

# Virtual learning impacts communication and teamwork

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## Funding information

This work was funded by an Educational Scholarship Grant from the International Association of Medical Science Educators.

## Abstract

**Background:** Essential interpersonal skills, such as teamwork and communication, are increasingly emphasised in the curricula of various health professions' programmes. A push towards virtual learning has gained traction following COVID-19 online learning; however, the implications of this modality on the aforementioned skills remain unclear.

**Approach:** Medical, physician assistant, physical therapy and occupational therapy students engaged in a four-part educational intervention aimed at promoting inter-professional teamwork, communication and role knowledge during an anatomy course taught in-person in 2019 and virtually in 2020. Students' perceptions of the intervention were explored through focus groups following each of these educational interventions using inductive coding.

**Evaluation:** A comparison of focus group and survey data collected in both years demonstrated less effective communication and teamwork. With respect to communication and teamwork in a virtual learning setting, the following subthemes were identified: *Challenges ascribed to the virtual learning format, Feeling of missing out on in-person experiences, Less engagement and accountability, Lack of bonding and teamwork, Feeling uncomfortable*, as well as *Added difficulty regarding Conversing, Ensuring inclusivity, Hesitation and Inadvertently domineering discussions*. Communication challenges stemming from the virtual learning format were identified as the primary hindrance.

**Implications:** Therefore, virtual learning may be less effective than in-person with respect to cultivating communication and teamwork skills. In our context, and based on the evaluation, we have decided to assess the utility of virtual interactive sessions in the context of other activities in the curriculum to ensure in-person opportunities are available for students to cultivate the necessary communication and teamwork skills.

## 1 | BACKGROUND

Essential interpersonal skills, such as communication and teamwork, are critical component of health professions' curricula with evidence

to suggest that "poor communication with colleagues and patients is the main factor in creating the conditions for medical error."<sup>1(p126)</sup>

Pre-clinical courses can serve as catalysts for interpersonal skill acquisition through curricular interventions targeting interprofessional

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socialisation.<sup>2</sup> For instance, collaborative forms of experiential learning, such as team- or case-based learning, foster effective communication and teamwork.<sup>3</sup>

## *Pre-clinical courses can serve as catalysts for interpersonal skill acquisition.*

The COVID-19 pandemic forced many health professions' programmes to transition in-person pre-clinical courses to a virtual format. Some have suggested making a permanent shift to teaching pre-clinical content virtually.<sup>4</sup> However, the efficacy of virtual versus in-person educational interventions aimed at promoting interprofessional collaboration and communication is unclear and the question remains: Do students struggle with communicating with their peers, particularly during interprofessional interactions, through virtual means?

## *The efficacy of virtual versus in-person educational interventions aimed at promoting interprofessional collaboration and communication is unclear.*

Effective communication and teamwork are integral skills for health professions, which is why activities that cultivate said skills are often embedded vertically throughout the curriculum, beginning with the basic science courses. One such activity, a small group, case-based learning (CBL) intervention incorporated throughout a first-semester anatomy course for occupational therapy doctoral (OTD), physical therapy doctoral (DPT) and masters of physician assistant studies (MPAS) students, was implemented in-person in 2019 and then virtually in 2020. Thus, the perceptions and experiences of the students who participated in this CBL intervention were examined to identify if virtual learning impacted the perceived effectiveness of communication and teamwork during these sessions.

## *Effective communication and teamwork are integral skills for health professions.*

## 2 | APPROACH

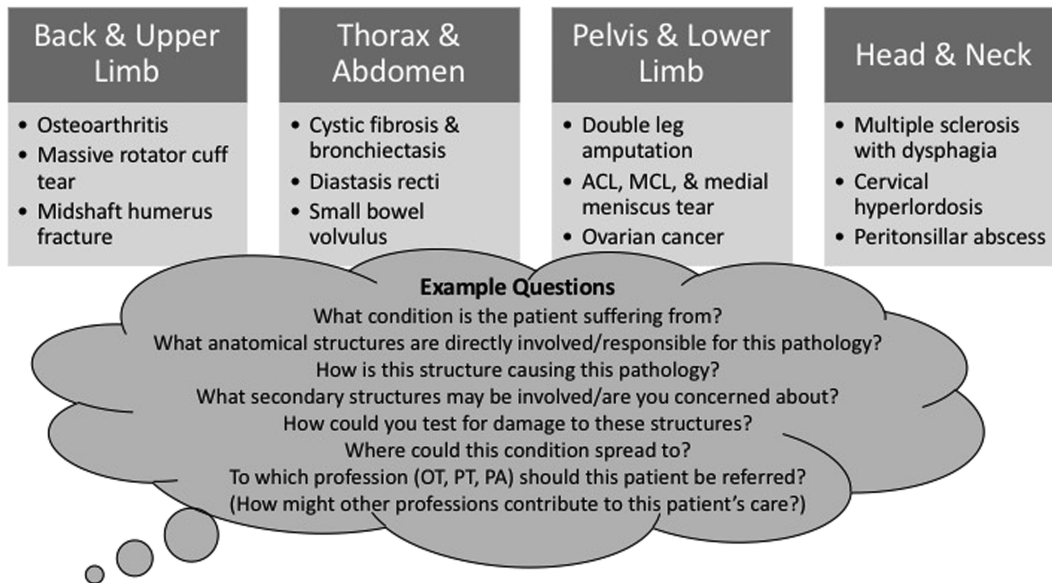
First-semester OTD, DPT and MPAS students participated in small group CBL sessions embedded throughout their anatomy course in a virtual format in 2020 using Zoom (Zoom Video Communications v. 5.0, San Jose, CA, USA). The CBLs aimed at promoting interprofessional skills including communication, role knowledge and teamwork in addition to facilitating students' application of their anatomy knowledge to clinically based patient scenarios, as outlined in Figure 1. An interprofessional education (IPE) competency framework described by Thistlethwaite et al. (2014)<sup>5</sup> with the four core competencies (roles and responsibilities, interprofessional communication, teamwork and team-based care and values and ethics) of IPE identified by the Interprofessional Education Collaborative (IPEC)<sup>6</sup> served as the underpinning for the design of this initiative. The 2020 virtual cohorts' anatomy and CBL curriculum paralleled the 2019 historical control cohort's curriculum, which were completed entirely in-person.<sup>7</sup>

During these CBL sessions, fourth-year medical (MD) students served as near-peer facilitators since the literature suggests near-peer mentoring and tutoring is an effective method for fostering interprofessional teamwork during IPE.<sup>8</sup> Each CBL session covered three cases, constructed with input from clinical faculty, designed to highlight the roles of OTs, PTs and PAs in team-based patient care, with each profession serving as the most appropriate health professional to assist one of the hypothetical patients (Figure 1). In addition to answering open-ended questions pertaining to anatomy and clinical concepts related to the case, students were asked to discuss what roles each profession might play in the hypothetical patients' care.

## 3 | EVALUATION

In order to assess CBL efficacy with respect to promoting role clarity through effective communication and teamwork, in both 2019 and 2020, a total of eight 1-hour focus groups were conducted within 1 week of the exams that followed each CBL session to examine students' experiences and perceptions of the educational intervention. A secondary objective was to gain insight into the impact of these CBLs on students' learning and perceived acquisition of other IPE-related skills such as communication and teamwork. However, determining the impact of virtual participation was not a specific goal. Participants were selected through convenience sampling; all students enrolled in the course were invited to participate and the first three students from each programme (OTD, DPT and MPAS) to volunteer were selected.

An inductive and iterative approach to qualitative thematic analysis was utilised to examine the 2020 focus group data for this component of a larger study.<sup>9</sup> One author (HLH) employed analytic procedures that followed the six phases of thematic analysis<sup>10</sup>: familiarisation with the data, generation of initial codes, search for themes, review of themes, definition of themes and production of the report. Following the creation of a preliminary codebook, the



**FIGURE 1** Summary of the content presented in the case-based learning (CBL) sessions

second author (MAM) completed a code application test utilising Dedoose qualitative software (SocioCultural Research Consultants LLC v. 8.0, Los Angeles, CA). Discrepancies were discussed, leading to another iteration of the codebook, and consensus was reached to ensure consistency in the application of the codebook. Transcripts from the 2019 (historical control) cohort's focus groups were re-analysed to specifically examine communication difficulties.

Emerging subthemes from the 2020 focus groups related to the theme of *Virtual Communication, Teamwork and Collaboration Impediments* are displayed in Table 1. In 2019, the only issues mentioned were related to MD student facilitators overestimating students' prior knowledge; thus, the subthemes outlined in Table 1 were specific to virtual learning only.

While students recognised the importance of effective communication and teamwork in their healthcare careers, the communication barriers uniquely derived from virtual learning impaired their perceived ability to acquire those skills. Students felt unable to circumvent the additional communication obstacles posed by their virtual learning environment (subthemes A, B, C<sub>1</sub> and E):

“In the future we are going to have to interact with doctors and other professions and work as a team. But with the whole virtual situation, we did not get to form those bonds or rely on each other like we would have, I think, if we were in-person. We just did not converse as much because it's a lot harder to have a group conversation or discussion on Zoom. And it's a bummer because I feel like we would've gained that teamwork skill a lot better if we were in-person instead.”

The above quote not only stresses the importance of effective communication and teamwork among healthcare professionals; it exemplifies several subthemes regarding hindrances attributed to virtual learning (A, B, C<sub>1</sub> and E). Difficulty forming relationships with peers virtually was perceived as an impediment to the development of teamwork and communication skills, a sentiment echoed by the following quote which pinpoints virtual learning as the root cause of this barrier (subthemes A, C<sub>1</sub> and E):

“Virtual learning kind of impeded that ability to build teamwork and communication skills during [CBL].”

Several virtual learning-specific barriers appeared to hinder students' perceived ability to acquire teamwork and communication skills. The inability to pick up on non-verbal social cues when someone is about to speak, coupled with the awkwardness of virtual conversations and fear of inadvertently talking over someone, was commonly cited (subthemes A, C<sub>1</sub>, C<sub>3</sub> and C<sub>4</sub>):

“Because you are not face to face with these people talking about it, you know, it's also hard to take turns talking on Zoom. Because you never know who's going to unmute, and then you are 'like, oh, they are talking' and then you mute yourself. So that's definitely kind of challenging. You do not want to over talk on someone.”

Another challenge was ensuring inclusivity during a virtual discussion. Students reported inadvertently domineering their team's conversation to avoid awkward silences rather than ensuring everyone participated (subthemes C<sub>2</sub>, C<sub>3</sub>, C<sub>4</sub> and F). This makes it more difficult to promote engagement and inclusivity virtually (subthemes A, C<sub>2</sub>, C<sub>4</sub> and D):

**TABLE 1** Subthemes (A–F) regarding impaired communication, teamwork or collaboration in a virtual CBL setting

Theme: Virtual communication, teamwork and collaboration impediments		
Symbol	Subtheme(s)	Description
A	Challenges ascribed to virtual learning format	Any communication- or teamwork-related hindrances students ascribe to the virtual learning format (i.e. perceive as a unique challenge caused by the virtual environment)
B	Feeling of missing out on in-person experiences	References to valuable experiences that are gained while participating in a course or programme in-person that are difficult/impossible to replicate virtually
C	Added difficulty collaborating	Aspects of collaborative learning students perceive as more difficult to do virtually
C <sub>1</sub>	Difficulty creating a dialogue/ conversing	Added struggle to create a back-and-forth dialogue or truly converse with one another
C <sub>2</sub>	Difficulty ensuring inclusivity	Harder to notice which peers are unsuccessful trying to talk or have yet to talk
C <sub>3</sub>	Difficulty overcoming hesitation/silence	Added hesitancy to unmute oneself and speak up leading to more frequent “awkward silences”
C <sub>4</sub>	Difficulty inadvertently domineering discussion	Overcorrection of “awkward silences” by talking too much and not allowing others time to speak
D	Less engagement and accountability	Describe feeling less engaged, present, focused and so on during CBL and perception of less accountability to actively participate (i.e. easier to slip under the radar and not participate)
E	Lack of bonding/ teamwork	Express feeling a lack of cohesion while working as a team, less of a connection or bond with peers and not feeling like a “team” while working in CBL small group
F	Feeling uncomfortable	References to feeling awkward, uncomfortable, unnatural and so on while talking to peers or working as a team during CBL

“In my group, there were just two people speaking. The same two people... and then I’m like, ‘there’s other people in the group that have not spoken ...’ Just making sure that everybody’s participating is a struggle with virtual team-based learning exercises especially.”

As the above quote eluded to, less active participation from one or more individuals impedes the entire team’s ability to work cohesively and communicate. While one can observe which students are not actively contributing to a discussion in-person and encourage those students to participate, this can be more challenging to notice during virtual discussions, leading to a lack of accountability. This lack of accountability in a virtual setting leads to less engagement, as seen in the following quote (subthemes A and D):

“When you are in-person, you have to be there and fully participate and give it your all. I think virtual learning really takes away the accountability.”

Finally, additional distractions associated with virtual learning environments contributed to less engagement, which in turn detracted from the discussion quality, thus hindering teamwork and communication (subthemes A and D):

“Because [the CBLs] are virtual, most people seem less engaged than they would be if it were in-person. Some seem like they are distracted, looking at other stuff on their phones or computers. And some turn their cameras off and do not really participate. And because of that, there’s less emphasis on the actual discussion because less people are genuinely trying to participate in it.”

Figure 2 illustrates the thematic framework derived from these emerging subthemes, which pertain to theme of *Virtual Communication, Teamwork and Collaboration Impediments*. This theme encompasses three essential skills which health professionals must effectively demonstrate when interacting with patients and colleagues in a clinical setting. It is worth noting once more that none of these impediments were identified in the focus groups conducted with students who engaged in the same CBLs in-person prior to the pandemic.

## 4 | IMPLICATIONS

Communication and teamwork are important competencies for healthcare workers,<sup>11</sup> and health professional students’ ability to demonstrate effective communication and teamwork are purported to improve patient care and enhance professional practice.<sup>12</sup> However, the impediments associated with virtual learning were identified as compounding variables contributing to a perceived negative impact on acquisition of teamwork and communication skills during a CBL activity aimed at promoting interprofessional competencies. These obstacles, while potentially minor (e.g. unstable internet connections, asking others to unmute), can accumulate to create greater barriers to communication, much like “death by a thousand paper cuts.” Previous work has confirmed added difficulty ensuring inclusion of all team members in a virtual discussion.<sup>13</sup>

Previous work has found that communicating virtually is subpar compared with in-person communication as evidenced by emerging

**FIGURE 2** Thematic framework based upon findings. The diagrammatic depiction of this thematic framework illustrates the codes emerging from these data, the crucial interpersonal skills said codes negatively factor into, as well as the relationship between the overarching theme, *Virtual Communication, Teamwork and Collaboration Impediments*. Each code represents a factor that can dampen intraprofessional, interprofessional and patient interactions by inhibiting communication, teamwork, or collaboration. Furthermore, if one cog in this three-cog system fails to run effectively, logical reasoning suggests that the other two cogs, or components of this triumvirate, would be impeded as well. Thus, any impediments to one of these three essential skills can impair collaborative practice not only in an education setting but also in a clinical one as well



studies on clinician–patient interactions<sup>14,15</sup> as well as studies on medical education.<sup>16</sup> Furthermore, several of these studies also note the limitations of telehealth and virtual learning include the following: unperceived non-verbal cues, difficulty establishing a rapport, increased difficulty including all team members in collaborative work and unstable internet connections as an added disparity for some participants.<sup>16–18</sup> Therefore, it is logical to infer that the challenges encountered by students in this project are primarily due to the transition to virtual learning as opposed to other factors.

*Communicating virtually is subpar compared with in-person communication.*

While there are benefits to adopting a virtual pre-clinical curriculum, including convenience and flexibility,<sup>4</sup> it is important to consider the limitations posed as well.<sup>13,16,18</sup> This project's findings demonstrate essential interpersonal skills (namely, communication and teamwork) were perceived as more difficult to acquire virtually compared with in-person; therefore, it is necessary to consider these limitations of virtual learning when deciding if it is best to adopt a virtual curriculum for health professionals. Moving forward, this course ceased to implement these small group CBL sessions virtually as this work indicates in-person pre-clinical education experiences should be maintained, particularly if they aim to foster communication and teamwork. Furthermore, these findings suggest that collaborative

learning activities remain in-person whenever possible in order to aid in the development of essential interpersonal skills.

*While there are benefits to adopting a virtual pre-clinical curriculum, including convenience and flexibility,<sup>4</sup> it is important to consider the limitations.*

*In-person pre-clinical education experiences should be maintained, particularly if they aim to foster communication and teamwork.*



## These findings suggest collaborative learning activities remain in-person whenever possible.

It is worth mentioning that due to the increased utilisation of virtual visits with health professionals, which are an effective way for certain patient populations to access medical care,<sup>14,15</sup> the Association of American Medical Colleges (AAMC) has proposed telehealth competencies for educators to consider incorporating into existing curricula.<sup>19</sup> However, the AAMC cautions that these recommended competencies (which are not intended for high-stakes assessments or accreditation standards) should not replace existing competencies, including those related to communication and teamwork skills. Based on these recommendations in conjunction with the findings from this project, the cultivation of virtual communication and teamwork skills is more appropriate within the clinical curriculum, through telehealth competencies, as opposed to the pre-clinical curriculum.

### ACKNOWLEDGEMENTS

This work was funded in part by an Educational Scholarship Grant from the International Association of Medical Science Educators. Thank you to Dr. Chris Newman and Dr. Michael Boulous for helping collect radiology images for the CBL sessions as well as Dr. Rebecca Rebman, Dr. Terry Petrenchik, and Prof. Sean Sreniawski for providing clinician feedback on CBL cases prior to the educational intervention.

### CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

### ETHICS STATEMENT

Ethical approval was sought from the Indiana University Institutional Review Board (Protocol #1902433811). This study was deemed exempt. All participants gave signed consent for their focus group data to be used for the purpose of publication.

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### REFERENCES

- Bleakley A, Marshall R. Can the science of communication inform the art of the medical humanities? *Med Educ.* 2013;47(2):126–33. <https://doi.org/10.1111/medu.12056>
- DiVall MV, Kolbig L, Carney M, Kirwin J, Letzeiser C, Mohammed S. Interprofessional socialization as a way to introduce collaborative competencies to first-year health science students. *J Interprof Care.* 2014; 28(6):576–8. <https://doi.org/10.3109/13561820.2014.917403>
- Anderson ES, Thorpe LN. Learning together in practice: An interprofessional education programme to appreciate teamwork. *Clin Teach.* 2010;7(1):19–25. <https://doi.org/10.1111/j.1743-498X.2009.00331.x>
- Emanuel EJ. The inevitable reimagining of medical education. *Jama.* 2020;323(12):1127–8. <https://doi.org/10.1001/jama.2020.1227>
- Thistlethwaite JE, Forman D, Matthews LH, Rogers GD, Stekettee C, Yassine T. Competencies and frameworks in interprofessional education: A comparative analysis. *Acad Med.* 2014;89(6):869–75. <https://doi.org/10.1097/ACM.0000000000000249>
- [IPEC] Interprofessional Education Collaborative. Core Competencies for Interprofessional Collaborative Practice Washington, DC: Interprofessional Education Collaborative; 2011.
- Herriott HL, Byram JN, Gunderman RB, McNulty MA. Targeted small group case-based learning sessions improve role knowledge among medical and healthcare professional students. *Anat Sci Educ.* 2022- Under review.
- Shields RK, Pizzimenti MA, Dudley-Javoroski S, Schwinn DA. Fostering interprofessional teamwork in an academic medical center: Near-peer education for students during gross medical anatomy. *Anat Sci Educ.* 2014;8(4):331–7. <https://doi.org/10.1002/ase.1466>
- Saldaña J. Longitudinal Qualitative Research: Analyzing Change Through Time Walnut Creek (CA): AltaMira Press; 2003.
- Braun V, Clarke C. Using thematic analysis in psychology. *Qual Res Psych.* 2006;3(2):77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Warde CM, Giannitrapani KF, Pearson ML. Teaching primary care teamwork: A conceptual model of primary care team performance. *Clin Teach.* 2020;17(3):249–54. <https://doi.org/10.1111/tct.13037>
- Anderson ES, Thorpe LN. Students improve patient care and prepare for professional practice: An interprofessional community-based study. *Med Teach.* 2014;36(6):495–504. <https://doi.org/10.3109/0142159X.2014.890703>
- Wildman JL, Nguyen DM, Duong NS, Warren C. Student teamwork during COVID-19: Challenges, changes, and consequences. *Small Group Res.* 2021;52(2):119–34. <https://doi.org/10.1177/1046496420985185>
- Imlach F, McKinlay E, Middleton L, Kennedy J, Pledger M, Russell L, et al. Telehealth consultations in general practice during a pandemic lockdown: Survey and interviews on patient experiences and preferences. *BMC Fam Pract.* 2020;21(1):269. <https://doi.org/10.1186/s12875-020-01336-1>
- Kennedy NR, Steinberg A, Arnold RM, Doshi AA, White DB, DeLair W, et al. Perspectives on telephone and video communication in the intensive care unit during COVID-19. *Ann Am Thorac Soc.* 2021;18(5): 838–47. <https://doi.org/10.1513/AnnalsATS.202006-729OC>
- Foo CC, Cheung B, Chu KM. A comparative study regarding distance learning and the conventional face-to-face approach conducted problem-based learning tutorial during the COVID-19 pandemic. *BMC Med Educ.* 2021;21:141. <https://doi.org/10.1186/s12909-021-02575-1>
- Breton M, Sullivan EE, Deville-Stoetzel N, McKinstry D, DePuccio M, Sriharan A, et al. Telehealth challenges during COVID-19 as reported by primary healthcare physicians in Quebec and Massachusetts. *BMC Fam Pract.* 2021;22(1):192. <https://doi.org/10.1186/s12875-021-01543-4>
- Elkhamisy FAA, Sharif AF. Medical students perceptions of virtual learning stations as an innovative teaching tool: A qualitative study. *Interact Learn Environ.* 2021. <https://doi.org/10.1080/10494820.2021.2002366>
- AAMC. Telehealth Competencies Across the Learning Continuum. AAMC New and Emerging Areas in Medicine Series Washington, DC: AAMC; 2021.

**How to cite this article:** Herriott HL, McNulty MA. Virtual learning impacts communication and teamwork. *Clin Teach.* 2022;19(5):e13514. <https://doi.org/10.1111/tct.13514>