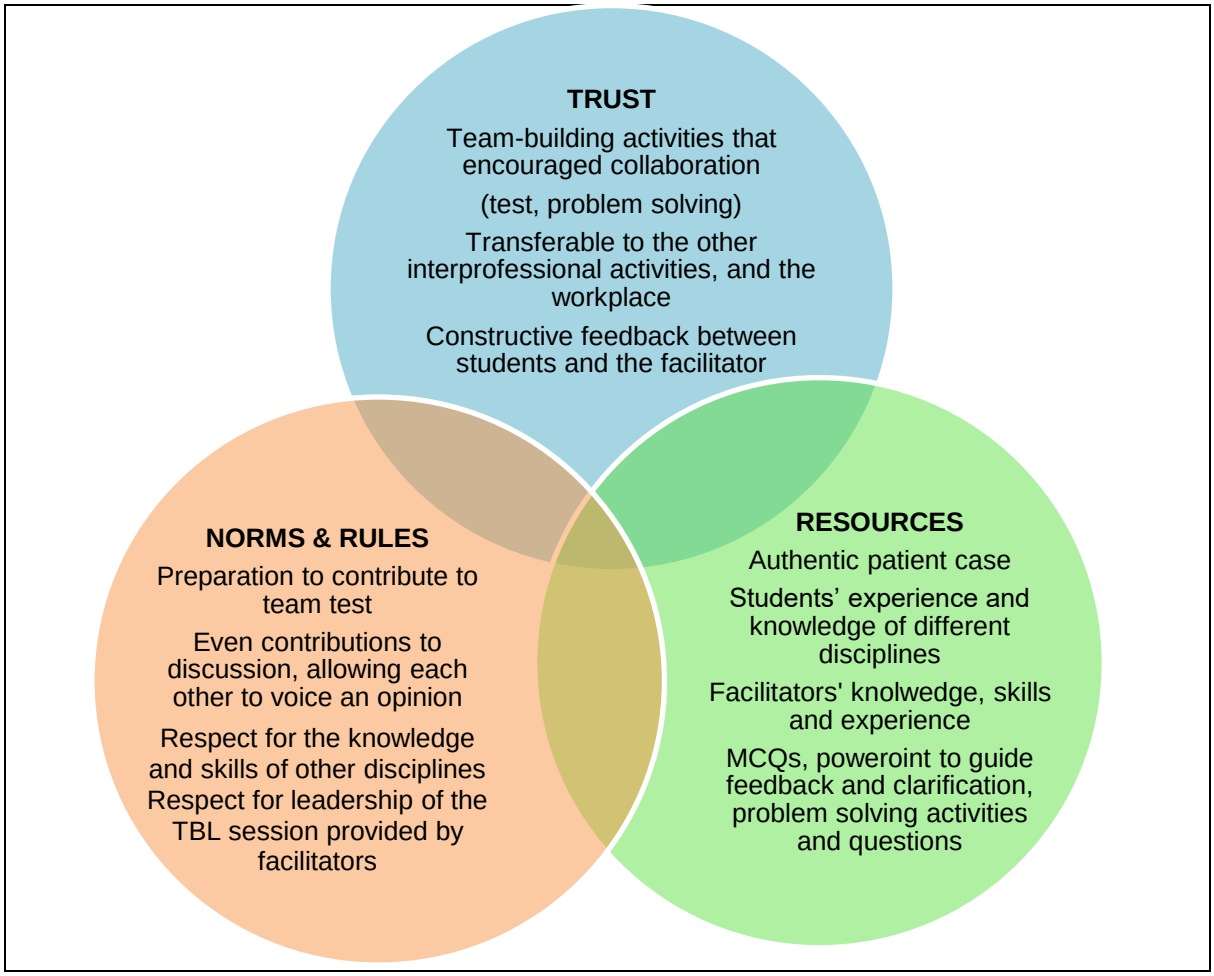

Figure 3: ***E****lements specific to the interprofessional patient safety TBL that were identified as key to the development of social capital.*

Trust

Students were required to rely on their peers' contributions to team tasks to complete the TRAT and then engage in discussion about the clinical case. Responses to the closed questionnaire items relating to the quality of team processes, including interprofessional collaboration, were positive. Focus group results indicated that students valued the development and promotion of interprofessional trust. A

significant barrier to interprofessional collaboration is deficiency in the understanding of roles and practices of other disciplines and existing biases.[27] This educational module provided a positive experience that may encourage students to reinvest in future interprofessional collaborations, both during their studies and in the workforce. Similar findings were reported by Chan et. al., where 801 health professional students from across six healthcare disciplines participated in a 'one off' interprofessional TBL session, resulting in a significant improvement in their attitude towards interprofessional learning and their readiness to engage in future interprofessional activities.[13]

Resources

Student responses indicated that the TBL format of the class provided a clear structure to the session. The key internal resources were those within the TBL module, including the pre-reading, the readiness assurance test, as well as the patient case and related problem-solving activities. Qualitative feedback indicated that the real-life frameworks used, such as graded assertiveness, were elements that would be useful in the workplace. External resources included the knowledge that each student brought to the session specific to their discipline. Additionally, facilitators brought not only their professional knowledge and skills, but also their teaching skills to the TBL which allowed for immediate and accurate feedback to individuals and teams. Students valued learning about the perspectives of each discipline. A willingness of members within a social network to offer assistance within the team structure is key to success.[28] During the TBL, students willingly shared their knowledge and experience, and communicated effectively with each other and the facilitators, checking comprehension. Importantly, students felt that the TBL session and the development of similar interprofessional patient safety learning activities would ultimately contribute to better patient care.

Importantly, IRAT results from across pharmacy, nursing, and medicine support that all three disciplines had a similar level of base-knowledge in order to contribute to class activities. Furthermore, the mixed discipline teams performed evenly. In a previous interprofessional TBL study on the topic of patient safety and ethics, involving 639 students from across 10 healthcare disciplines, there were significant differences between the IRAT scores of some disciplines.[12] Similar difficulty was encountered by a TBL study involving 39 senior students from across five healthcare disciplines[14]. Our results suggest it may be beneficial to have fewer disciplines (three or four, rather than 10) involved in a single interprofessional TBL to make curriculum alignment more manageable and the clinical case for discussion inclusive of each discipline[15].

Norms and Rules

As outlined by Hean et. al., compliance or non-compliance with norms can either restrict or facilitate individual and group action.[17] Students commented that team members were respectful of the opinions of different disciplines, and *"receptive to each other's perspectives*", recognising that individuals *"have different experiences in the workplace".* As reflected in the IRAT results, most students attended prepared and ready to engage in discussion, and did not 'freeload' during the session, as is sometimes reported in small group learning.[29] Within and beyond their teams, students felt their knowledge and contributions were valued by those from other disciplines. The three disciplines felt able to contribute to the problem-solving activities, and students reported that provision of an authentic patient case helped them to understand each other's roles and their joint responsibilities.

Study limitations

We had a small sample size of 27 students in this pilot study. Participation was voluntary, which has the potential to limit the representativeness of our results, with those attending potentially more engaged

in learning from different professions. A mixed methods approach, however, gave rich insight into the student experience.

Conclusion

Dedicated interprofessional training at a pre-vocational level can achieve improved patient safety outcomes at the healthcare institution level. Our study provides an effective and scalable interprofessional framework to assist development of social capital among health professional students. The interprofessional TBL was valued by pharmacy, nursing, and medicine students, providing a useful approach to teaching patient safety. Moreover, the interactive TBL format helped to maximise the social advantage of interprofessional group learning. Students' test results across three disciplines suggest a similar level of prior knowledge and appropriate curricula alignment on the topic of patient safety. Participation in the program has the potential to shift knowledge and attitudes towards a greater appreciation of patient safety issues, and better prepare our health professional students for an interdisciplinary workforce.

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1.8 An interprofessional Peer Teacher Training program for health professional students: ‘face to face’ verses ‘online only’

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An Interprofessional Peer Teacher Training program for health professional students: 'face to face' versus 'online only'.

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An Interprofessional Peer Teacher Training program for health professional students: ‘face to face’ versus ‘online only’.

Abstract

In 2020, following the disruption of COVID-19, we rapidly moved the interprofessional Peer Teacher Training (PTT) program, traditionally delivered via blended learning to ‘online only’ format. Consisting of seven modules, the PTT program is designed to provide health professional students with opportunities to develop skills in teaching, feedback, assessment, teamwork and communication, in preparation for peer teaching and future practice. This study sought to compare ‘blended learning’ with ‘online only’ delivery. ‘Blended learning’ format, included a one-day face-to-face session, requiring 9 facilitators. Students participated in small group learning activities, and were formatively assessed on their teaching and feedback skills. ‘Online only’ delivery occurred across three weeks, using asynchronous and synchronous activities, requiring 11 facilitators. Students completed a post-course questionnaire. Data were analysed using descriptive statistics and thematic analysis. Eighty-five students completed the program; 36 in ‘blended learning’ and 49 ‘online only’ format, from six disciplines (health sciences, medicine, nursing, pharmacy, oral health and public health). All (100%) ‘blended learning’ and 67% ‘online only’ participants completed the questionnaire. Both sets valued the online reading, discussion boards, videos, with opportunities to practice teaching skills, give and receive feedback. They reported an increased understanding of the roles of other disciplines. However, the ‘face-to-face’ component had some associated benefits, including a more positive attitude towards interprofessional learning and intention to teach. While ‘online only’ delivery of the program provided an effective alternative to the traditional ‘blended learning’ format, additional ‘real-time’ sessions may improve student engagement.

Practitioner Notes

1. ‘Online only’ delivery of teacher training provides an effective alternative to ‘blended learning’ format.
2. Opportunities for ‘real time’ participation, with formative assessment and feedback increases engagement.
3. Clearly structured online modules and provision of simple teaching frameworks assist students to apply what they have learnt to different contexts.
4. Face-to-face sessions bring associated benefits, promoting a more positive attitude towards interprofessional learning and intention to teach.
5. Ensuring the provision of opportunities for Peer Teacher Training alumni is an important next step.

Keywords

COVID-19, teacher training, interprofessional, online learning, blended learning

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Introduction

The Peer Teacher Training (PTT) program was developed in 2016 at the University of Sydney as an interprofessional, blended learning (face-to-face and online), modular program to provide senior health professional students with opportunities to develop skills in teaching, feedback, assessment and communication in preparation for peer assisted learning activities, and future health professional practice. In its traditional blended learning format, students are provided with theoretical background delivered online, and opportunities for active participation in small group interprofessional learning teams during a one-day face-to-face session (Burgess et al. 2017). The blended learning format of the PTT program has been previously described (Burgess et al. 2017) and adapted for implementation internationally (Karia 2020).

More than 300 senior health professional students had completed the blended learning program prior to the unprecedented disruption caused by COVID-19. However, this disruption provided the motivation to create a pedagogically sound, creative solution to adapt our traditional 'blended learning' PTT program to an 'online only' format. As university educators, we have a responsibility to ensure that opportunities continue to be made available for health professional students to develop professionalism skills relevant to their future careers (Irby & Wilkerson 2003). Evidence suggests that formal teacher training produces positive outcomes in terms of competency and further engagement in education (Burgess et al. 2014; Marton et al. 2015). Graduates with prior teacher training demonstrate greater effectiveness and enthusiasm for teaching, and remain more active in upskilling themselves, compared to those who do not (Hill et al. 2009; Kloek et al. 2016).

We therefore sought to reframe teacher training opportunities by integrating theory with practice online, through both asynchronous and synchronous activities, and provision of appropriate assessment methods. To our knowledge, there are no other teacher training programs for health professional students delivered completely online. A recent systematic review of formal peer teacher training programs for health professional students was published in 2018 (Burgess & McGregor 2018). Nineteen programs were identified globally, including USA (7/19), Germany (4/19), Australia (4/19), Netherlands (4/19), United Kingdom (1/19) and Canada (1/19). However, all reported programs were described as being delivered either via blended learning or face-to-face, with none delivered via 'online only' (Burgess and McGregor 2018).

The aim of this study was to explore and compare students' perception of the PTT program delivered using the traditional 'blended learning' format and the new 'online only' format.

Methods

Course design

The PTT program consists of seven modules, listed below, and described in Table 1. Detailed descriptions of each module have been previously published.

Module 1: Introduction to the Peer Teacher Training program.

Module 2: Feedback in the clinical setting (Burgess et al. 2020a)

Module 3: Planning and delivering a teaching session (van Diggele et al. 2020)

Module 4: Facilitating small group learning in the health professions (Burgess et al. 2020b)

Module 5: Key tips for teaching in the clinical setting (Burgess et al. 2020c)

Module 6: Teaching a skill (Burgess et al. 2020d)

Module 7: Effective clinical handover (Burgess et al. 2020e)

Table 1

Description of Peer Teacher Training program modules

Module name	Module description
Module 1: Introduction to the Peer Teacher Training (PTT) program	This module provides a brief introduction to the PTT program, with opportunities to critically reflect on past and current 'good' and 'bad' teaching experiences; and the foundation for skill development in the area of effective feedback in the clinical setting.
Module 2: Feedback in the clinical setting	This module explores the role of feedback within the learning process, the barriers to the feedback process, and practical guidelines for facilitating feedback, with opportunities to practice with peers.
Module 3: Planning and delivering a teaching session	This module introduces the central concepts of teaching plan development and delivery. Participants are provided with opportunities to develop their skills in planning to deliver a teaching session and providing written feedback to their peers.
Module 4: Facilitating small group learning in the health professions	This module provides participants with an overview of approaches and tips to improve learner engagement when facilitating small groups, and the practice in teaching healthcare topic to peers.
Module 5: Key tips for teaching in the clinical setting	This module provides participants with an overview of approaches and key tips for teaching in the clinical setting. Although there are many competencies developed by students in the clinical setting, our tips for teaching focus on the domains of medical knowledge, interpersonal and communication skills, and professionalism.
Module 6: Teaching a skill	This module explores how skills are learned, ways to improve skills performance, determining competency, and the provision of effective feedback. Participants are required to teach a non-

	healthcare skill, and provide and receive feedback.
Module7: Effective clinical handover	Using ISBAR (Identify, Situation, Background, Assessment, Recommendation) as a framework, the purpose of this module is to highlight key elements of effective clinical handover. Students are encouraged to practice with their peers.

Blended learning format

In February 2020, the PTT program was delivered in its traditional 'blended learning' format (online and face-to-face). Students were provided with access to all online material for two weeks prior to attending a one-day face-to-face session.

Facilitators: An interprofessional team of nine facilitators, including two educationalists, three clinicians from pharmacy (n=1) and medicine (n=2), and four senior student PTT alumni from pharmacy (n=3) and nursing (n=1) assisted with facilitation of the face-to-face delivery. Details are provided in Table 2.

Assessment and feedback: Formative assessment and feedback occurred throughout the face-to-face class. Students were required to attend class prepared to engage in interactive large and small group learning activities. In their small groups (four to five students per group), students presented a pre-prepared 5-minute teaching session on a healthcare topic and a 5-minute skills teaching session on a non-healthcare topic. These activities were formatively assessed using prepared marking rubrics. Students were provided with peer and facilitator feedback. Students were also formatively assessed and provided with comments on their feedback ability. Using clinical scenarios in the large group classroom, role play was used to practice clinical handover, using ISBAR as a framework.

Online only format

In October 2020 the program was delivered completely online across three weeks. 'Online only' students were required to contribute to multiple discussion boards, submit an online teaching plan, a video of themselves teaching a five-minute skills session and providing and receiving peer feedback. In addition, students participated in a 1.5 hour synchronous Zoom session.

Facilitators: An interprofessional team of eight facilitators, including two educationalists, and six clinicians from medicine (n=2), pharmacy (n=1), nursing (n=1), dentistry (n=1), physiotherapy (n=1), provided asynchronous feedback for online module discussion boards and required activities across three weeks. A total of 11 facilitators, including two educationalists, one senior health professional student, and eight clinicians from medicine (n=4), pharmacy (n=1), nursing (n=1), dentistry (n=1), physiotherapy (n=1), facilitated the 1.5 hour synchronous Zoom session. Details are provided in Table 2.

Assessment and feedback: Formative assessment and feedback occurred throughout the online program, and in the Zoom session. Online, students were required to contribute to discussion boards, submit a video of themselves teaching a five-minute skills session, and give and receive

peer feedback. Students were required to attend the Zoom session prepared to engage in an interactive small group activity (4 to 5 students per group). In their small groups, students presented a pre-prepared 5-minute teaching session of a healthcare topic requiring approximately 2 hours of pre-class preparation. The activity was formatively assessed using an online prepared marking rubric. Students were provided with feedback from their peers and the assigned small group facilitator. Students were also formatively assessed and provided with comments on their feedback ability.

Certificate of completion

At the completion of each PTT program, students received a certificate to evidence their commitment to development of teaching skills.

Study design

Recruitment

For each iteration of the program, senior students from The University of Sydney, Faculty of Medicine and Health (medicine, pharmacy, health sciences, nursing and dentistry) were invited by email to take part in the PTT program, and were required to register online.

Data collection and analysis

We followed a similar study design to our previous published study (Burgess et al. 2017). Quantitative and qualitative data were collected from participants via post-program questionnaire. At the end of each program (blended learning and online only), the relevant participants were asked to voluntarily complete the survey, delivered online via Qualtrics. The questionnaire was based on three key themes, including:

Participants' perceived ability regarding the learning outcomes for each module. For example, *"I am able to carry out a short teaching session to students".*

Participants' intention to take part in future peer tutoring activities, such as "*I am likely to volunteer to tutor peers this year/next year".*

Participants' attitudes towards interprofessional learning. This was measured using questions from the Readiness for Interprofessional Learning Scale (RIPLS) (Parsell & Bligh 1999). For example, "*Shared learning with other healthcare students has helped me to think more positively about other health professionals"*.

For closed items, we used a five-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). Participants were also asked to respond to open-ended questions that related to the most useful aspects of the PTT program, suggested improvements and any positive or negative aspects of working with other health professional students.

Quantitative data were analysed using descriptive statistics. Thematic analysis was used to code and categorise qualitative data, and build an understanding of the students' experience. A portion of the data was read by three authors (AB, CvD and JB) to identify initial themes. Following

negotiation of meaning between these authors, a coding framework was developed and applied to the full data set by the first author (AB) (Braun & Clarke 2013).

Ethics approval

The University of Sydney Human Research Ethics Committee approved the study. Consent for participation was obtained from participants to enable us to include their data from this study.

Results

Registration and demographics

In total, 131 students registered for the PTT program in 2020, and 85/131 (65%) completed the program. Of the 85 participants, 36 (42%) completed the program in blended learning format, and 49 (58%) in 'online only' format. Students were from six disciplines: health sciences (n=27, 32%), medicine (n=22, 26%), nursing (n=19, 22%), pharmacy (n=11, 13%), oral health (n=5, 6%), and public health (n=1, 1%).

Blended learning format

Registration and demographics

In total, 58 health professional students registered for the PTT program (see Table 2). Of the 58 who registered, 36 (62%) successfully completed the PTT program. This included 23 health sciences students [physiotherapy (n=8), diagnostic radiography (n=7), occupational therapy (n=6), speech pathology (n=2)]; pharmacy students (n=7); medicine students (n=3); nursing students (n=2); public health student (n=1).

Online only format

Registration and demographics

In total, 73 health professional students registered for the October online PTT program (see Table 2). Of the 73 who registered, 49 (67%) completed the program, including students from medicine (n=19), nursing (n=17), oral health (n=5), pharmacy (n=4), and health sciences (n=4). Health science students included those from rehabilitation counselling (n=2), physiotherapy (n=1) and exercise physiology (n=1).

Table 2

Summary of program information - 2020 PTT programs

Mode of delivery and date	No. of Participants registered	No. of Participant numbers completed	Health professions represented	Facilitators
Blended learning (face-to-face and online) February 2020 Face-to-face class 9am-4pm Royal Prince Alfred Hospital	58	36 (62%)	Health sciences (23) (including 8 physiotherapy, 7 Diagnostic Radiograph, 6 Occupational Therapy, 2 Speech Pathology) Pharmacy (7) Medicine (3) Nursing (2) Public Health (1)	Senior facilitators (providing short lectures, and guidance to students). 2 educationalists 1 pharmacist 1 medical practitioner 1 medical intern (program alumni) Senior student facilitators (PTT alumni): 3 senior pharmacy students, 1 senior nursing student
Online Delivered across 3 weeks October 2020 With one 1.5hr zoom session on teaching a healthcare topic, giving and receiving feedback	73	49 (67%)	Medicine (19) Nursing (17) Oral health (5) Pharmacy (4) Health sciences (4) (including 2 rehabilitation counselling, 1 physiotherapy, 1 exercise physiology).	Online (Canvas) across 3 weeks 2 educationalists 2 medical practitioners 1 pharmacist 1 dentist 1 nurse 1 physiotherapist 1.5 hr Zoom session 2 educationalists 5 medical practitioners 1 dentist 1 nurse 1 physiotherapist 1 senior medical student
Total	131	85 (65%)	Health Sciences (27) Medicine (22) Nursing (19) Pharmacy (11) Oral Health (5) Public Health (1)	

Post-course questionnaires

Of the 36 students who completed the program via blended learning, all (100%) completed the post-course questionnaire. Of the 49 students who completed the program via 'online only', 33 (67%) completed the post-course questionnaire.

Responses to closed items

Student experiences of learning outcomes

Student responses to questions regarding program outcomes are provided in Figure 1. For each of the models of delivery, the learning outcomes were achieved by the majority of participants.

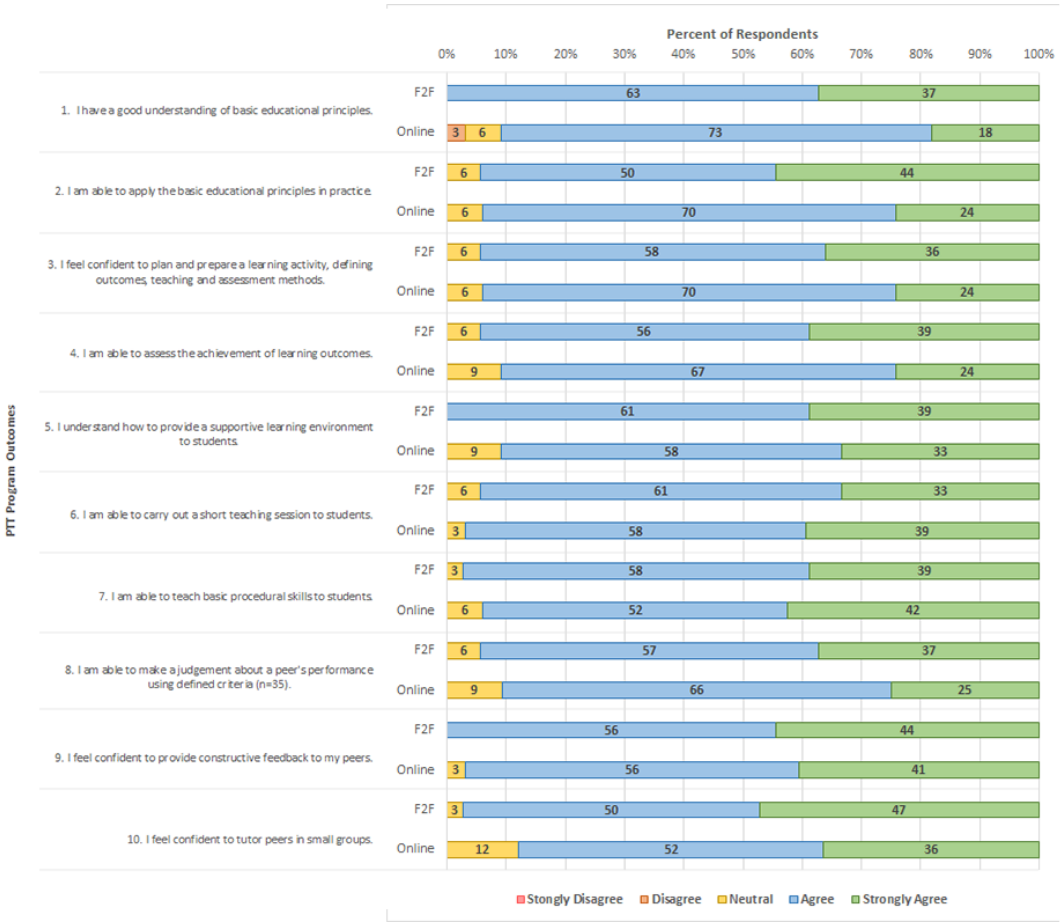

Figure 1

Participants' perceptions of PTT program outcomes Face to Face (FTF; N=36) and Online (N=33) post-course evaluation

Student intentions to participate in peer teaching and preparedness to practice

Student responses to questions regarding their intention to participate in peer tutoring activities are provided in Figure 2. There is a notable difference in student responses, with face-to-face participants showing greater confidence and intention to teach and assess peers and in the future health professional practice.

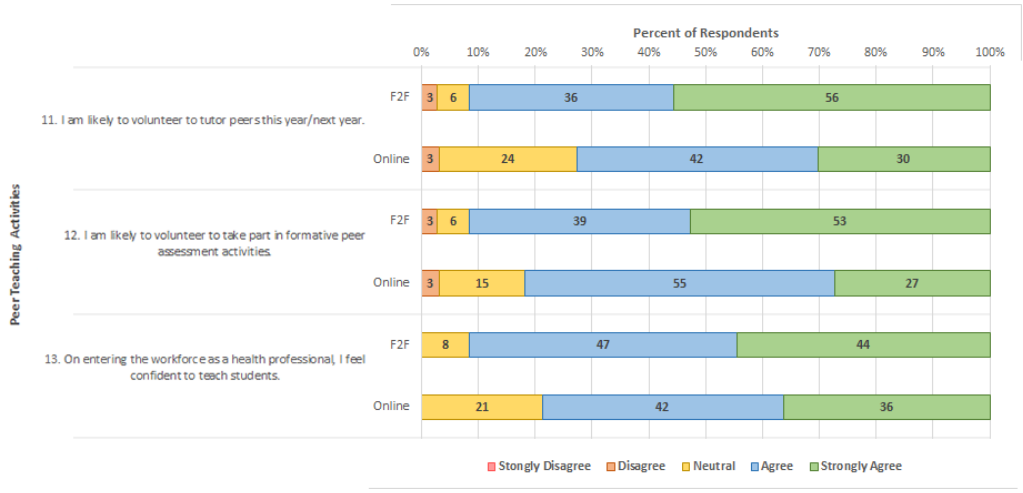

Figure 2

Participants' intention to participate in peer teaching activities Face to Face (FTF; N=36) and Online (N=33) post-course evaluation

Student attitudes towards interprofessional learning

Student responses to questions regarding attitudes towards interprofessional learning are provided in Figure 3. Face-to-face participants responded more positively than online participants regarding their attitudes towards interprofessional learning.

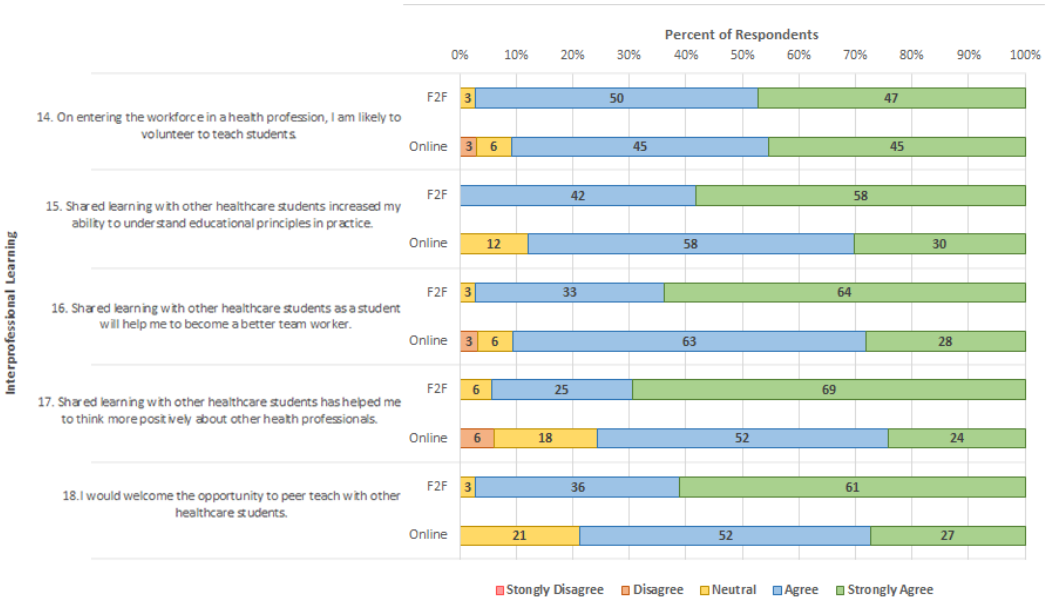

Figure 3

Participants' perception of interprofessional learning Face-to-Face (FTF; N=36) and Online (N=33) post-course evaluation

Responses to open-ended questions

Participant responses to open ended questions are displayed in Tables 3 and 4. Qualitative data presented in Table 3 includes students' perceived *"most useful aspects"* and *"suggested improvements"* to the PTT program. Responses from both blended learning and online only participants suggest that students appreciated the interactive nature of the PTT program, with multiple small group sessions and opportunities to apply theory and practice newly acquired skills in a friendly environment, and receive feedback from both peers and faculty. Students valued the opportunity to learn and apply structured frameworks that they can transfer to the workplace, and the provided video examples, including frameworks to plan a teaching session (OAS model) (van Diggele et al. 2020), give and receive feedback (Pendleton's model) (Pendleton et al. 2003), teach a skill (Peyton's model) (Walker & Peyton 1998) and communicate handover (ISBAR) (Finnigan et al. 2010). Although both 'blended learning' and 'online only' students found the online modules concise and well structured, some students felt additional online modules would be valuable. 'Blended learning' participants suggested a reduction in the duration of the 'face-to-face' session, while 'online only' participants suggested additional opportunities for real-time interaction, and a reduction in the number of discussion boards. Both sets of students valued the flipped classroom model, where they came to either face-to-face class or the online Zoom session prepared to engage with their peers.

Table 3

Open-ended responses from 'blended learning' and 'online only' participants to most useful aspects and suggestions for improvement

What did you find to be the most useful aspects of the Peer Teacher Training program?		
Theme	Examples of comments	
	Blended learning (online and face-to-face)	'Online only'
Interactive nature of small group sessions and the opportunity to practice, with facilitators providing clear instructions on teaching techniques	• Small group teaching, lots of experience providing feedback to others, friendly facilitators. (medicine) • The teaching session for us to practice and getting feedback from peers and facilitators on how to improve. (physiotherapy)	• The 5-minute teaching activity was a good way to engage with other students and allowed us to put the skills we had learnt into practice. (medicine) • Supportive teaching staffs, unambiguous and directive structure of the program with helpful modules. (nursing)
Provision of frameworks and models to use in future teaching (Peyton's four step approach to teach a skill, Pendleton's feedback model, ISBAR for clinical handover), with opportunities for practice	• Having clear simple models for preparation and delivery of teaching and giving and receiving feedback. (occupational therapy) • The Peyton's four step approach is really helpful in deep understanding of teaching and helps me teach in a more logical way and the assessment tool also helps me a lot to give efficient peer review and assessment. (physiotherapy)	• The clear models that can be applied in practice. Pendleton for providing feedback, Peyton for teaching a skill. These are useful tools I can take forward into my practice. (nursing) • I definitely learnt numerous new skills throughout the program. I especially found the different models that were utilised e.g. Pendleton's model, Peyton's approach etc. extremely useful to use as a base framework and guidance to form my own lesson plans, lessons etc. (medicine)
Learning how to constructively give feedback, with opportunities for practice	• The model introduced giving feedback and the opportunities to try the skills being taught. (occupational therapy) • Learning how to give feedback in a constructive and kind way that prevents defensiveness. (occupational therapy)	• Learning about Pendleton's feedback model and practising it was helpful. (medicine) • Being able to use quick and easy frameworks to apply during teaching e.g. Pendleton's model of feedback or ISBAR etc. (medicine)

Receiving immediate feedback from peers, with opportunities to practice and apply the feedback	• Receiving feedback instantly from peers and chance to practice. (physiotherapy) • The feedback which was given helped improve my confidence and encouraged me further. (pharmacy)	• Peer feedback and teaching of useful techniques to incorporate into my future teaching practices. (medicine) • Introduction to fundamentals of teaching, eg lesson plan structuring, feedback process, and then opportunity to apply theory. (medicine)
Participants appreciated learning and applying a method to plan and structure a lesson	• The methods on how to plan and execute the lesson plan. (pharmacy) • Learning about structuring a teaching session. (exercise physiology)	• Learning how to make learning plans, give feedback, practise giving feedback, and teach a practical skill. (medicine) • Preparing a lesson plan with a specific structure gave me confidence that I would be capable of same in future. (medicine)
Participants appreciated the opportunity to engage with students from other disciplines	• I enjoyed the interdisciplinary approach and working with people who have different experiences. (occupational therapy) • Learn different insight of other health care professional students. I enjoyed hearing about topics from other disciplines. (physiotherapy)	• The combination of disciplines made to be a supportive group where we understood where every disciple focuses on when approaching patient health and providing feedback. (dentistry) • Enjoyed the multidisciplinary environment. (medicine)
The flipped classroom model provided students with the opportunity to prepare well prior to the real-time sessions	• Engaging students to prepare beforehand and deliver presentations. (medical imaging) • The preparation is very useful and helped me become confident when engaging in the activities. (nursing)	• Defining the models in giving feedback, lesson planning and skill teaching was very helpful and consistently embedding it into our content and assignments helped cement that practice in our minds. (medicine) • Practicing putting what we learned into action - through the 5 minute teaching and the final video. (medicine)

Participants noted the benefits of learning from their peers as well as faculty, and participating in discussion boards	• It was great opportunity to learn from staff as well as other students with different knowledge. (nursing) • Teaching peers. (pharmacy)	• I enjoyed participating in discussion boards and reading the submissions of other students. (dentistry) • Discussion boards, videos. (rehabilitation counselling)
Participants valued the succinct and concise online modules, videos, and helpful teachers	• Teaching materials provided e.g. lecture notes/slides. (pharmacy) • The theory was very interesting despite it being quite simplistic. The repetition was very helpful in learning how to apply it. (medicine)	• Online modules to work through were concise and very useful. The simple structured parts that gave me the information I needed around teaching and feedback. (medicine) • The course outline, the simplicity of it and how helpful all the teachers were. The entire program was great! Especially all the helpful videos! (pharmacy)
The 'blended learning' participants described the face to face activities as 'fun'	• All the activities are inviting to all of the group, it's very helpful and fun. (diagnostic radiography) • Good experience! Very applicable and useful. Good content! Teaching a skill was very fun!!! (pharmacy)	
The 'online only' participants appreciated the flexibility the program offered		• Able to learn and engage at my own pace. (rehabilitation counselling)
What suggestions would you make for improvement in the Peer Teacher Training program?		
Both groups of students suggested that there should be additional small group activities	• I would suggest more activities for future training programs. It will help facilitators incorporate more skill development components. (diagnostic radiography) • More time during small group discussion (occupational therapy)	• If there could be an opportunity for it to be more interactive in real time such as a designated time we would answer the questions or have a discussion would help boost engagement (pharmacy) • The program overall was fantastic, the only thing I would suggest would be to have more face-to-face interaction such as the

		Zoom session we had (oral health)
The 'blended learning' participants suggested a shorter face-to-face session	• Did not need a full day to achieve all the activities. The program can be shorter. (occupational therapy) • Make the whole session shorter, as it can be completed much quicker i.e. the skills demonstrations in total could be done in 25 min. (physiotherapy)	
The 'online only' participations suggested a reduction in the number of discussion boards, and additional tasks, such as multiple choice questions		• I think too many reflective / discussion boards. Would prefer additional activities to put theory in to practice (i.e. develop lesson plan). (medicine) • Maybe instead of as many forums, instead having MCQs that also test some of the theory covered. (oral health)

Qualitative data presented in Table 4 includes students' responses to the "most positive aspects of working with other health professional students", and "any negative aspects to working with other health professional students". Both 'blended learning' and 'online only' participants valued the interprofessional context, sharing their experiences, seeing both the differences and similarities across the health professions, and learning from other disciplines. Although both 'blended learning' and 'online only' participants were positive regarding the interprofessional aspect, they felt that it was sometimes difficult to understand different terms and topics when communicating with students from other health professions.

Table 4

Open-ended responses from 'blended learning' and 'online only' participants to the most positive aspects of working with other health professionals, and any negative aspects.

What did you find to be the most positive aspects of working with other health professionals?		
	Examples of comments	
Theme	'Blended learning" (face-to-face and online)	'Online only'
Both groups of students mentioned that the course allowed them to	• Getting to know them and their working nature really allowed me to understand	• Learning how different disciplines still indeed experience the same aspects of

see the similarities across the health professions, and realise the elements common to all disciplines	how similar our roles are in terms of patient care and how we can utilise the same skills to manage patient care. (diagnostic radiography) • Understanding what we had in common. (speech pathology)	learning and cover core principles and we can use this commonality as a basis to collaborate. (medicine) • Knowledge from different areas. Breaking assumptions about other professions. (nursing)
Both groups of students appreciated learning different approaches to teaching used by the different disciplines	• Different perspectives on topics and teaching. (occupational therapy) • Getting better perspective of the communication and its importance between different professions in healthcare. (diagnostic radiography)	• Learning different teaching approaches used in other health professions. It was a good dynamic. Allowed us to understand different types of teaching experiences. (nursing) • How eager we all were to learn and learning different styles of teaching from others was a definite plus! (pharmacy)
Both groups of students felt they gained a greater understanding of the roles and practice of other disciplines	• Developing an awareness of other health professions and their roles in team. (medicine) • Knowing knowledge from other disciplines. Knowing their insight and views…. I love learning about their disciplines as well as figuring out how we could work together. (medical imaging)	• Got to see how health issues are targeted by different disciplines. (medicine) • Gained different perspectives and better understood professions expectations and concerns. (medicine)
Learning and sharing their own experiences with other disciplines, and adjusting their approaches to communication	• Learning a patient clinical history from diff perspectives and develop a more holistic understanding of patient settings. (medical radiation) • It gives the opportunity to networks with other health professional students, as well as being able to practise the communication skills with people who don't already know what you are talking about. (occupational therapy)	• Is understanding that everyone is different and that they provide different perspectives to the approach of feedback. (dentistry) • I got to learn more of their perspectives, their approach and understanding of certain topics and enabled me adjust my teaching to cater for them. (medicine)
Students appreciated the opportunity to meet and network with students from other disciplines	• That it helps students connect and understand what different disciplines can bring into the session. (nursing) • How fabulous to work with others as a team, learn together and help each other	• Despite being held online, the PTT course provided an environment that encouraged discussion between the different professions. (medicine) • It was nice to get to meet some people from other faculties

	for better understanding. (nursing)	before we enter the workforce together. (medicine)
Students suggested that in learning the roles of other health professionals, they could also identify knowledge and skills that were transferable across disciplines	• Learning other professionals' roles and learning transferrable skills from them. (occupational therapy) • Helps others understand the role of other healthcare professional as they have different expertise and knowledge. (pharmacy)	• I enjoyed meeting some in the zoom teaching session and learning about their topics. (medicine) • Able to gain different perspectives from others in relations to the learning/teaching process. (Rehabilitation counselling)
The variety of topics taught provided deeper engagement in learning and teaching	• Learning topics from other health professional students. (physiotherapy) • Able to share different topics and skills. (diagnostic radiography)	• Different backgrounds and knowledge levels meant we could all learn something different from each other (medicine) • They have a different perspective, and made for good practice teaching as they had not encountered the topic I chose, whereas other med students would have. (medicine)
Building future relationships with other disciplines and helping to develop a respect and trust for the work of other professions	• Knowing that other students are lovely and friendly helps to build future relationship with them with confidence. (pharmacy) • Real life experience when later on entering the work field. (pharmacy)	• It was the good opportunity to interact and know their perception of diverse branches of health care professionals. We also got to know how each and every health care professionals were enthusiastic on their work and we got opportunity to thank and inspire them for their contribution as a team in health care. (nursing) • The most positive aspect would be seeing everyone respecting each profession and being able to see different perspectives of health care students (oral health)
Were there any negative aspects to working with other health professional students?		
Some students (from both groups) felt there were different levels of knowledge and training of each profession	• Gaps in knowledge and lack of understanding in certain topics. (pharmacy) • Coming to terms with different ideas from each other that may take time to explain and understand. (physiotherapy)	• Some were very junior compared to where I am in my training, but I don't think this is necessarily a bad thing. (medicine) • Different knowledge from different educational background, can be difficult to understand or relate to. (nursing)

Discussion

We sought to compare delivery of the Peer Teacher Training (PTT) program in 'blended learning' and 'online only' format, across three domains: 1) experience of PTT program learning outcomes, 2) intention to participate in teaching and preparedness to practice, and 3) attitudes towards interprofessional learning. Our results suggest that both groups of participants felt able to achieve most of the learning outcomes through provision of relevant literature, being able to actively participate during the face-to-face class or Zoom sessions and online activities, formative assessment and feedback from peers and faculty. However, 'online only' participants expressed a need for additional synchronous activities, with increased opportunity to practice new teaching skills and receive additional feedback. Additionally, our results indicate that 'online only' participants felt less confident to undertake teaching activities, both as students and on entering the workforce. While both participant groups indicated that their learning was enriched through the interprofessional context, this was more evident in the 'blended learning' context, where students attended the face-to-face session.

Participant experiences of the PTT program learning outcomes

Most participants reported a good level of confidence in their ability to teach and assess students using defined criteria, with little variation between 'blended learning' and 'online only' participants. Participants also appreciated the many formative assessment opportunities, with multiple sources of feedback – a unique feature of the PTT program. Recent systematic reviews of teacher training programs for health professional students identified lack of participant assessment and feedback as a common deficit (Dandavino et al. 2017; Burgess & McGregor 2018). Both groups of participants reported that the online pre-learning prepared them for the real-time sessions. They highlighted the benefits of learning and applying frameworks, such as, the 'OAS' model to plan teaching, Peyton's model to teach a skill, Pendleton's model for feedback, and ISBAR to communicate clinical handover. They noted these frameworks could be applied across disciplines and to "multiple clinical situations" to prepare and deliver their teaching. A highlight for all participants was the small-group sessions with opportunities to practice teaching and to give and receive feedback. However, online participants indicated a need for additional synchronous sessions. This is in line with evidence that supports the value of small group peer learning, where participants are engaged and involved in building their own learning experience (Kitchen 2012; Graffam 2007).

Participant intentions to participate in teaching and preparedness to practice

Fostering a desire to learn and teach encourages lifelong learners, who continue to refine their teaching skills (Schumacher et al. 2013). We identified a greater intention to teach and assess both at University, and on entering the health professional workforce by 'blended learning' participants. This finding supports literature suggesting that face-to-face activities provide greater benefit in terms of enjoyment and skills development compared to online activities (Cook & Steinert 2013; Kennedy 2019). A study of clinician educator online training found that although flexibility is increased, the face-to-face activities play an important role in developing relationships with peers and teachers (Wearne et al. 2011). This suggests that additional 'real-time' activities should be provided. Furthermore, to ensure practice opportunities for skills development, it will be important to provide appropriate opportunities for relevant practical teaching experience.

Participant attitudes towards interprofessional learning

Both groups of participants reported their experience of the interdisciplinary aspect of the PTT program as positive, and reported an increased appreciation and respect between disciplines, and a desire to teach and collaborate with each other. However, this was more evident in the 'blended learning' participants who had multiple opportunities for active participation in small groups during the face-to-face class. Students reported sharing and learning different teaching pedagogies used within the different disciplines. They valued learning about the perspectives of each discipline, their roles and responsibilities, and in particular, the differences and commonalities in the knowledge and skills of various disciplines. Although a willingness of network members to share their knowledge is key to success of such programs (Hean et al. 2003), there were some perceived difficulties regarding communication between disciplines where background knowledge and skills may differ.

Limitations

PTT program participants were recruited on a voluntary basis, which may have biased our results, which may not be applicable to our wider student population, or to other university settings. Further, although overall, there was an 85% (72/85) response rate to the post-course questionnaire, there was a greater response rate from the 'blended learning' participants (100%) compared to the 'online' participants (67%). It is possible that the data may have been skewed by the selection bias of those who chose to engage with the program afterwards being more likely to be those who had a positive experience of it.

Conclusion

Our findings indicate that both the 'blended' and 'online only' learning formats provided excellent frameworks for students to develop their teaching skills in an interprofessional context. Both groups of students found the online materials to be well structured, with relevant literature and multiple short videos as examples to assist preparation for small group in-class or synchronous online activities. These activities provided opportunities for students to learn topics, roles and perspectives of other disciplines; practice skills in teaching and the giving and receiving of feedback. Notably, our results indicate that 'blended learning' delivery may be improved by reducing the duration of the 'face-to-face' session. Conversely, 'online only' delivery may be improved by additional 'real-time' small group activities – an advantage of which may be strengthening students' perception of interprofessional activities. While we acknowledge that we have lost valuable face-to-face interactions, we have made a rapid and successful transition to adapt the design and delivery of our PTT program to the current contextual circumstances available to us. In doing so, we have improved our readiness for long-term disruption to meet the important need to prepare our students as future clinical educators within an interprofessional workforce. The next step will be to ensure provision of opportunities for alumni of the PTT program to teach their fellow students.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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