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Using a Co-Teaching Team to Enhance Research Proposal Feedback in an Online Medical Education Graduate Course

Tara F. McKinley

tara.mckinley@cchmc.org

University of Cincinnati College of Medicine

Jennifer M. Brady

University of Cincinnati College of Medicine

Daniel Herchline

University of Cincinnati College of Medicine

Lisa E. Herrmann

University of Cincinnati College of Medicine

Francis J. Real

University of Cincinnati College of Medicine

Melissa Klein

University of Cincinnati College of Medicine

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Abstract

Introduction: Medical education scholarship often lacks key elements of rigor, potentially due to experienced researchers' lack of time and resources to teach students pursuing advanced research training. Literature in this area is sparse, but co-teaching has shown promise in other educational contexts. We implemented a co-teaching model, facilitated by both physician and non-physician instructors with medical education research experience, into a Masters-level medical education research course.

Methods: Utilizing a pragmatic worldview and epistemological interpretive framework, this qualitative study analyzed research project proposal feedback provided in a single non-physician instructor model and a co-teaching model. Two authors independently coded de-identified feedback comments on first drafts of student proposals using a feedback guide based in the literature. The research team reviewed codes and revised the coding tool. After re-coding, the full team reviewed the final codebook.

Results: Fifty-three proposals (single instructor model: n = 22; co-teaching model: n = 31) were analyzed. We identified two themes: Proposal-Specific Feedback, identified in both teaching models; and Broader Scholarship Guidance, noted in only the co-teaching model. Proposal-Specific Feedback included editing/corrections and comments about qualities of a rigorous study within the project. Feedback unique to the co-teaching model addressed study design and scholarly writing beyond the scope of the assignment and Masters project, resources for further exploration, and project scope and future project plans.

Conclusions: Co-teaching models within a Masters-level medical education research course may add value by increasing rigor and methodological scope, developing self-regulated learning, and providing learners with guidance to build their projects and research agendas.

Introduction

Scientific writing and dissemination of research are critical skills for advancement among healthcare professionals engaged in educational scholarship, particularly for those working in academic medical centers.[1] Education-focused manuscripts often lack aspects of scientific rigor, such as adequate study design description, critical literature review, validity evidence, and supporting theoretical or conceptual frameworks.[2–8] This in part may be due to insufficient advanced training in research methods and scientific writing.

Thus, there is a need to cultivate advanced research skills among healthcare professionals disseminating educational scholarship to build a stronger evidence base and promote scientific advancement in the field. Unfortunately, little is known about how to most effectively promote scientific writing skills among those pursuing advanced medical education research training.[6] The design and implementation of research in academic clinical settings depends on clinician expertise to align study procedures with clinical workflows and operational realities. This perspective is critical to ensuring

feasible data collection and successful study execution, representing a skill set that is often beyond the training of non-clinical research professionals. However, clinical commitments often prevent practicing clinicians with unique insights into the functioning of medical centers from serving as instructors in educational research coursework.[1,9]

Co-teaching may be a strategy to support advanced education research skills for health professionals. Co-teaching involves two key components: 1) instructors with different areas of expertise and 2) shared responsibilities both inside and outside the classroom.[10] Instructors collaborate in course planning, instruction, and assessment.[11] Reported benefits of co-teaching models include interaction with instructors of varied expertise, exposure to different teaching styles, introduction to perspectives from unique disciplines, and expansion of networking opportunities for career development.[12–14] Moreover, with co-teaching models, students report greater access to instructors, better understanding of course expectations, and deeper understanding of the connection between basic and clinical sciences.[13,15,16] Co-teaching gives more opportunity for alignment between instructors and students' interests and educational needs compared to traditional models that utilize a single instructor.[13,14]

Descriptions of co-teaching models come primarily from the K-12 literature, where they have been most widely integrated, with limited research on co-teaching at the collegiate level[17] or in online courses.[15] In fact, much of the literature around implementing co-teaching models at the graduate and medical education levels is theoretical and grounded in K-12 outcomes[11,16,17] or consists of "best practices" based on the personal experiences of instructors.[10,12–14,18] Co-teaching might be particularly relevant to health care professionals who often work in multidisciplinary teams and within environments where team science is emphasized.[19]

Previous literature that does exist on co-teaching models in graduate education describe programs where graduate students,[20,21] STEMM post-docs,[22] or newly hired undergraduate faculty[21] meet regularly with an experienced mentor. However, while popular with learners, program outcomes are not reported, and this literature does not describe co-teaching in post-graduate medical education.

Within medical education, co-teaching has become more prevalent at the undergraduate medical education level in pre-clinical and basic science courses. This teaching model is intended to provide medical students with the clinician's perspective for application of concepts in anatomy and pathology.[23,24] However, reported outcomes are limited and mainly include increased learner satisfaction, increased self-assessed knowledge or knowledge on tests. Addressing this lack of high-level outcomes data (i.e. application of knowledge, behavior change), especially in graduate or post-graduate research training, is key in determining effective teaching methods in this area.

In our Master of Education program for healthcare professionals, we integrated a co-teaching model with a physician and non-physician instructor within a Medical Education Research course in response to student requests for more specific guidance on their Masters projects. For this study, we sought to

understand how a co-teaching model may promote advanced research skills through qualitative analysis of research proposal feedback. Specifically, we aimed to explore the attributes of feedback students received when the course was facilitated by either a single non-physician instructor or co-taught by both a non-physician and physician instructor.

Materials and Methods

Assumptions and Framework

We approached this project from a pragmatic worldview, focusing on real-world application of a co-teaching model in an online, graduate-level, medical education-focused research course.[25] Specifically, we focused on an epistemological interpretive framework within pragmatism, which prescribes building knowledge through a variety of methods, tools, and a diverse research team.[25,26] We applied this paradigm via a research team with a variety of experience and perspectives, coding informed by a coding tool, and abductive reasoning in the analysis process.

Study design was informed by Vygotsky's Zone of Proximal Development, which places emphasis on differences in learning independently versus learning through interactions with an expert instructor who guides independent practice.[27,28] Learning and improvement are internal processes that occur through ongoing interactions, focused attention, and feedback from an experienced mentor or instructor.[27] In this context, guidance from a team of instructors may allow students to further explore their areas of interest through exposure to more varied research methods, receive feedback that is better targeted to their specific project, plan more efficiently for dissemination of results, and gain experience working with a multidisciplinary team.

Setting and Participants

Our Master of Education program is medical education-focused and intended for clinicians and others involved in educating medical practitioners, trainees, or students. The program typically has 60–80 students enrolled, most of whom (~ 95%) are physicians. Pediatrics is the most represented specialty, but the program also has students from internal medicine, emergency medicine, anesthesiology, urology, radiology, and surgery. The program consists of 30 credit hours of courses, all offered asynchronously online. Students typically complete the program in 2–4 years.

Course Structure

Graduate students in the Master of Education program are required to take a Medical Education Research course in the planning phase of their final Masters project. Students meet with the instructor(s) during the first few weeks of the course to review initial project outlines, research questions/study aims, and study design. Students subsequently receive two rounds of feedback from

the instructor(s) on the introduction and methods of their project proposal, as well as one round of peer feedback, before submitting their final proposals.

In response to student feedback for more guidance on study design rigor to maximize opportunities for scholarly dissemination, we adapted the course structure in Spring 2022 to be co-taught. Prior to 2022, the course was taught by a single non-physician instructor who held a doctoral degree in education and had experience with educational research. The instructor managed all administrative aspects of the course and provided feedback to students on their research proposals. In the co-teaching model, the course was taught by a team of a physician and non-physician instructor, both of whom held terminal degrees and had experience with educational research. Course structure, goals, objectives, and assignments remained the same in both teaching models.

Two physicians rotate in the physician role of the co-teaching model, each teaching 1–2 semesters per year, and provide guidance about the relevance and rigor of the project, feasibility of methods, and plans for dissemination. The non-physician instructor teaches the course every semester. She ensures the proposed project meets program requirements and oversees the administrative and non-proposal-related sections of the course (e.g., discussion boards, grading).

Both instructors provide feedback independently on each assignment. The physician instructor makes initial comments within the proposal document, which are uploaded to the course learning management system. The non-physician instructor then adds additional feedback as needed, specifically with regards to methods, study design, theory, timeline, or other aspects that might be outside the physician instructor's expertise.

Research Team & Reflexivity

The research team consisted of current and former instructors for the Medical Education Research course, program leaders, and physician faculty educators from different divisions with advanced degrees in education. All members of the research team have disseminated educational research and represent Assistant, Associate, and Full Professor ranks. The core team all hold roles within the Masters program as program directors or instructors. This team led study design, reviewed coding and analysis, and provided general direction for the study. The coders have Masters-level degrees in education and backgrounds in medical education research but are not directly involved with the Master of Education program. We chose to structure team roles this way to minimize conflicts of interest and potential bias, as well as to diversify discussion and analysis.[26] Team members directly involved with the Masters program did not perform any data coding, and all re-coding or analysis was reviewed by the entire team.

Study Design

This qualitative study utilized thematic analysis of feedback provided on the first draft of research proposals. Two independent coders reviewed in-text and summative feedback comments from

instructors on students' first full draft of their research proposals submitted before implementation of the co-teaching model (Fall 2020 – Fall 2021) and after implementation (Summer 2023 – Spring 2024). The gap between time periods allowed for adjustment to the co-teaching structure and transitions in instructor staff. Coders were blinded to the teaching model when the feedback was provided. The coders utilized a coding tool to provide structure and standardization to their coding approach. Coders participated in a practice coding session with members of the core research team to ensure understanding of the tool and consistency in its usage. Coders were asked to note any additional comments about how feedback was presented that were not covered by the coding tool. The core research team of instructors and program leaders analyzed codes after the independent coding process was complete.

This project was deemed exempt by the Cincinnati Children's Institutional Review Board, and a waiver of informed consent was granted (reference #2024 – 0385).

Coding Tool Development

We based our coding tool on work by Hattie and Timperley,[29] who developed a feedback model based on a large meta-analysis of feedback-related articles. This coding tool consisted of two parts. Part 1 addressed levels of individual feedback comments; part 2 addressed overall impression of feedback as a whole. (Additional File 1). Hattie and Timperley described four levels of feedback and their effectiveness on student performance: feedback about (1) the task [FT] (e.g., whether work is correct/incorrect, including more details, clarifying), (2) the process [FP] (e.g., re-organizing sections to better describe the problem, defining the scope of the project), (3) self-regulation [FR] (e.g., knowledge, skills, abilities outside the bounds of the project, such as working with a mentor, utilizing resources), and (4) the self [FS] (e.g., generic praise statements like "great work"). In addition to assigning feedback comments to a particular level (FT, FP, FR, or FS), coders developed more specific code(s) to characterize the content. For example, text might be coded by the level as "Feedback about the Task (FT)" though the content of the feedback may further be described by assigning the code "more detail." Through this process, we aimed to build off Hattie and Timperley's framework while still exploring the granularity of the feedback content. Hattie and Timperley[29] also described three feedback questions around (1) defining goals, (2) how to reach those goals, and (3) future advice. The questions were adapted for Part 2 of our feedback tool as they addressed global feedback in response to learners' understanding of the research design process and provided guidance on refining and moving the projects forward. Coders used Part 2 of the coding tool to evaluate the overall feedback provided on each research proposal.

Data Analysis

Coders initially independently coded six proposals and submitted them to the core team ahead of an initial peer debriefing meeting. The lead researcher reviewed codes and noted any discrepancies or areas for discussion. The team discussed discrepancies and any questions the coders had, specifically in granularity of codes, until consensus was achieved.

Next, all proposals were coded independently by both coders. The coders subsequently attended another peer debriefing meeting with the core research team to discuss analysis and any additional generated codes. The lead researcher revised the codebook and re-coded relevant feedback comments. The full research team met again to review this updated codebook, including themes, sub-themes, code definitions, and example quotes. Questions and discrepancies were discussed and resolved. A final version of the codebook was distributed to the team for review and approval.

Results

We coded a total of 53 research proposals (N = 22 single non-physician instructor, N = 31 co-teaching model) and identified two themes that provided insights into the types of feedback students received through the different teaching models.

The theme of Proposal-Specific Feedback occurred in both teaching models. The team noted two sub-themes: 1) feedback about editing/corrections and 2) feedback about qualities of a rigorous study. The second theme, Broader Scholarship Guidance, was only noted in the co-teaching model. Within this theme, two subthemes were established: 1) feedback on scope and feasibility and 2) feedback beyond the scope of the Masters project. Tables 1 & 2 include supporting representative quotes.

Theme 1: Proposal-Specific Feedback Common to Single Instructor & Co-Teaching Models

Within this theme, students received feedback that addressed components of the proposal itself and/or the specific project (Table 1).

Subtheme: Feedback focused on editing and corrections

Feedback about editing and corrections focused on adding detail, clarifying information, organization and formatting, course or assignment logistics, and general praise. Comments within this subtheme referred to specific revisions within the manuscript. In general, comments provided instructions or asked clarifying questions about the writing itself. Examples include “much more detail is needed here on data analysis,” [Proposal (P) 22, single instructor]; “for the manuscript, you will want everything to be in the past tense,” (P32, co-teaching); and “this is the start of your data collection section” (P2, single instructor).

Subtheme: Feedback about qualities of a rigorous study

Feedback about qualities of a rigorous study focused more on the project itself rather than specific errors or corrections. In some cases, feedback comments addressed specific components of the proposal: defining the problem/gap/hook,[30] the literature review, or conceptual/theoretical frameworks. Comments included: “being sure to define terms that the general public may not know (even if you as a physician would understand) and further fleshing out your chosen theoretical framework and why you

chose it" (P39, co-teaching) and "Consider starting this as a new paragraph and adding a sentence as a transition to really frame up your purpose/aim section" (P15, co-teaching).

Other comments addressed the overall study design (e.g., analysis, sampling, tool, validity/reliability) and encouraged students to think further about aspects of their projects and ways to increase the rigor during the planning process: "I think the assessment outcome description needs the most work - you'll want to describe the development of the survey and relevant validity evidence in much more detail so readers understand what data they will expect to see in the results section," (P49, co-teaching) and "did you pilot these with any peers/experts to gauge usability and content validity?" (P1, single instructor). Some comments provided advice for future drafts: "Have you identified a target journal for publication? I wonder how this literature review will transform in your future versions," (P18, single instructor).

Table 1
Representative quotes from theme: Proposal-Specific Feedback

Sub-theme	Representative Quotes
Feedback focused on editing and corrections	"This is the start of your Data Collection section" (P2, Single Instructor) "Make sure you are being consistent with tense" (P30, Co-Teaching) "Include citations for these sentences" (P39, Co-Teaching) "I might save this for the discussion since it seems somewhat out of place in this paragraph" (P35, Co-Teaching) "Great first draft of your Methods" (P40, Co-Teaching) [instructions for next steps in course] (multiple proposals, Single Instructor)
Feedback about qualities of a rigorous study	"Stay in the literature – it would be expected that there are additional sources you may end up including here" (P23, Single Instructor) "Now you need to lead the reader through "to the hook" meaning what is the purpose of your study, research questions etc and how it may contribute forecasting your methods…" (P25, Single Instructor) "Maybe you could focus here a bit on what the specific purpose of this study is rather than the potential implications of the work" (P28, Co-Teaching) "What curriculum/learner outcomes will you assess?" (P31, Co-Teaching) "For the purposes of the proposal, would spend a few sentences describing this theoretical framework and why you feel it is a good fit for your study/curriculum." (P39, Co-Teaching) "Great! Content validity. Were they provided the answer to the question during the pretest? That might bias the posttest results." (P52, Co-Teaching)

Theme 2: Broader Scholarship Guidance Appeared in Co-Teaching Model Only

In this theme, feedback provided guidance on more abstract concepts, higher-level teaching, and general advice about academic writing and medical education research work (Table 2).

Subtheme: Feedback related to scope and feasibility of the project

Feedback directly addressed the intended scope of the project and whether the project was feasible within the Masters timeline. Typically, this feedback asked students to consider limiting the scope of the project and/or splitting a more ambitious project into multiple, more manageable projects. Examples of these comments include: “I recognize that this work will span beyond the Masters to develop the formal curriculum. Would keep this proposal focused on what you will be doing for your Master's project, which I believe is the needs assessment, correct?” (P41, Co-Teaching), “focus groups and qualitative analysis can be a big undertaking. This isn't to discourage you…but it is to encourage you to focus on a completed project for the program. You could potentially do the qualitative portion as a Part 2…depending on your timeline” (P47, Co-Teaching), and “I think this is an awesome end goal! But you already have quite a bit here with even identifying inter-rater reliability for trained raters…so I think you can consider if you want to do the faculty inter-rater reliability with this initial project or as a next step” (P37, Co-Teaching).

Subtheme: Feedback that extends beyond the scope of the Masters project

Building on the prior themes, this feedback provided guidance beyond the scope of the Masters project addressed lifelong, or self-regulated, learning. In this theme, comments included feedback specific to the paper or project, followed by suggestions for scholarly writing that often extended beyond the parameters of the research proposal or project. These comments appeared in manuscript feedback in a variety of ways – teaching moments, resources, and future projects. For example, one comment noted, “[concentrate] the bulk of your introduction on eLearning and GI rather than medical education as a field...for now it’s totally fine – I would always suggest erring on the side of too many words at this stage because it’s easier to cut words for a publication than have to go back into the literature and pull extra relevant info at the end” (P48, Co-Teaching).

Instructors often relied on their own experience with the writing process: “… your draft reads like the write-up of a project you've been working on for a long time and have explained a million ways to different people...meaning some of the initial rigor or details or specificity of the design and implementation have been streamlined, probably overly so…I expect working with a local mentor will help tremendously with the final write-up as they'll have fresher eyes” (P52, Co-Teaching).

Additionally, instructors shared resources relevant to the current project but also general to scholarly writing, methodology, or frameworks. Instructors recommended, “[University's] Writing Center is a great resource…they offer specific feedback and appointments geared toward graduate students writing for publication. [scheduling link]” (P34, Co-Teaching).

Table 2
Representative quotes from theme: Broader Scholarship Guidance

Sub-themes	Representative Quotes
Feedback related to scope and feasibility of the project	“for the purposes of your final Master's project, you [could] focus on the checklist development, especially since you plan to go through the rigor of a modified Delphi.” (P31, Co-Teaching) “There's already a lot of work…anticipating that many interviews and a heavy coding burden. Generating a model might be a next step, but it's probably beyond the scope of getting this project done in a reasonable amount of time.” (P43, Co-Teaching) “Trying to do a mixed methods study is very challenging in the limited time you have to complete your Masters and it is difficult to do both the quantitative and qualitative portions well…my recommendation is to stick with the quantitative study and really focus on the validity evidence for your surveys. This will be really important to ensure your final project is publishable.” (P47, Co-Teaching)
Feedback that extends beyond the scope of the Masters project	“Depending on the journal you’re submitting to, you might consider additional bracketing about your coders/team in relation to your subjects. This is common in a lot of qualitative studies.” (P30, Co-Teaching) “The intro section can be the most difficult to write in many cases, and many authors prefer to write it last…You may consider making these revisions but staying flexible with the final version until you’re finishing up your project.” (P45, Co-Teaching) “This almost sounds like a 2nd follow up study using the same data set! … your QI project begets a second study (this qualitative study) which begets a third study. .. This is how you develop your research niche!” (P46, Co-Teaching) “consider re-organizing your intro to more directly introduce your project. One strategy I recommend is [description of strategy]. In this case, since you're focusing on a needs assessment, you don't necessarily need to make such direct statements about evidence at every point…you only have to convince them that the topic is worth looking into.” (P50, Co-Teaching)

Discussion

This study highlights differences in feedback provided in the same course when delivered by a single instructor versus a co-teaching model. Both models provided feedback related to concrete, paper- or project-specific revisions. However, the co-teaching model feedback addressed the scope and feasibility of proposed projects and encouraged self-regulated learning and exploring resources beyond course content and/or the current project.

Most of the feedback categorized within Theme 2: Broader Scholarship Guidance was provided by the physician instructor, and the physician instructors provided all of the feedback categorized in the subtheme of feedback that extended beyond the scope of the Masters. This pattern suggests a potential distinction in the types of guidance given by each instructor role within this co-teaching model. The physician instructors’ comments more frequently oriented students toward broader scholarly

considerations, including dissemination and future publication, which may reflect the influence of clinical and academic experience on framing student work within a wider scholarly context.

Instructors also built upon one another's feedback to provide more comprehensive and nuanced guidance. Physician instructors also sometimes used feedback comments to refer to the non-physician instructor to clarify design questions, project/program expectations, or university resources. These interactions suggest an awareness of and respect for each instructor's complementary areas of expertise. Even when providing feedback independently, the instructors functioned as a cohesive teaching team, underscoring the value of an established co-teaching model for supporting student learning and project development.[10–14,19] Although limited to a single program, these patterns may indicate that co-teaching arrangements can offer complementary forms of guidance, with different instructors contributing distinct perspectives on both the development and the longer-term scholarly trajectory of student projects.

By providing feedback about scope, feasibility, and planning for future projects, instructors may help students design more rigorous initial and future projects, which could lead to increased publication.[21,31,32] This may be increasingly important for educational faculty as they often report inadequate protected time for scholarship, a key consideration for academic promotion.[9] In addition, prior research demonstrated that guidance on project scope and feasibility, especially for learners who are on a set program timeline, promoted successful publication of capstone projects.[33,34] As students in the Masters of Education program are more novice educational researchers, this feedback on early proposals may help appropriately scope their project within the timeline of the Masters program and busy clinical schedules to optimize chances of publication.

Co-teaching models require more resources and coordination than a single instructor model. We propose that the benefits may outweigh the costs if the course is thoughtfully planned and executed. When considering adopting a co-teaching model, programs should consider the potential increased cost of additional instructor time, especially for physician faculty. In our case, dividing the workload to focus physician time on providing direct feedback on issues related to clinical and academic context, as opposed to administrative tasks, helped mitigate time and cost demands.

Outside of metrics for academic success, our co-teaching model demonstrated facets of quality adult education. Feedback that encourages self-regulated learning can increase learner engagement with their work, enhance learners' self-efficacy, and perceived importance of the task overall.[29] Adult learning theory recommends providing broad guidance and resources so students can explore topics, methods, and other project details on their own; helping learners solve real-world problems; and learning in network with colleagues and through interactions with multi-disciplinary team members.[11] This spectrum of instruction aligns with the principles of Vygotsky's Zone of Proximal Development by providing focused feedback on the writing process and study design.[27] Getting feedback from a broader team of instructors provided students the tools to learn independently after the course ended, thus further guiding independent practice.[28]

This study has several limitations. First, the lead researcher on this project also served as the non-clinical instructor within the co-teaching model and led the analysis of codes. To mitigate bias, all coding was completed by physician educators without direct ties to the program, and the full research team reviewed all codes, iterations of the codebook, and the final themes and subthemes. Second, the single instructor model feedback came from one individual which could account for some of the differences in feedback and the approach to project-specific versus more global feedback. To help limit conclusions based on feedback style, codes about style (e.g., probing questions, use of first-person versus third-person) were not used in final analysis. Finally, this study occurred in a Masters-level program at a single institution, and results may not be transferable to other graduate medical programs.

Implications for Research/Next Steps

Providing more targeted, comprehensive feedback that extends learners' research and scholarly writing beyond the confines of a single research course may enhance the rigor of research proposals and projects and potentially improve publication outcomes, thereby strengthening the broader body of educational scholarship. Further investigation of co-teaching, as well as quantitative evaluation of final project outcomes, is needed to more definitively assess the impact of this model in graduate and post-graduate research education.

Declarations

Ethics approval and consent to participate

This project was deemed exempt by the Cincinnati Children's Hospital Medical Center Institutional Review Board, and a waiver of informed consent was granted (reference #2024-0385). The study was conducted in accordance with the Helsinki declaration.

Consent for publication

n/a

Availability of data and materials

Data sets are not included in this submission due to confidentiality concerns with submitting student work and the bulk of including 53 individual manuscripts. However, two tables within the manuscript provide representative quotes for each occurrence.

Conflicts of Interest

The authors report there are no competing interests to declare.

Funding Declaration

No funding was obtained for this study.

Author Contributions

TFM, LEH, FJR, MK conceptualized the study. TM collected and de-identified the data, trained coders, reviewed codes, created initial themes, and wrote/revised the manuscript. JB, DH coded proposals, reviewed final analysis, and provided feedback on manuscript drafts. LEH, FJR, MK reviewed initial analysis, approved final analysis, and provided feedback on manuscript drafts. All authors read and approved the final manuscript.

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