The Journal of Medical Education Research 2025 Vol 5 No 1 pp 277-294, DOI: 10.5750/jmer.v5i1.2421

CO-DESIGNING CURRICULAR INNOVATIONS: EVALUATING THE IMPACT OF A STUDENT AND FACULTY SCHOLARSHIP IN TEACHING AND LEARNING PROGRAM

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ABSTRACT

Introduction: Faculty development enhances teaching, professional growth, and educational scholarship, yet opportunities for collaborative educational scholarship with students remain limited. The Interprofessional Scholars' Collaboration in Teaching and Learning (iSCTL) addresses this gap by fostering collaboration among health professions educators and learners to tackle complex challenges and develop interdisciplinary skills. Despite its promise, such programs are underutilized and rarely evaluated. This study assessed iSCTL's outcomes to demonstrate its impact on health professions education.

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Methods: A mixed-methods approach was used to evaluate three years of iSCTL participants. Pre- and post-program surveys measured mastery of program objectives, while follow-up surveys and interviews conducted one-year post-participation explored sustained impact. Quantitative analysis included descriptive statistics, Cronbach's Alpha for reliability, and Wilcoxon signed-rank tests. Qualitative data underwent thematic analysis.
Results: Participants demonstrated significant improvements in mastery of iSCTL objectives ($P < 0.001$), supported by strong internal consistency (Cronbach's Alpha > 0.7). Three themes emerged: program impact, barriers and facilitators to learning, and recommendations for improvement. Follow-up findings revealed that 62% implemented their projects, and 90% reported enhanced research, teaching, and career growth. Participants credited mentorship, hands-on learning, and networking as key to their success.
Conclusion: iSCTL enhanced interdisciplinary collaboration, career development, and scholarly teaching. Findings emphasize integrating the scholarship of teaching and learning into training and offer guidance for optimizing program design to maximize impact.

Keywords: faculty development, health professions education, program evaluation, interprofessional education, collaboration

INTRODUCTION

Faculty development in medical education is critical for enhancing teaching effectiveness, fostering professional growth, and promoting the scholarship of teaching and learning (Yuan et al., 2024). Across the United States, academic institutions strive to equip faculty with the skills to design, implement, and evaluate innovative educational practices that meet the evolving needs of learners (Virant-Young et al., 2014). However, a persistent gap exists in integrating faculty development with opportunities for meaningful engagement in educational scholarship, particularly those that include students (Claus and Wiese, 2019; Kohan et al., 2023; Stockert and Ohtake, 2017; Van Schalkwyk et al., 2024). This gap hinders faculty adoption of scholarly teaching practices and limits students' early exposure to educational scholarship principles.

Historically, medical and health professions education has operated in isolated learning environments, offering limited opportunities for interdisciplinary collaboration among students and faculty (Claus and Wiese, 2019; Kauff et al., 2023). However, there is growing recognition of the benefits of interprofessional collaboration (IC) in fostering teamwork and enriching learning experiences (Abu-Rish Blakeney et al., 2021; Thistlethwaite, 2015; Thistlethwaite et al., 2014; Willgerodt et al., 2020). IC provides platforms for faculty and students from disciplines such as medicine, nursing, pharmacy, and allied health professions to engage in joint research projects, case-based discussions, simulations, teaching, and other scholarly activities (Abu-Rish

Blakeney et al., 2021; Orchard et al., 2005; Stockert and Ohtake, 2017). These relationships enhance interprofessional competencies, teamwork, and shared decision-making, leading to improved healthcare outcomes and evidence-based practices (Reeves et al., 2017; Silva et al., 2022; I. l Silver and Leslie, 2017; Virant-Young et al., 2014).

Through IC, faculty and students address complex healthcare challenges from multiple healthcare disciplines' perspectives (Babin et al., 2023; Davis et al., 2015; I. L. Silver and Leslie, 2017). Faculty members benefit from professional development, interdisciplinary networking, and mentorship opportunities, which enhance their teaching methodologies, curriculum development skills, and scholarly activities (Brandt et al., 2014; Ratka et al., 2017; Woltenberg et al., 2021). Students gain critical thinking, problem-solving, and research skills, (O'Leary et al., 2020; Silva et al., 2022; I. l Silver and Leslie, 2017; Steinert, 2020; Steinert et al., 2012; Woltenberg et al., 2021; Yuan et al., 2024) along with early exposure to interprofessional collaboration and patient-centered care principles. Moreover, junior faculty members gain valuable experience leading research projects, bolstering their ability to secure grants and fostering innovation in medical education (Anderson et al., 2014; Loyal et al., 2018; I. L. Silver and Leslie, 2017).

Inadequate IC limits faculty and students' exposure to diverse healthcare perspectives, perpetuating disciplinary silos and stagnation in teaching practices, faculty burnout, and reducing the retention rate within the institution (Abu-Rish Blakeney et al., 2021; Hanson et al., 2022; Thistlethwaite, 2015, 2012; Thistlethwaite et al., 2014; Whitehead, 2007; World Health Organization, 2013). This lack of collaboration adversely affects learning outcomes, interdisciplinary teamwork, and ultimately, patient care quality (Hanson et al., 2022; Loyal et al., 2018; World Health Organization, 2013). Faculty development programs often focus on short-term metrics, such as scholarly output and professional growth, (Kohan et al., 2023; Van Schalkwyk et al., 2024; Virant-Young et al., 2014) overlooking their long-term impact on institutional culture and educational scholarship. Additionally, students' contributions are frequently excluded from evaluations, underscoring the need for inclusive approaches (Leslie et al., 2013).

To address these challenges, medical education institutions must prioritize and facilitate IC initiatives that enhance both faculty and student experiences. The Interprofessional Scholars Collaboration in Teaching and Learning (iSCTL) Program exemplifies such an initiative. This faculty development program extends participation to first-year medical and physician assistant students over nine-months, providing early exposure to educational scholarship while fostering a collaborative learning environment. The program bridges generational and professional divides, cultivating a community of practice focused on educational excellence.

Participants in the iSCTL Program engage in project-based learning, mentorship, and workshops that address contemporary challenges in medical education, such as curriculum innovation, assessment strategies, and

technology integration. This study explores the program's impact on faculty and student participants, emphasizing its role in developing educational scholarship competencies, fostering collaboration, and overcoming barriers to impactful educational projects. This study highlights its potential as a model for inclusive, innovative approaches to advancing the scholarship of teaching and learning in medical education.

PROGRAM DESCRIPTION

ISCTL

The iSCTL Program at Case Western Reserve University (CWRU) School of Medicine (SOM) offers the opportunity for faculty members and first-year medical/physician assistant (PA) students to enhance their skills as medical educators and scholars. This program encourages participants to develop and implement innovative projects within various curricula (e.g., undergraduate and graduate medical education) within a supportive environment. Collaborating with experts in health professions education, participants engage in project implementation, educational theory exploration, and curriculum innovation. Faculty members with project ideas aimed at improving student/trainee education are encouraged to apply, as are early-phase students from MD and PA students.

The nine-month program includes interactive workshops where participants refine curricular projects, engage in educational development, and explore the art of teaching scholarship. Project topics span topics from needs assessments to equity and inclusion, technology integration, and generative AI as an educational tool. Goals include fostering a scholarly community, enhancing understanding of teaching theories, developing curriculum design skills, and promoting educational scholarship. Faculty scholars are expected to mentor student scholars throughout the program while providing them with sufficient agency to co-lead their projects.

Benefits for participants include professional development funding, mentorship opportunities, expertise and scholarship development in health professions education, and the opportunity to plan, implement, evaluate, and disseminate educational projects. Students may also receive reimbursement for travel and conference expenses when presenting their work and have the chance to work one-on-one with their faculty partner on project development.

METHODS

SETTING AND DESIGN OF THE STUDY

The study encompassed three cohorts of participants from 2021, 2022, and 2023, following a structured timeline of activities. Each student participant was paired with a faculty member based on shared project interests. Faculty

applicants submitted project proposals, which were reviewed by the program directors to ensure alignment with educational priorities. Students were matched with faculty members based on shared interests and were not required to propose individual projects. Before starting the program, all participants completed a pre-program survey to assess their baseline mastery across four core areas: learning and assessment (6 items), curriculum development (10 items), teaching and feedback (9 items), and educational scholarship (8 items).

During the program, participants engaged in interactive workshops focused on refining projects and building educational skills. These sessions provided opportunities for faculty and student scholars to collaborate on project implementation and iterative design. After the program, participants completed a post-program survey that revisited the same four areas to evaluate changes in their perceived mastery of the program objectives.

One year after completing the program, participants were invited to complete a follow-up survey and participate in optional semi-structured interviews. The follow-up survey gathered information on project status, dissemination efforts, career progression, and program impact. Additionally, participants rated their level of agreement with statements related to iSCTL's programmatic goals. Interviews were guided by a semi-structured protocol and focused on the program's influence on participants' career development, the impact of their projects, and factors that facilitated or hindered project completion.

ETHICAL APPROVAL

This study was exempted by the CWRU Institutional Review Board (IRB). Participation was voluntary, and informed consent was obtained. All data were de-identified before analysis.

DATA ANALYSIS

Both the pre-test and post-survey were analyzed to understand the participants' knowledge of all four core program objectives. Descriptive statistics, including means, standard deviations, and frequencies, were calculated to summarize responses. The Wilcoxon Signed-Rank test was used to assess changes in participants' mastery levels before and after the program. Internal consistency of survey items was assessed using Cronbach's Alpha, and the reliability of the measures was further tested using ANOVA with Cochran's test. Effect sizes were calculated to measure the magnitude of observed changes. These statistical analyses were performed using IBM SPSS Statistics, version 29.0.1.0. Likewise, the follow-up survey was analyzed using descriptive statistics i.e., frequencies, and mean were used to summarize the results.

Qualitative data from follow-up interviews (one year after completion of the program) and open-response items were analyzed to explore participants'

experiences and perspectives on the program. A deductive-inductive coding approach guided by grounded theory principles was employed to construct a detailed and robust codebook. This included iterative steps of open coding, axial coding, and selective coding to identify emergent themes. Trustworthiness was ensured through strategies such as triangulation of data sources, peer debriefing, and member checking with participants. Dependability was achieved through detailed audit trails documenting the coding process, and confirmability was supported by collaborative coding sessions to minimize researcher bias. Regular team meetings were conducted to review and refine the codebook, resolve discrepancies, and ensure alignment with qualitative research standards. Continuous feedback and revisions were facilitated using shared documents to ensure rigor and depth in the analysis.

RESULTS

PRE-POST PROGRAM SURVEY RESULTS

Cohort sample sizes slightly varied, with 19 participants in 2021, 20 in 2022, and 14 in 2023, maintaining an overall retention rate of 98%. Participants who missed either the pre-test or post-test were excluded from the analysis. Most participants were female, comprising 68%, 80%, and 64.3% across the three years. In 2022 and 2023, students and faculty were equally represented, while in 2021, students accounted for 58% and faculty for 42% of participants.

The reliability of survey items across the four categories was assessed using ANOVA with Cochran's test and Cronbach's Alpha. Results showed strong internal reliability across all cohorts (2021, 2022, and 2023), with Cronbach's Alpha exceeding 0.970 and P-values < 0.001. However, normality assumptions were not met as assessed by Shapiro-Wilk and Kolmogorov-Smirnov tests, necessitating the use of non-parametric tests due to the sample size of fewer than 30 participants per cohort.

Descriptive statistics grouped Likert scale responses into "No Mastery" (1–2) and "Mastery" (4–5) categories. Participants reported the highest mastery in the teaching and feedback skills category, with over 70% demonstrating mastery in giving feedback (78%), facilitating small group teaching (71%), and conducting direct observations (70%). Curriculum development emerged as the second-most mastered category, with 50% of participants mastering 8 out of 10 skills. The most well-mastered skills included formulating study questions and identifying outcomes (68%). However, lower mastery rates were observed for describing adaptive expertise (40%) and applying Kern's six-step curriculum framework (43%) (Table 1).

Paired sample tests revealed statistically significant improvements in participants' mastery of all program objectives pre- to post-training (Mdn = 1.5–2.28 pre-test vs. Mdn = 4–4.2 post-test, $Z = -5.661$ to -6.284, $p < 0.05$). Effect sizes ($r = 0.6$) confirmed substantial gains, aligning with the program's

Table 1. Interprofessional scholar collaboration teaching and learning scale: descriptive statistics

N = 106	No Mastery (N/%)	Mastery (N/%)	*p*-value***
Learning and Assessment			<.001
Compare and contrast active and passive learning strategies	20(29)	67(63)	
Describe how adaptive expertise can frame a process of life-long learning	49(46)	43(40)	
Define and give examples of formative and summative assessment strategies	29(24)	63(60)	
Describe the role of reflection in action and reflection on action in learning	35(33)	57(54)	
Consider how information technology has challenged the traditional role of the classroom	23(23)	62(58)	
Curriculum Development, Implementation, and Evaluation			<.001
Develop a curriculum project in which goals, educational strategies, and assessments are aligned	23(21)	65(61)	
Formulate a study question and identify outcomes	26(15)	72(68)	
Develop well-formed learning objectives that incorporate multiple levels of Bloom's Taxonomy	35(33)	59(55)	
Describe assessment strategies congruent with each level of Miller's Pyramid	47(44)	47(44)	
Describe the value of a pilot and propose one for your project	28(26)	61(57)	
Propose a scholarly project design and evaluation method for your project	20(29)	62(58)	
Prepare a project application for IRB review	29(27)	63(59)	
Create a curriculum development cycle for your project utilizing Kern's six steps	45(42)	46(43)	
Demonstrate a focused educational literature search for your project that includes educational databases and the MedEd portal	33(29)	61(58)	
Compare and contrast quantitative and qualitative evaluation methods and justify those chosen for your project	28(26)	56(51)	
Teaching and Feedback Skills			<.001
Large group teaching	24(34)	61(58)	
Small group student-centered teaching	22(21)	75(71)	
Small group teacher-centered teaching	25(24)	64(60)	
Clinical Teaching	42(40)	55(52)	
Procedure teaching	48(44)	46(43)	
Giving feedback	14(13)	83(78)	
Direct Observation	20(29)	74(70)	

(Continued)

Table 1. (Continued)

N = 106	No Mastery (N/%)	Mastery (N/%)	*p*-value***
Write a description of the teaching methods you prefer to use and why	38(36)	56(52)	
Educational Scholarship and Professional Development			<.001
Explain how your project follows each of the six Glassick's criteria for scholarship	47(44)	48(45)	
Develop a works-in-progress abstract and poster for your project	32(21)	63(59)	
Draft responses for Bordage's 7 steps for manuscript preparation	50(47)	46(43)	
Choose a regional or national venue and a timeline for submitting an abstract about your project	38(36)	53(50)	

Note: *Responses were 5-point Likert scale (1= = No Prior experience, 2 = slight mastery, 3 = Neutral, 3 = some mastery, 4: Full mastery). For reporting purposes, responses 1 & 2 were grouped as "Not Mastery" and 3 & 4 as "Mastery"
**Wilcoxon signed the Ranks Test for Pre- and Post-test Mean scores. (Hypothesis: The median differences between the pre-and post-test mean scores are equal to 0.
***P-value <.005, statistical significance

Table 2. Related sample wilcoxon signed ranked test

Items statements	Median		Z	*P*-value	r^a (effect size)
	Pre	Post			
Qn 1: *Learning and Assessment*	2.4	4	–6.284	<.001***	0.6
Qn 2: *Curriculum Development, Implementation, and Evaluation*	2.2	4.2	–6.287	<.001***	0.6
Qn 3: *Teaching and Feedback Skills*	2.8	4	–5.661	<.001***	0.6
Qn 4: *Educational Scholarship and Professional Development*	1.5	4	–6.218	<.001***	0.6

Note: *P values <0.05 means there is a statistically significant*
Hypothesis Test: there are no significant differences in the median scores for Pre and post-test mean scores
*** P-value <.005, statistical significance
r^a (r = z/√N)= *According to Cohen(1988) criteria .1 = small Effect, .03 Median effect, and .5 = Large Effect*

goals (Table 2). A histogram of scores indicated consistent positive changes, demonstrating the program's effectiveness in enhancing skills among both students and faculty (Figure 1).

FOLLOW-UP SURVEY RESULTS

A total of 19 (51%) Medical students, 15 (41%) assistant/associate/full professors completed the survey and 7 participants were interviewed. The follow-up study

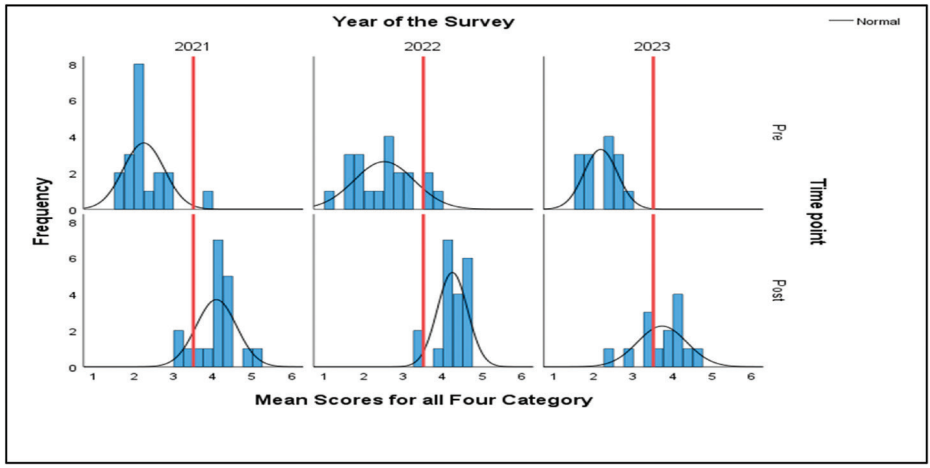

Figure 1. Comparable graphs that show the impact of the ISCTL program before and after the training across the years

revealed that 62% reported the successful implementation of their projects or curricula. A significant portion of participants had the opportunity to present their work at national (32%) and regional (11%) conferences. Most participants (90%) agreed that the iSCTL program enhanced their research skills, teaching, and overall engagement in health professions education. Approximately, 54% reported collaborating with faculty and students outside their iSCTL cohort or at other institutions (61%).

The open-ended questions examined the outcomes and accomplishments participants attributed to their involvement in the iSCTL program, as well as how the program supported their career development and advancement. Participants consistently highlighted the program's strong impact on their professional growth, praising its mentorship, hands-on learning opportunities, and contributions to the development of teaching portfolios and research initiatives. One participant noted, *"iSCTL has allowed me to facilitate my interest in medical education, something that I otherwise never really thought I would gravitate towards or explore. In doing so, iSCTL has helped me realize that I want to pursue a career in academic medicine".*

The program significantly enhanced participants' careers by fostering their interest in medical education and advancing their skills in curriculum development, research, and teaching. Mentorship, interprofessional collaboration, and networking opportunities were highly valued, often leading to leadership roles and expanded career prospects. The following quote is evidence:

"My participation in iSCTL, and specifically the session where we pitched our ideas to other iSCTL participants for feedback, led to the suggestion that we expand our project to the CWRU [interprofessional course (IPE)] setting.

This changed the game for our iSCTL project and allowed me to grow my career within the IPE office with new opportunities for curriculum design, networking with faculty from other disciplines, leadership, and research".

Transformative experiences included developing simulations, launching curricula, and presenting work at conferences was also highlighted, example one participant had this to say *"Developing a simulation from scratch was an incredibly valuable experience. It's a different way of thinking and curriculum development"* Another participant echoed that *"I was able to help create and launch a curriculum for graduate healthcare professional students. It was rewarding to be able to learn methods for curriculum development".*

Overall, iSCTL appears to be a catalyst for academic growth, enabling participants to enhance their teaching, advance their research, and expand professional networks in medical education.

INTERVIEW RESULTS

Thematic analysis of qualitative data revealed three major themes: the impact of the ISCTL program, factors that hindered or facilitated learning, and recommendations for program improvement.

IMPACT OF THE ISCTL PROGRAM

Participants reported various positive impacts on their career development, including increased knowledge, network building, and confidence in research and evaluation. One participant noted, *"I think it was valuable because it made me more interested in medical education, but it also taught me a lot about how to develop a curriculum from scratch"* (Interviewee 7). Another participant reflected on the networking benefits, saying, *"It's really valuable to form such a close relationship with a student. I could just tell everybody about it because it allows people who don't have formal research to collaborate"* (Interviewee 4). Some participants also mentioned that the program helped them make progress on pending projects, with one stating, *"The schedule really helped me stay on track and complete my project, which I've been struggling to finish for years"* (Interviewee 4).

FACTORS FACILITATING OR HINDERING LEARNING

Support from mentors and engaging projects were key facilitators. As one participant explained, *"Having a supportive mentor made all the difference in guiding my project"* (Interviewee 3). Conversely, barriers included IRB delays and recruitment challenges. One participant remarked, *"The IRB was really the biggest hang-up for us—it took so much time that we couldn't start data collection until the program was almost over"* (Interviewee 4).

PROGRAMMATIC RECOMMENDATIONS

Participants suggested securing IRB approvals early on, offering extended timelines, and increasing opportunities for peer feedback. One participant recommended, *"It would be great if projects were already approved before we started, so we could focus more on execution"* (Interviewee 5). Another emphasized the importance of mentor support post-program, stating, *"Continued guidance from mentors would help ensure projects are completed even after the program ends"* (Interviewee 3).

Overall, the qualitative findings highlighted the program's strengths in fostering professional growth and collaboration while identifying areas for future improvement.

DISCUSSION

The results of this study highlight the significant impact of the ISCTL program on participants' professional development and skill acquisition. Quantitative analysis revealed statistically significant improvements in mastery across all program objectives, with substantial gains in teaching and feedback skills, curriculum development, and educational scholarship. Notably, over 70% of participants reported mastery in giving feedback, facilitating small group teaching, and conducting direct observations, while curriculum-related skills such as formulating study questions and identifying outcomes were also well-developed. Additionally, other analyses identified consistent trends across different years, highlighting specific skill items on the Likert scale where participants consistently excelled or were challenged. Consequently, there is a recommendation for program leadership to revisit the curriculum and determine if there should be additional focus on those areas. Similar to other studies (Abu-Rish Blakeney et al., 2021; Reeves et al., 2017, 2013; Silva et al., 2022; I. l Silver and Leslie, 2017; Willgerodt et al., 2020), the qualitative findings and follow-up survey in this study underscored the program's positive influence, with participants emphasizing enhanced confidence, networking opportunities, and progress on previously stalled projects. Facilitators of learning included strong mentorship and alignment with participants' interests, whereas barriers such as IRB delays and recruitment challenges hindered progress. Together, these results demonstrate the program's effectiveness in fostering meaningful career development growth (Homeyer et al., 2018; O'Leary et al., 2020) while identifying opportunities for future refinement.

The findings of this study underscore the significance of integrating faculty development with the scholarship of teaching and learning (Steinert et al., 2016). Similar to established programs like the Stanford Faculty Development Center for Medical Teachers and the Harvard Macy Institute, the iSCTL Program demonstrated its ability to enhance teaching competencies and foster

professional growth. However, the iSCTL Program goes further by including students as active participants, bridging a critical gap in traditional faculty development initiatives (O'Sullivan and Irby, 2011). This unique feature not only enriched the learning environment but also empowered students to engage in educational scholarship at a formative stage in their careers (Abu-Rish Blakeney et al., 2021; Alexandraki et al., 2021; World Health Organization, 2013), a dimension largely absent in other faculty development models.

The study's results support the argument that current faculty development evaluations often prioritize short-term outcomes, such as self-reported teaching improvements. In contrast, the iSCTL Program's impact on more intermediate-term outcomes, including scholarly output, mentorship relationships, and project dissemination, highlights the value of a more comprehensive evaluation framework (Steinert et al., 2016). For example, participants reported significant progress on scholarly projects and enhanced confidence in their ability to contribute to educational innovation. These findings align with the national imperative to equip educators with the skills needed to design, implement, and evaluate impactful educational practices while extending these opportunities to students, fostering a broader culture of educational scholarship (Leslie et al., 2013).

By addressing gaps identified in the introduction, the iSCTL Program sets a precedent for incorporating students into faculty development initiatives. This inclusion not only benefits students by providing early exposure to educational scholarship but also enriches the faculty experience through collaborative learning and intergenerational mentorship (Reeves et al., 2017, 2013; Shakhman et al., 2020). Future faculty development initiatives should consider adopting similar inclusive approaches, as the iSCTL model demonstrates the potential for sustained contributions to institutional culture and the advancement of the scholarship of teaching and learning.

The iSCTL program demonstrated significant effectiveness in fostering professional development, skill acquisition, and personal growth among participants, with key outcomes including increased confidence, enhanced networking, and progress on delayed projects. Through its emphasis on medical education research, teamwork, and communication, the program equipped participants with the skills needed to make meaningful contributions to their fields and pursue lifelong learning in academic medicine. Structured mentorship, collaboration, and targeted workshops played a central role in these successes. However, limitations such as occurrence at a single institution may limit the generalizability of the findings, and reliance on self-reported data may introduce bias. Qualitative insights, while valuable, were influenced by the depth and breadth of participant responses, potentially overlooking some experiences. Despite these issues, the evaluation's combination of quantitative and qualitative methods offered a well-rounded understanding of the program's impact. Evaluations of such programs should consider long-term follow-up and consideration facilities and barriers to project completion and

the specific impact of mentorship and collaboration between students and faculty in this context.

PRACTICE POINTS

1) Faculty-student collaborative opportunities enhance learning and professional growth in medical education programs.
2) Targeted workshops and skill-building activities support the acquisition of teaching and scholarship competencies.
3) Programs should proactively address administrative barriers, such as IRB applications and expectations, to maximize participant engagement.
4) Long-term mentorship and follow-up support can sustain project progress and ensure project dissemination.

ACKNOWLEDGMENTS

The authors are grateful to Dr. Terry Wolpaw for her vision to create the Scholars Collaboration in Teaching and Learning more than two decades ago and for entrusting the program and its interprofessional expansion to the authors listed herein.

FUNDING

The research/project was supported by The Clowes Endowment for Innovations in Medical Education.

DECLARATION OF INTEREST STATEMENT

The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS

Conception (CC, MLM, AWD, KQ), Data collection (KQ), Analysis (EM), drafting of manuscript (EM), editing (EM, KQ, CC, MLM, AWD)

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