Insights About Instructional Design Features of an Interprofessional Education Initiative Involving Clinical Reasoning with Physiotherapy and Medicine Students

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ABSTRACT

Interprofessional education aims to prepare students in health professional programmes for collaborative practice. Because of its ubiquity in healthcare, clinical reasoning can be used as a vehicle for designing interprofessional education initiatives. However, little is known about how design features of interprofessional education initiatives involving clinical reasoning are experienced by students from different professions. This evaluation study aimed to identify design features from feedback provided by students from two health professions after participating in an interprofessional education workshop involving clinical reasoning. Content analysis was used to analyse written responses from 88 fourth-year undergraduate medicine and physiotherapy students (80% response rate). Eight design features were identified and three of them were represented disproportionately when professions were compared. More medicine students requested practice presenting cases, whereas more physiotherapy students suggested emphasis on management reasoning and expressed appreciation for exchanging professional perspectives and working collaboratively. Features common to both groups of students were requests for a greater focus on case discussions, guidance about how to think about case information, explanations about how to apply knowledge to the cases, more demonstrations of how experienced clinicians think, and opportunities to learn how to be open to possibilities and consider the bigger picture. These insights can be used by educators when they design interprofessional education initiatives featuring clinical reasoning.

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INTRODUCTION

Interprofessional education is promoted as an integral component of health professional programmes because it provides students with experiences intended to enable them to work collaboratively with each other in their future practice as healthcare professionals (Australian Medical Council, 2012; Frenk et al., 2010; Physiotherapy Board of New Zealand, 2019; World Health Organization, 2010). To build interprofessional competencies, educators design instruction that requires students to interact as they discuss and apply concepts and skills that are common among health professions (Buring et al., 2009; Reeves et al., 2016; Rogers et al., 2017; Young et al., 2020). One skill featured in interprofessional education initiatives is clinical reasoning (Gummesson et al., 2018; Hanum & Findyartini, 2020; Miles et al., 2016; Seif et al., 2014). Foundational evidence provides some insights on student preferences and educator perspectives with interprofessional education initiatives involving clinical reasoning exercises. A comparison of feedback from different health programme students is yet to be established to better understand design features of interprofessional education initiatives. Consequently, it is unclear how the instructional design features used in interprofessional education workshops that involve clinical reasoning may impact how students develop interprofessional competencies. The absence of such insight is an important gap in the literature as professional accreditation bodies and educators continue to advocate for the inclusion of opportunities for students to learn interprofessional competencies in their pre-registration education programmes. This situation poses a question for instructional designers and educators to consider: if clinical reasoning is used as a vehicle to learn interprofessional competencies, then what instructional features in the design of interprofessional education initiatives might optimise outcomes for different groups of health profession students?

Clinical reasoning can be defined as the sum of the thinking and decision-making processes associated with clinical practice (Higgs, 2018). However, the roles health professionals play when providing person-centred care can have an impact on how clinical reasoning may be viewed by practitioners (Young et al., 2020). A doctor may view clinical reasoning as a means of arriving at a diagnosis or generating a problem list (Croskerry, 2009a; Trowbridge et al., 2015). A physiotherapist may also view clinical reasoning as hypothesis-oriented; however, this view may emphasise movement and collaboration with a patient (Chowdhury & Bjorbækmo 2017; Hendricks, 2021; Hess, 2021; Huhn et al., 2019). Diverse perspectives about clinical reasoning can provide a vehicle for generating rich discussions among students from different professions that also support the development of interprofessional competencies

(Hanum & Findyartini, 2020). Recommended instructional design features for interprofessional education initiatives vary depending on the theoretical perspective underpinning the recommendations. When clinical reasoning is viewed primarily as a thinking process, recommendations include providing students with explicit opportunities to practise deliberately and reflect upon their use of intuitive and analytical thinking process because the former is context-dependent, whereas, the latter can be learned in more theoretical or abstract situations (Connor & Dhaliwal, 2015; Croskerry, 2009b; Trowbridge et al., 2015). When clinical reasoning is viewed as a process of enculturation into professional practice, then recommendations emphasise providing students with opportunities to develop problem-solving capabilities that involve tasks, situations, and interactions with others that increase in complexity, ambiguity, and authenticity over time (Higgs 2018; Wijbenga et al., 2019). Interprofessional education initiatives involving clinical reasoning appear to use instructional strategies that address the thinking processes and professional practice dimensions of clinical reasoning. Examples of such strategies are case-based role playing in a classroom setting (Gummesson et al., 2018), vignettes used to structure interactions in simulated ward environment (Miles et al., 2016), and mentorship to support immersion in collaborative student-led patient care experiences (Seif et al., 2014). Consequently, the recommended instructional design features for interprofessional education initiatives involving clinical reasoning are well-grounded in educational theory and supported by evaluation studies reporting student satisfaction. Missing from the literature, however, are studies that analyse feedback from students to specifically provide insights about instructional design features.

Students are uniquely positioned to provide insights to instructional designers about possible trade-offs between opportunities to apply and practise profession-specific clinical reasoning skills and opportunities to build interprofessional competencies in interprofessional education initiatives (O'Keefe & Ward, 2018). Insights might also be gained by exploring how students from different professions may experience this type of interprofessional education initiative. Therefore, this evaluation study aimed to identify instructional design features in feedback provided by students from different professions after participating in an interprofessional education initiative involving clinical reasoning.

METHODS

A mixed methods approach (Creswell & Creswell, 2018) featuring content analysis (Hsieh & Shannon, 2005) was used to address the aim of this study. This approach enabled categories representing instructional design features identified in student feedback to be developed independent of profession, followed by a comparison of category frequencies by profession (Castro et al., 2010; Nzabonimpa, 2018). Ethical approval was obtained from the Human Ethics Committee at the University of Otago (D17/420), including consultation with the Ngāi Tahu Research Consultation Committee.

Participants and setting

This study took place at the University of Otago with fourth-year undergraduate students in medicine and physiotherapy programmes during their first week of class in Dunedin, New Zealand. Medicine students were mid-way through their six-year Bachelor of Medicine and Bachelor of Surgery degree, while physiotherapy students were starting the final year of their four-year Bachelor of Physiotherapy degree. For both professions, the fourth year is when the undergraduate course becomes primarily based in clinical workplace environments. All students had at least one prior interprofessional education experience in their third year. This prior experience involved three two-hour workshops where students from medicine, physiotherapy, and pharmacy worked in small groups of approximately four people per group to learn about each other's professions while studying the topic of smoking cessation with case scenarios. These experiences are part of a university-led interprofessional education strategy (O'Brien et al., 2015).

This study explored a three-hour clinical reasoning workshop attended by all fourth-year students in medicine (n = 80) and physiotherapy (n = 30) on the main university campus. To coordinate staff and resources, the workshop was pragmatically scheduled at a time when both groups of students were preparing for clinical placements and when clinical reasoning workshops for each group previously occurred separately. The goals of the workshop were for students to use and further develop their clinical reasoning skills in an interprofessional setting. Existing clinical reasoning workshop material developed for the medicine students was adapted by the first author (EK) to enhance its relevance to physiotherapy students. Three cases were prepared that contained presenting complaints related to the head, chest, and abdomen with associated signs and symptoms, history, and results from examinations and investigations that would be familiar to medicine and physiotherapy students. Students were divided into small groups of approximately four people, with each group containing at least one physiotherapy student. The workshop was facilitated by five medicine doctors, two physiotherapists, one interprofessional education administrator, and one education advisor. The facilitators modelled how to explain their thinking aloud using a framework for clinical reasoning based on the Calgary–Cambridge communication method (Kurtz & Silverman, 1996; Silverman et al., 2013). This communication method was familiar to medicine students because it was taught to them in the early years of the medicine programme. The clinical reasoning framework was developed by educators at the medical school and reviewed by the first author and deemed suitable for use with physiotherapy students because it was compatible with the communication method they had been familiarised to. The clinical reasoning framework provided students with guidance for communication with a patient to initiate a consultation and build a relationship, gather and analyse information about the presenting problem and symptoms, perform a relevant physical examination, and end with an explanation and plan involving a differential diagnosis or problem list. After modelling how to use the framework, students were invited to work through the three cases in their small groups. Students were encouraged to share their thoughts about case information using a *think aloud* technique that was familiar to both groups of students (Pinnock et al., 2015). This technique balanced conveying clinical reasoning as a thinking process and professional practice because it facilitated discussion

about the importance or meaning of case information. The case information was presented to students one paragraph at a time. Facilitators circulated among the groups to encourage discussion about the information presented in each paragraph and to support links between their ideas before progressing to the next paragraph. Each case ended with a brief verbal case presentation where students were asked to provide a succinct case summary or hand over to another health professional.

Data collection and analysis

All students were invited to complete an evaluation questionnaire at the end of the workshop, which formed the data for this research. The questionnaire was developed by the teaching team when the workshop was designed to prompt open-ended reflection and feedback comments. The four prompts for reflection were:

1. What part of today's session about clinical reasoning did you find most helpful/useful?
2. How might clinical reasoning help when you take your next history?
3. What do you want to learn more about?
4. Please suggest an improvement for our next clinical reasoning workshop with you.

Written responses were collected from all students who consented to participate in the study. All data were collected on the same day from participants and de-identified before analysis to protect students' anonymity. Students noted their profession; no further demographic information was collected.

All data analyses were performed by the authors using a content analysis approach (Hsieh & Shannon, 2005). Content analysis was chosen as a flexible approach to quantifying qualitative data and comparing design features in feedback provided by students from different professions after participating in an interprofessional education initiative involving clinical reasoning (Castro et al., 2010; Nzabonimpa, 2018). To address this aim, the researchers collated the questionnaire responses blind to profession. The questionnaire data were parallel coded independently by both researchers using qualitative data analysis software, HyperResearch (ResearchWare, Version 3.7.3, Randolph, MA). More than one category code could be applied to text in written responses. Next, the researchers met to discuss the codes and identify a limited number of categories. Any differences were discussed until resolved by achieving 100% consensus. Descriptive categories were created with limited abstraction (Vaismoradi et al., 2016). This decision addressed the large number of relatively short text responses and our intention to subsequently compare categories of responses by profession. At this point, we interpreted the categories of responses as design features according to the elements in the systems model of teaching and learning (Biggs, 1993) and used in published reviews about interprofessional education initiatives (Hammick et al., 2007; Reeves et al., 2016). The systems model outlines three components of teaching and learning: presage, process, and product. The presage component includes student and teaching context factors such as the prior knowledge and expectations learners and teachers bring with them to the learning environment. The process component encompasses how deeply students engage with the task. The product component addresses how and what was learned by students. The use of the systems model enabled us to interpret the categorical results as instructional design features as seen from the students' perspective of how they perceived and contributed to the teaching context, how they engaged with and participated in the think aloud task, and what they thought about learning clinical reasoning skills with peers from another health professional programme.

To compare the instructional design features by profession, the eight categories identified from the qualitative content analysis were quantified (Elo et al., 2014; Hsieh & Shannon, 2005). All responses were read independently by both authors. Each response was assigned to as many categories as matched the content of the response. The frequencies and percentages were calculated to show the relative prevalence of each category in the two professions. Prevalence data were analysed using chi-square tests. The null hypothesis was that there would be no difference in the number of medicine and physiotherapy students in each of the eight categories. Since there are no other published accounts of statistical results for comparing medicine and physiotherapy feedback responses from an interprofessional clinical reasoning workshop, effect sizes of 0.10, 0.30, 0.50 were interpreted to be small, medium, and large, respectively, as suggested by Cohen (1988) for chi-square tests with 1 degree of freedom. All statistics were calculated using IBM SPSS (Version 25, Armonk, NY) with an alpha level of 0.05.

RESULTS

Sixty-five medicine students and 23 physiotherapy students (81% and 77% response rates, respectively) consented to participate in this study and completed the questionnaire. Eight instructional design features were identified from student responses from both professions. Support for the null hypothesis was indicated by the results of the chi-square tests for five of the eight instructional design features: participating in case-focused discussions, receiving guidance about clinical reasoning, applying clinical reasoning cases, observing clinical reasoning modelled by clinicians, and seeing benefits of learning clinical reasoning. Table 1 summarises the findings and presents the results of the statistical analyses of the prevalence data.

A significant relationship with a medium effect was found between responses from medicine and physiotherapy students about "communicating and collaborating interprofessionally". Medicine students were less likely than physiotherapy students to respond about "learning from different perspectives" (Participant (P)80 Physio). A significant relationship with a medium effect was found between responses from medicine and physiotherapy students about "practising presenting cases to each other". Medicine students were more likely than physiotherapy students to request more "practice giving case presentations" (P34 Med). A significant relationship with a large effect was found between responses from medicine and physiotherapy students about "emphasising management reasoning". Medicine students were much less likely than physiotherapy students to ask for "more relevance to physio" (P29 Physio) with an increased emphasis on reasoning beyond the diagnosis to include management reasoning.

Table 1

Instructional Design Features Identified in Feedback from Medicine and Physiotherapy Students

Instructional design feature	Representative responses	Medicine (n = 65)		Physiotherapy (n = 23)		χ^2	p	Effect size ϕ
		n	%	n	%			
1. Communicating and collaborating interprofessionally	Getting ideas from students in other professions (P23 Physio) Meeting med students was helpful, to understand their scope, knowledge, ideas, etc. (P29 Physio) Good to practise, good collaboration with physio (P41 Med) Working in team and discussing (P70 Med)	30	46	17	74	5.262	0.022	–0.245
2. Participating in case-focused discussions	Need longer on each case please (P1 Med) Less role-play, more case time (P12 Med)	41	63	5	22	1.773	0.183	ns
3. Receiving guidance about clinical reasoning	Learning how clinicians think while taking a history going through cases (P45 Med) Give experience in how to guide thinking (P67 Physio) Help me structure and come to more accurate conclusions and patient specific differential diagnosis (P88 Physio)	34	52	15	65	1.147	0.284	ns
4. Applying clinical reasoning to cases	Working on the cases (P2 Med) Going through case studies (P42 Physio)	34	52	7	30	3.266	0.071	ns
5. Practising presenting cases	How to make succinct summary about patient during handovers in ward (P21 Med) Case presentations – feedback on good/bad (P46 Med)	22	34	2	9	5.418	0.020	0.248
6. Observing clinical reasoning modelled by clinicians	Hearing more docs think out loud (P3 Med) Need some extra demonstration of clinical reasoning by scenarios to show how to do it (P19 Med)	14	22	6	26	0.200	0.655	ns
7. Seeing benefits of learning clinical reasoning	Help me to think through all possibilities (P13 Med) Keep different possibilities open (P58 Physio) Try to get a big picture before giving diagnosis (P73 Physio)	13	20	6	26	0.372	0.542	ns
8. Emphasising management reasoning	More treatment ideas rather than a diagnosis driven session (P11 Physio) Management treatment plans after diagnosis for different conditions (P43 Med)	4	6	10	44	17.691	< 0.001	–-0.448

Note. Med = medicine student; ns = not significant; P = participant; Physio = physiotherapy student. Percentages rounded to the nearest whole number.

DISCUSSION

This study generates findings of interest to educators designing interprofessional education initiatives that feature professional skills such as clinical reasoning. The results of this study suggest that medicine and physiotherapy students had similar perceptions about the instructional design features of an interprofessional education workshop about clinical reasoning, with three notable differences. Similarities encompass instructional design features intended to support students to learn clinical reasoning skills such as "receiving guidance about clinical reasoning", "applying clinical reasoning to cases", and "seeing the benefits of learning clinical reasoning". These findings provide insights about how competencies of health professional groups other than medicine can be developed in interprofessional education contexts (Faresjö et al., 2007; Rogers et al., 2017). Requests for more time spent "participating in case-focused discussions" and "observing clinical reasoning modelled by clinicians" reflect design features of the workshop that were valued and could be enhanced. These two requests are in alignment with findings from studies involving medicine students learning clinical reasoning (Audétat et al., 2017; Connor & Dhaliwal, 2015; Croskerry, 2009b; Trowbridge et al., 2015) and were also considered applicable to physiotherapy students.

However, there were notable differences between professions in the prevalence of feedback on three instructional design features. The first difference was the greater prevalence of requests for emphasising management reasoning from physiotherapy students. Feedback such as "more long term input where physios would more likely be involved" (P82 Physio) suggests that case materials supported discussions that were weighted more towards diagnostic reasoning than management reasoning. Medicine students also noted that the case materials were "very doctor focused" (P57 Med). These findings are not surprising given the different professional perspectives on clinical reasoning (Cook et al., 2018; Higgs, 2018; Young et al., 2020). From an instructional design perspective, case materials can be altered to increase emphasis on management reasoning. One option might be to extend the timeline of the case to include short- and long-term management, and potentially follow-up information.

The second difference was the greater prevalence of feedback about communicating and collaborating interprofessionally from physiotherapy students. A comment about the usefulness of the workshop was interpreted to indicate appreciation for the opportunity to "work together using each other's expertise and build upon the clinical picture" (P58 Physio). This finding may indicate that physiotherapy students had greater awareness of two core interprofessional competencies during the workshop: role understanding and interprofessional communication (Interprofessional Education Collaborative, 2016; Orchard et al., 2010; Rogers et al., 2017; Suter et al., 2009). When viewed from an instructional design perspective, this difference may have been due to the approximately 3:1 ratio of medicine to physiotherapy students in the workshop. Physiotherapy students may have felt compelled to work collaboratively in small groups if they were the only person representing input from their profession's perspective. Consequently, small group composition may have influenced the balance of professional views articulated in discussions. A future study could examine the impact of the proportion of professions represented in small groups on how learning outcomes are experienced among students from each profession.

The third difference was the greater prevalence of requests from medicine students for practising presenting cases. Medicine students felt "nervous" (P34 Med) about presenting cases and requested additional practice with "different formats so it's less rehearsed sounding" (P35 Med). This concern expressed by medicine students may reflect a greater emphasis on case presentations by clinical educators in their programme. When considered from an instructional design perspective, requests for more opportunities to practise presenting cases can be viewed as reflecting the priorities of the medicine programme and an emphasis on developing diagnostic reasoning skills. In the context of learning clinical reasoning, presenting a case is analogous to problem representation and is recognised as a valuable focus of attention in learning diagnostic reasoning (Audétat et al., 2017; Connor & Dhaliwal, 2015; Croskerry, 2009b; Trowbridge et al., 2015). Future workshops could include more opportunities to present cases for both groups of students by varying the format to include other contexts such as a ward-based face-to-face handover, a note written to a general practitioner or physiotherapist, or a conversation with a patient about their management plan.

The findings from this research highlight the ability of a shared case-based clinical reasoning workshop to surface both common and different professional perspectives. As also reported by Burgess et al. (2020), both medicine and physiotherapy students appreciated the opportunity to work together and gain another professional perspective on patient cases. The interprofessional context of the workshop created opportunities to broaden student and educator perspectives of clinical reasoning, consistent with descriptions of clinical reasoning as a thinking process and an encultured practice influenced by professional occupations (Connor & Dhaliwal, 2015; Croskerry, 2009b; Higgs, 2018; Trowbridge et al., 2015; Wijbenga et al., 2019). Findings from this workshop could be enriched with further data collection from students and by including staff perspectives; however, the workshop has not been repeated to date due to timetabling impasses and resource costs for nine staff to facilitate a session with 110 students despite having multi-level support that is vital for interprofessional education initiatives to succeed (de Vries-Erich et al., 2017). The mixed methods approach allowed the authors to identify and compare instructional design features from the limited evaluation feedback generated by the questionnaire given to the students at the end of the workshop that neither a qualitative nor a quantitative approach could achieve alone. Even though the quantitative phase of analysis involved the use of statistical analyses to determine which instructional design features differed in prevalence between professional groups, results should be considered indicative due to the overarching interpretivist perspective underpinning this study. While others may view these two approaches to data analysis

as incompatible, we support the view that different approaches can offer insights that may be inaccessible by each approach on its own (Castro et al., 2010; Nzabonimpa, 2018).

CONCLUSION

Findings from this study expand our understanding of the instructional features perceived by students when educators design interprofessional education initiatives that involve clinical reasoning. Medicine and physiotherapy students were found to make similar comments and requests about participating in case-focused discussions, receiving guidance about clinical reasoning, applying clinical reasoning cases, observing clinical reasoning modelled by clinicians, and seeing benefits of learning clinical reasoning. Notably, there was a greater prevalence of comments about communicating and collaborating interprofessionally and emphasising management reasoning among physiotherapy students, whereas requests for practising presenting cases were more prevalent among medicine students. We interpreted these differences as instructional features that can be adjusted to better suit medicine and physiotherapy students when they participate in an interprofessional education workshop involving clinical reasoning. Insights generated by this study may help educators to enhance their efforts when designing interprofessional education initiatives that feature clinical reasoning or other shared competencies of different health professional groups.

KEY POINTS

1. Eight features were identified from 88 responses from students in medicine and physiotherapy programmes about the instructional design of an interprofessional education workshop featuring clinical reasoning.
2. Five features were similarly prevalent in both groups: participating in case-focused discussions, receiving guidance about clinical reasoning, applying clinical reasoning to cases, observing clinical reasoning modelled by clinicians, and seeing benefits of learning clinical reasoning.
3. Among physiotherapy students, there was a greater prevalence of comments about communicating and collaborating interprofessionally and emphasising management reasoning, whereas requests for practising presenting cases were more prevalent among medicine students.
4. Findings can be used by educators to consider how they might adjust the design of interprofessional education initiatives that address shared competencies of different health professional groups.

DISCLOSURES

No funding was obtained for the study. The authors report no conflicts of interest that may be perceived to interfere with or bias this study.

PERMISSIONS

Ethical approval was obtained from the Human Ethics Committee at the University of Otago (D17/420).

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CONTRIBUTIONS OF AUTHORS

Both authors (EK and MA) contributed to all aspects of this research including design, data collection, analysis, drafting and editing of the manuscript.

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