

Preparing for the Transition to Academic Practice: A Graduate Medical Education Elective

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ABSTRACT

Background Residents and fellows as educators (RFAE) programs typically focus on clinical teaching skills in single departments, which may not be sustainable for those with limited trainees or faculty.

Objective To determine the feasibility and value of a 2-week interdepartmental RFAE elective for advanced teaching skill development and transition to practice as clinician educators.

Methods Facilitated discussion, simulation, and critiqued peer presentations developed participants' skills in teaching, curriculum design, professional development, and scholarship. Assessments in this prospective intervention included 2 self-reported surveys addressing: (1) teaching process and motivation (Conceptions of Learning and Teaching [COLT]), and (2) skills and attitudes. We administered both surveys at baseline, immediate-post, and 3-month-post elective with data compared across time points using Kruskal-Wallis tests. Program evaluation comprised daily open-ended surveys on engagement and an end-of-course feedback survey.

Results There were 79 participants from 2019 to 2023. Survey response rates were 84.8% (67 of 79) at baseline, 58.2% (46 of 79) immediate-post, and 51.9% (41 of 79) 3-month-post. Most participants were residents (89.9%, 71 of 79), female (60.8%, 48 of 79), from pediatrics and/or medicine departments (77.2%, 61 of 79), and in their final year of training (77.2%, 61 of 79). COLT factor orientation to professional practice scores increased in the immediate-post (3.3) compared to baseline (2.5) surveys ($P=.008$). Teaching skills attitudes scores increased for all questions in 3-month-post compared to baseline surveys. In open-ended questions, participants emphasized the importance of professional development sessions in guiding their careers toward medical education.

Conclusions This interdepartmental elective was feasible, favorably received, and sustained over time, with observed changes in participants' teaching skills attitudes.

Introduction

The Liaison Committee on Graduate Medical Education and the Accreditation Council for Graduate Medical Education (ACGME) identify teaching skill development as an important component of graduate medical education (GME).^{1,2} Consequently, residents and fellows as educators (RFAE) programs have been widely implemented, but remain heterogeneous in their goals, reproducibility, content, and assessments.³⁻⁵ Future clinician educators (faculty who are teachers, scholars, and/or leaders) require experience beyond clinical teaching to meet the ACGME Clinician Educator Milestones.^{6,7}

The optimal content and structure of RFAE programs remain unclear. Most published RFAE interventions are

short, clinically focused didactics in single departments.^{4,5,8} In contrast, RFAE workshops, tracks, and electives have focused on developing advanced skills in scholarship and professional identity formation.⁹⁻¹⁵ Meeting the ACGME Clinician Educator Milestones requires interventions that promote reflection and application, which can be time- and resource-intensive.⁶ Interdepartmental RFAE programs can leverage institutional resources and cultivate diverse perspectives, but may pose logistical challenges.^{9,10,16,17} Electives can consolidate time and resources, but most reported RFAE electives offer limited professional development, and we are unaware of reports of interdepartmental RFAE electives.^{11,12,18,19}

The lack of effective early curricular interventions for transitioning educators may disadvantage residents and fellows seeking education careers. To address this need, we created and evaluated an interdepartmental GME elective to enhance existing teaching and curriculum design skills and prepare participants to embark on careers as clinician educators.

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Editor's Note: The online supplementary data contains further data from the study including the surveys used in the study.

Methods

Setting and Participants

All Penn State College of Medicine residents and fellows in at least postgraduate year 2 were eligible to participate. The course was advertised to all GME trainees and program directors. We capped enrollment at 20 learners based on our experience with effective classroom size and limitations in simulation resources and facilitator recruitment. Residents and fellows in the existing interdepartmental Clinician Educator Track and those who could complete the entire elective received priority enrollment. The course directors (R.S.C., A.B.C., A.L.D.) taught most sessions and also recruited facilitators from diverse backgrounds and departments. One faculty had protected time (0.2 full-time equivalent [FTE]) and administrative support (0.05 FTE) for the RFAE program through an endowment from the Penn State Woodward Center for Excellence in Health Sciences Education. The course directors met with all facilitators and provided course syllabi. Materials included a simulation center and teaching platforms (eg, white boards, computer projection, online learning platform).

Intervention

This elective was implemented annually from 2019 to 2023 as a part of the Penn State RFAE program. Our design approach aligned with Kern's framework and previously published RFAE curricula recommendations.^{20,21} We reviewed the literature to identify characteristics of successful RFAE programs, finding that reproducible materials focused on teaching skills and curriculum design.²²⁻²⁹ The course directors held iterative discussions regarding the core skills needed by transitioning clinician educators and expanded the curriculum to include career development, based on their experience in faculty development. We designed a 2-week RFAE interdepartmental elective with learning objectives, content, and assessments aligned into themes of teaching skills (eg, feedback, didactic innovations), curriculum design, professional development (eg, mentorship, job negotiation), and education scholarship (TABLE 1).

Educational strategies promoted application and reflection through observed teaching, debriefs, journal clubs, simulation, and microteaching (TABLE 1). Participants presented 10-minute teaching sessions at the start and end of the elective with peer and faculty feedback. Informal lunches introduced participants to educators with different career paths.

Outcomes

The primary outcome of this prospective intervention study was teaching attitudes of participants.

KEY POINTS

What Is Known

Small residency and fellowship programs have difficulty supporting educator training programs, which could benefit trainees entering professional educator roles after graduation.

What Is New

This 2-week interdepartmental elective model with multiple teaching modalities was highly acceptable, sustained over time, and successful in improving teaching skills attitudes.

Bottom Line

An interdepartmental elective approach is feasible and acceptable, and appears to facilitate medical education careers.

Participants were invited to complete anonymous electronic surveys of teaching attitudes at baseline, immediate-post, and 3-month-post elective. We sent 2 reminder emails at each time point to nonresponders. We adapted the Conceptions of Learning and Teaching (COLT) tool to assess participants' teaching process and motivation, which aligned with our goal of promoting learner-centered education (online supplementary data Appendix A). The COLT includes factors of teacher-centeredness, appreciation of active learning, and orientation to professional practice.^{30,31} We changed "students" to "learners" and "tutor" to "facilitator/teacher" and omitted the item "being introduced to the day-to-day practice of their future profession motivates students to learn" to better reflect our participants. Responses were on a 5-point Likert scale (1=strongly disagree, 5=strongly agree). An additional self-reported survey from the Woodward Center for Excellence in Health Sciences Education assessed teaching skills and attitudes over the past 3 months on a scale of 0 (low) to 100 (high) and with open-ended questions (online supplementary data Appendix B). Additional validity evidence for this survey was not obtained.

The program was evaluated with daily open-ended questions about engagement and unanswered questions (online supplementary data Appendix C) to provide information to trainees in real time, and a final course evaluation on suggestions for improvement (online supplementary data Appendix D) to revise content for the subsequent year.

Analysis

We used descriptive statistics to summarize learner demographics. We compared COLT factors and the teaching skills responses at baseline, immediate-post, and 3-month-post using Kruskal-Wallis tests. Given the nonstandard score distributions, we used medians and interquartile ranges.

TABLE 1
Graduate Medical Education Elective Curriculum Map

Learning Objectives	Content	Methods	Assessment/Evaluation
Goal: To enhance the teaching knowledge and skills of residents and fellows and to promote their understanding of introductory concepts in medical education			
Theme: teaching skills			
Describe introductory concepts in adult learning theory and apply those concepts to their teaching Describe medical education clinical and didactic teaching tools and discuss the evidence for their use as best practice	<ul style="list-style-type: none"> ▪ Adult learning theory ▪ Large group teaching ▪ Chalk talks ▪ Clinical teaching ▪ Feedback ▪ Small group teaching ▪ Teaching procedures ▪ Bias and inclusion ▪ Remediation ▪ Simulation 	<ul style="list-style-type: none"> ▪ Didactics ▪ OSTEs ▪ OSFE ▪ Microteaching ▪ Direct observation and feedback of teaching ▪ Project presentations 	<ul style="list-style-type: none"> ▪ COLT ▪ Teaching skills survey ▪ Peer presentation rubric ▪ OSTE rubric ▪ Exit tickets/final survey
Theme: curriculum design			
Outline approaches to curriculum design in medical education Develop learning objectives and an assessment plan for an observed teaching session	<ul style="list-style-type: none"> ▪ Curriculum design ▪ Learning objectives ▪ Hidden curriculum ▪ Clinical evaluation 	<ul style="list-style-type: none"> ▪ Didactics ▪ OSTE ▪ Microteaching ▪ Project presentations 	<ul style="list-style-type: none"> ▪ COLT ▪ Teaching skills survey ▪ Peer presentation rubric ▪ OSTE rubric ▪ Exit ticks/final survey
Theme: professional development			
Discuss potential careers in medical education and reflect upon this field as a career option	<ul style="list-style-type: none"> ▪ Teaching Perspectives Inventory ▪ Careers in medical education ▪ CV workshop ▪ Management and leadership 	<ul style="list-style-type: none"> ▪ Didactics ▪ Lunch discussions 	<ul style="list-style-type: none"> ▪ Discussed reflections ▪ Exit tickets/final survey
Theme: education scholarship			
Appraise the value of medical education scholarship	<ul style="list-style-type: none"> ▪ Medical education scholarship 	<ul style="list-style-type: none"> ▪ Journal club ▪ Didactics 	<ul style="list-style-type: none"> ▪ Discussed reflection ▪ Exit tickets/final survey

Abbreviations: GME, graduate medical education; OSTE, objective structured teaching examination; OSFE, objective structured feedback examination; COLT, Conceptions of Learning and Teaching.

Open-ended responses were described using number of responses and word count averages. We analyzed the daily feedback and final evaluation open-ended responses for content related to the course themes (teaching skills, curriculum design, professional development, scholarship). Daily feedback surveys were electronically captured from 2021 to 2023 and the final evaluation from all years except 2020 (due to a distribution error). The teaching skills responses were analyzed in categories of learner- or teacher-centered approach based on the Teaching Perspectives Inventory, which aligned with the course goal to cultivate learner-centered approaches.³² For example, “they should implement my lesson into practice” is a teacher-centered response and “tailor goals to what they find relevant” is a learner-centered response about setting learning goals.

This study was determined exempt by the Penn State College of Medicine Institutional Review Board.

Results

The number of participants ranged from 10 to 20 each year (79 total). Most participants were residents (89.9%, 71 of 79), female (60.8%, 48 of 79), from pediatrics, internal medicine, or combined medicine/pediatrics programs (77.2%, 61 of 79), and in their final year of training (77.2%, 61 of 79; TABLE 2).

Feasibility and Acceptability

Dedicated administrative support was crucial for coordinating course facilitators, rooms, and equipment. All facilitators needed initial training to align

TABLE 2
Learner Demographics (N=79)

Demographic	n (%)
Sex	
Male	31 (39.2)
Female	48 (60.8)
Resident/fellow	
Fellow	8 (10.1)
Resident	71 (89.9)
Year training	
2	18 (22.8)
3	50 (63.3)
4+	11 (13.9)
Department	
Anesthesia	2 (2.5)
Cardiology	1 (1.3)
Dermatology	1 (1.3)
Family and community medicine	3 (3.8)
Internal medicine	22 (27.8)
Combined medicine/pediatrics	3 (3.8)
Neonatal-perinatal medicine	2 (2.5)
Neurology	2 (2.5)
Physical medicine and rehabilitation	1 (1.3)
Pediatrics	36 (45.6)
Pediatric cardiology	3 (3.8)
Pulmonary critical care	2 (2.5)
Surgery	1 (1.3)

session and course objectives, which was time intensive in the first year. We fortunately had accessible facilities, equipment, and a learning management system at no additional cost. The elective was viewed favorably by participants, and the number of interested participants eventually exceeded the available slots. Invited facilitators consistently agreed to teach in the course over multiple years.

Assessment

In total, 67 of 79 participants (84.8%) completed the baseline, 46 (58.2%) the immediate-post, and 41 (51.9%) the 3-month-post surveys.

Orientation to professional practice increased between the baseline and immediate-post surveys and decreased in the 3-month-post survey (FIGURE). There was no change in teacher-centeredness or appreciation of active learning (FIGURE) or in comparisons of COLT factors when analyzed by year (data not shown).

Teaching skills scores increased across all questions in both the immediate-post and 3-month-post surveys compared to baseline. Comparisons reached

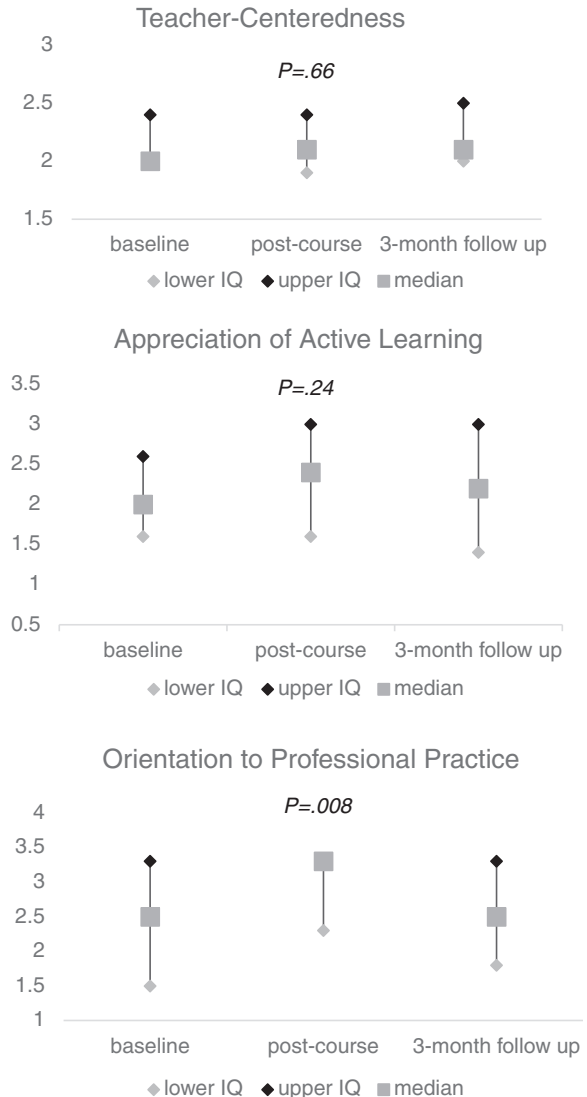


FIGURE
Conceptions of Learning and Teaching (COLT) Survey Responses

Note: The COLT survey is analyzed in factors of teacher-centeredness, appreciation of active learning, and orientation to professional practice. This figure shows the median and IQRs of survey responses for each subscore compared at baseline, immediate-post course, and 3-months post course. Scores for orientation to professional practice increased between the immediate-post compared to baseline surveys, but this change was not sustained at 3-months post course. Survey responses did not significantly differ for the teacher centeredness or appreciation of active learning subscores.

statistical significance for most questions in the baseline compared to immediate-post surveys and for all questions in the baseline compared to 3-month-post surveys (TABLE 3). Responses did not significantly differ in the immediate-post compared to 3-month-post surveys or in comparisons at all time points by year (data not shown). Most open-ended responses were learner-centered at baseline (387 of 638, 60.7%), immediate-post (288 of 451, 63.9%), and 3-month-post

TABLE 3
Teaching Skills Survey Responses

Survey Item ^a	Baseline vs Immediate Post, ^a Median (IQR)	P value	Baseline vs 3 Month Post, ^a Median (IQR)	P value
Maintaining a positive learning environment	75.0 (68.5, 80.0) vs 80.0 (70.0, 90.0)	.07	75.0 (68.5, 80.0) vs 80.0 (77.5, 87.5)	.0001
Introducing session and expectations	62.0 (55.0, 74.0) vs 72.5 (60.0, 84.0)	.02	62.0 (55.0, 74.0) vs 75.0 (65.0, 81.0)	.0018
Establishing goals with learner	60.0 (50.0, 75.0) vs 70.0 (60.0, 82.0)	.03	60.0 (50.0, 75.0) vs 75.0 (67.0, 85.0)	.0021
Incorporating appropriate questioning (knowledge/skills)	63.5 (50.0, 74.5) vs 70.0 (60.0, 80.0)	.05	63.5 (50.0, 74.5) vs 71.0 (59.5, 80.5)	.0440
Incorporating appropriate questioning (clinical reasoning)	60.0 (50.0, 75.0) vs 70.5 (60.0, 80.0)	.003	60.0 (50.0, 75.0) vs 75.0 (66.5, 85.0)	.0006
Actively engaging learner during patient care activities	60.0 (50.0, 76.0) vs 70.0 (60.0, 80.0)	.09	60.0 (50.0, 76.0) vs 74.5 (68.5, 82.5)	.0010
Assessing learner's clinical skills through direct observation	55.0 (50.0, 68.0) vs 70.0 (55.0, 80.0)	.005	55.0 (50.0, 68.0) vs 74.5 (64.0, 82.5)	<.001
Assessing learner's oral presentation(s)	56.0 (47.5, 70.0) vs 70.0 (52.0, 80.0)	.004	56.0 (47.5, 70.0) vs 72.5 (60.5, 80.0)	.0016
Providing verbal feedback	60.0 (50.0, 71.5) vs 73.5 (60.0, 88.0)	.004	60.0 (50.0, 71.5) vs 75.0 (60.0, 85.0)	.0050
Providing written feedback	50.0 (30.0, 60.0) vs 63.5 (50.0, 80.0)	<.001	50.0 (30.0, 60.0) vs 67.5 (59.0, 79.0)	<.001
Helping learner develop a (specific) plan to improve knowledge or skills	50.0 (40.0, 60.5) vs 63.5 (50.0, 77.0)	.001	50.0 (40.0, 60.5) vs 65.0 (55.0, 77.0)	<.001

^a Survey items are abbreviated in this table with full survey questions available in online supplementary data Appendix 2. Responses were on a scale of 0 (low) to 100 (high).

(193 of 319, 60.5%; online supplementary data Appendix E).

Program Evaluation

Daily Feedback Survey: Participants completed 356 daily feedback surveys, which averaged 16.2 words per response (2021-2023). The most engaging sessions were about teaching skills (59.3%, 211 of 356) and professional development (30.6%, 109 of 356; online supplementary data Appendix F). Perceived engagement with professional development was disproportionate to the relative content hours (3 hours compared to 21 hours for teaching skills).

The amount of planning in instructional design was eye opening to some: *"Fascinating to look at a different portion of medical education we lack during our training as we never see the ins and outs of curriculum development."* The professional development sessions highlighted clinician educator careers in a way that was not otherwise available: *"A lot of attending life is sort of behind a curtain... it's hard to guess what is realistic to ask for or expect in a job. It was helpful to identify people who might be good resources."*

Final Course Evaluation: Participants completed 67 of 79 (84.8% response rate) final course evaluations

(2019, 2021-2023). Most participants agreed or strongly agreed with questions about the overall quality of the course and their understanding of topics due to course participation (online supplementary data Appendix G). Open-ended responses averaged 39 words with most responses commenting on curricular design (39 of 57, 68.4%) and professional development (14 of 57, 24.6%; online supplementary data Appendix H). The course prompted participants to consider their professional development as educators: *"It helped me clarify my career goals... I think these topics are going to help me in so many arenas in my career, as a senior, as a resident, as an attending"* and *"It was fantastic in enhancing my internal outward philosophy on my future career."* Participants reflected positively on the course design and their engagement: *"Each session had a purpose that was thoughtfully and deliberately included in the curriculum, and built on itself in a way that really strengthened my understanding of how to improve as an educator."* Suggestions for session improvement varied, with some participants desiring increased interaction (ie, *"redesigning the curriculum design lecture to a brainstorm group project"*) and some less (ie, *"some days it became tiresome to constantly be discussing in small groups and I found*

myself wishing for one session that was just a PowerPoint”).

Discussion

This interdepartmental RFAE elective, developed to prepare trainees for future clinical educator careers, was highly acceptable to those selecting the experience, feasible and sustainable in terms of faculty and administrative supports, and indicative of some changes in attitudes toward teaching.

Elective participants' orientation to professional practice, assessed via the COLT survey, increased during the elective, but was not maintained 3 months post-survey. The lack of change in other COLT factors was unexpected as the course content appeared to align well with the COLT: we spent more curricular time on classroom than clinical teaching techniques. A short elective may be insufficient to significantly affect other professional elements. We saw significant increases in all surveyed teaching skills attitudes between baseline and 3-month-post. It is likely, however, that varied skill application opportunities following the course impacted the later survey results. Published RFAE interventions also show positive changes in teaching attitudes, but direct comparisons are difficult related to different assessment tools.^{5,33}

This elective was a resource-efficient way to implement an RFAE intervention across departments at Penn State. We found that, like existing interventions, interdepartmental representation cultivated diverse perspectives, but we did not directly measure this outcome.^{9,10,16} Of note, participation was not feasible for trainees from all departments (particularly surgical) due to competing priorities. Although professional development skills are similar across departments, focused interventions may be better suited for certain departments (eg, procedural teaching skills for anesthesia and surgery).^{34,35}

This study represents the experience of a single large academic institution. Participants were self-selected and highly interested in education; results may not reflect groups with differing interest levels. Self-reported assessments and decreased response rates over time could lead to response bias. Additional longitudinal qualitative data is needed to assess the relative impact of the elective and outside experiences on teaching skills, professional identity, and interdepartmental community building.^{9,17,36,37} We acknowledge that the open-ended responses may not represent the views of all participants and that themes may be missing.

In the future, additional educational opportunities could be offered following the elective to facilitate skill application and observation. Future assessments

could include higher-level outcomes and career trajectory after graduation.

Conclusions

This interdepartmental elective focusing on RFAE skill development and exploring educational themes not otherwise included during training was feasible, sustained, and highly acceptable to participants. Residents and fellows found the content on professional development to be particularly useful toward the end of their training.

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