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EDITED BY
Rebekah L. Layton,
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REVIEWED BY
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Lori Conlan,
National Institutes of Health (NIH), United States
Thi Nguyen,
Win Win Scientific, United States

*CORRESPONDENCE
Diane A. Safer
✉ diane.safer@einsteinmed.edu

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A new paradigm in PhD education: mapping and integrating psychosocial competencies to the PhD curriculum

Diane A. Safer[1]*, Victoria H. Freedman[2] and Arther B. Markman[3]

[1]Office of Career and Professional Development for Graduate Students and Postdocs, Albert Einstein College of Medicine, Bronx, NY, United States, [2]Graduate Programs in Biomedical Sciences, Albert Einstein College of Medicine, Bronx, NY, United States, [3]Office of the Executive Vice President and Provost, University of Texas at Austin, Austin, TX, United States

The development of a PhD student into a professional requires intellectual, technical, and psychosocial competencies. Ten proposed core competencies are considered essential for equipping PhDs with the skills needed to succeed in the future, no matter which field or career path they choose. Half of these involve technical competencies, which can be developed through classes, from hands-on experiential learning, and with guidance from mentors. The remaining half involve psychosocial competencies, which may not be explicitly covered within the framework of a guided mentorship. Here we suggest that the graduate school curriculum can play a vital role in teaching and developing these psychosocial competencies through training that involves honing foundational life skills, including students' motivational-organizational, self-regulation, and social-relational skills. This paper will provide an example of how psychosocial competencies were incorporated into the curriculum at distinct stages of PhD training at one institution.

KEYWORDS

compentency, psychosocial, curriculum, PhD, graduate, training

1 Introduction

In the dynamic landscape of academia, the pursuit of a PhD represents a significant intellectual journey. PhD students must master specialized knowledge. They learn research methodology, develop expert technical abilities, become proficient in statistical analyses and literature reviews, develop hypotheses, analyze data, and strengthen their writing and presentation capabilities. In addition, trainees must also learn social skills to collaborate and work effectively in a team and to lead and persuade others, as well as the emotional skills needed to stay motivated, be self-directed, and remain resilient. Development of technical competencies is a fundamental part of PhD training programs. However, development of social and emotional skills is not part of the typical PhD curriculum and is not explicitly covered within the framework of a PhD's guided mentorship, an apprenticeship with hands-on research training and personalized guidance from experienced mentors. This paper suggests that the graduate school curriculum can and should play a role in teaching and developing all competencies, including those not currently and expressly part of a PhD candidate's training. Drawing from experience in a scientific PhD program, the insights presented in this paper are broadly applicable and relevant across all disciplines.

A competency is defined as "a skill performed to a specific standard under specific conditions," and according to Sullivan and McIntosh (1996), competency training involves developing skills in a progression until mastery of a desired competency is achieved. The idea of competencies in education and training stems from the work of educational psychologist Benjamin Bloom, who developed a classification system, or taxonomy, for organizing educational and learning goals. Bloom's Taxonomy (Bloom, 1969) breaks cognitive skills into levels that allow educators to consider what information to teach and to determine the depth and complexity of the content. Bloom's Taxonomy includes 6 different levels starting at knowledge of specifics, and then moving through comprehension, application, analysis, synthesis, and ending with evaluation. One must show proficiency of specific competencies at each level before advancing.

Researchers (Verderame et al., 2018) identified 10 specific core competencies "crucial to prepare PhDs for future success, no matter the field or occupation they ultimately choose." Verderame et al. (2018) identified technical and research competencies expected from a PhD training program, such as (1) broad conceptual knowledge of a discipline, (2) deep knowledge of a specific field, (3) critical thinking skills, (4) experimental skills, and (5) computational skills.

The researchers recognized that a successful PhD training program also encompasses learning and proficiency in skills and abilities outside the traditional scope of PhD education. These scholars suggest that PhD candidates develop additional competencies that are more psychosocial in nature. Psychosocial refers to the "intersection and interaction of social, cultural, and environmental influences on the mind and behavior" (VandenBos, 2007). They include competencies such as (6) collaboration and team skills, defined as "openness to collaboration, self and disciplinary awareness, and the ability to integrate information across disciplines"; (7) responsible and ethical conduct of research, defined as "knowledge about and adherence to RCR principles, ethical decision making, moral courage, and integrity"; (8) communication skills, which are more than just oral and written communication skills, but also refer to communication with diverse audiences and to different stakeholders; (9) leadership and management skills, defined as the "ability to formulate a research vision, manage group dynamics and communication, organize and plan, make decisions, solve problems, and manage conflicts"; and (10) survival skills, described as a "variety of personal characteristics that sustain careers, such as motivation, perseverance, and adaptability, as well as participating in professional development activities and networking skills" (Verderame et al., 2018).

2 Developing PhD competencies

Classes taught in graduate school, guidance from mentors, and hands-on experiential learning provide what is needed to gain the skills and offer the experience to develop and gain mastery in technical and research competencies. However, development of psychosocial competencies must be considered as well. Psychosocial competencies guide one's approach to tasks and challenges. These skills involve a person's ability to "deal effectively with the demands and challenges of everyday life" (Manjunatha and Saddichha, 2011). They involve higher-order cognitive processes such as planning, monitoring, and regulating one's own thinking, emotions, and behavior for themselves and toward others. They lead to smarter decision-making and effective learning for individuals, and more productive, successful, efficient and trusting partnerships within collaborative and interdisciplinary teams across all disciplines [Bennett and Gadlin, 2012; Board on Behavioral Cognitive and Sensory Sciences (BBCSS), 2015; McCormack, 2024; National Research Council, 2012].

Developing these "non-academic attributes…give a person a competitive advantage in the labor market" (Chamorro-Premuzic et al., 2010). The value of psychosocial competencies has been recognized in the workforce (NACE, 2023; NNBIA, 2014; Poláková et al., 2023), in academia (HHMI and BWF, 2006; National Research Council, 2012; Quintans-Júnior et al., 2023), and by numerous STEM funding agencies, including DoD-DARPA (2024), DOE (2023), NASEM (2024), NIH (2024), NSF (2016), and more.

A study by Sinche et al. (2017) investigated which skills had the most significant impact on the career success of PhD scientists across fields, including the life, physical, social, engineering, and computational sciences. The study also examined which skills were strengthened and developed during PhD training. Their study found that PhD training effectively developed technical and research skills. However, the researchers found several areas, more psychosocial in nature, that were less developed, including "the ability to set a vision and goals, time management, ability to work on a team, ability to collaborate outside the organization, ability to manage others, and career planning and awareness skills."

This gap has been recognized by others as well. For example, The Council of Graduate Schools (CGS), in their report on professional development for STEM graduates, report that PhD training is "too narrowly focused on academic research skills at the expense of developing professional and personal skills valued by employers both outside and inside the academy" (Denecke et al., 2017).

2.1 Understanding and identifying psychosocial competencies for graduate student success

Psychosocial competencies are referred to by many different synonyms (e.g., soft, transferable, and core skills) and labels, such as *non-academic attributes* (Chamorro-Premuzic et al., 2010), *socioemotional or noncognitive skills* (Swanson et al., 2021), *generic skills* (Bennett et al., 1999), *employer top skills* (Adams, 2014), *career competencies* (NACE, 2021, 2023), and *"professional skills necessary to transition into careers in the biomedical research workforce"* (NIH, 2023). This large variety of labels lacks consensus and adds semantic confusion (Bennett et al., 1999).

Furthermore, the specific skills deemed essential not only vary in their labels but also in their number and combination. For instance, they have been identified as:

1 Life skills, which include decision making, problem solving, creativity, critical thinking, effective communication, interpersonal relationship skills, self-awareness, empathy, coping with emotions, and coping with stress (WHO, 1997).
2 21st century skills, described as cognitive, intrapersonal, and interpersonal dimensions of human competence involved in development and learning that can be transferred or used in new situations (National Research Council, 2012).

3 Individual abilities, encompassing decision making, problem solving, creative thinking, critical thinking, communication skills, interpersonal skills, self-awareness, empathy, and coping with emotions and stress (Winarsunu et al., 2023).
4 Key "transferable" soft skills and competencies, such as professionalism, reliability, coping with uncertainty, working under pressure, planning/thinking strategically, communicating/interacting with others (in teams or networking), written/verbal communication skills, information/communication technology skills, creativity, self-confidence, self-management, time-management skills, and willingness to learn and accept responsibility (Andrews and Higson, 2008).

An additional complication with these taxonomies is the disagreement among researchers about the degree to which these skills are independent of discipline-specific knowledge acquired during PhD training. In other words, researchers debate how much these skills rely on what people already know about their specific field. For example, Klein (1999) provides evidence that expert decision-makers use distinct strategies, or use different decision-making methods, compared to novices, suggesting that experience in a specific field influences these competencies. Furthermore, people's willingness to take risks varies depending on the field (Blais and Weber, 2006), making it challenging to teach strategies that work across all fields and disciplines. This highlights the difficulty in creating a standardized approach to teaching psychosocial competencies due to their interdependence with domain-specific knowledge and practices. Despite these challenges, finding effective methods to develop these competencies remains crucial.

2.2 Categorizing psychosocial competencies for comprehensive development

Psychosocial skills involve attitudes and behaviors and encompass both cognitive and emotional dimensions. They play a crucial role in how individuals navigate social relationships, manage emotions, cope with stress, adapt to challenges, organize their time, and show initiative.

To better understand and grow these essential skills, it is helpful to categorize them. Categorizing psychosocial competencies provides a structured approach for developing training strategies (National Research Council, 2012). It allows for a clearer focus on specific areas of growth, making it easier to create targeted programs for instruction and reinforcement. Additionally, this categorization facilitates the identification of strengths and areas for improvement, enabling more effective personal and professional development.

This paper suggests categorizing the skills into three primary areas: motivational-organizational, self-regulation, and social-relational skills. The following descriptions will describe each of these areas, highlighting their importance and how they contribute to overall psychosocial competency development.

Motivational-organizational skills refer to how individuals approach tasks, set goals, manage time, and stay motivated. They are crucial for personal and professional success as they help individuals stay focused, driven, and organized in pursuing their goals and managing their responsibilities. These include aspects like persistence, resilience, self-motivation, goal setting, time management, planning, prioritization, and task execution. They are all positively correlated with success. People with strong motivational-organizational skills:

- Approach learning with a growth mindset to embrace challenges, persist, and stay focused on goals despite challenges (Dweck, 2006).
- Manage time effectively to optimize productivity and efficiency (Macan et al., 1990).
- Proactively search for and seize opportunities toward career success (Seibert et al., 2001).
- Set clear objectives toward future goals, showing proactive career behaviors (Strauss et al., 2012).

Self-regulation skills are aspects of emotional intelligence (EQ) that are related to the capacity to manage and control one's emotions effectively in various situations. This includes self-awareness, self-management, and self-efficacy, which is defined as confidence/belief in one's capability to succeed in a particular task (Bandura, 1977). These skills are essential for personal wellbeing, healthy relationships with others, and professional success. People with strong self-regulation skills:

- Show strong self-awareness of communication style and approach to managing conflict and can self-manage, leading to a stronger ability to collaborate with others or lead teams (Bennett and Gadlin, 2012; Mayer and Salovey, 1997).
- Demonstrate confidence in themselves to achieve goals (Maddux and Kleiman, 2021; Schunk and Dibenedetto, 2020; Supervía et al., 2022).

Social-relational skills, also aspects of emotional intelligence (EQ), refer to the ability to be socially aware and maintain relationships. These proficiencies involve perceiving and understanding others' perspectives and emotions and showing cultural competency. These skills are crucial for navigating social situations and leading diverse teams. People with strong social-relational skills:

- Understand social dynamics and have empathy for others (Mayer and Salovey, 1997).
- Manage relationships to partner/collaborate successfully with others (McCormack, 2024).
- Demonstrate cultural proficiency, fostering collaboration, respect, and trust (NACE, 2021).

The good news is these skills can be taught and then strengthened through education, training, and practice (Almeida and Morais, 2021; Bisbey et al., 2021; Emanuel et al., 2021; Mwita et al., 2023; Parlamis and Monnot, 2018), and when developed, these skills can have a broad positive impact. For instance, developing motivational-organizational skills by teaching time management techniques (Aeon et al., 2021) and project management methods (Dinsmore, 1989) led to increased research productivity and enhanced feelings of wellbeing. Strengthening self-regulation skills by training effective communication (Brown et al., 2020) led to improved professionalism and career competitiveness. Building social-relational skills by strengthening emotional intelligence (Srivastava, 2013) led to a better training experience working with peers and research mentors.

Importantly, developing psychosocial skills has been found to improve mental health (Savoji and Ganji, 2013). Mental health issues are pervasive in PhD training (Evans et al., 2018). A systematic review of studies looking at the mental health of PhD students found that depression and anxiety are highly prevalent among students (Satinsky et al., 2021). Evans et al. (2018) found that feelings of depression and anxiety were significantly correlated with ability to balance work and life, and significantly correlated with students' relationships with their mentors. Strong psychosocial skills, however, have been found to decrease anxiety and increase self-esteem (Winarsunu et al., 2023). Therefore, possessing strong psychosocial skills, such as resilience, self-awareness, communication skills, and stress management, which are considered necessary for success in graduate school and for professional success (Fuhrmann, 2016; Weatherton and Schussler, 2022), can also have a positive impact on students' overall mental health.

2.3 The graduate school curriculum's vital role

Graduate schools can cultivate the growth and enhancement of psychosocial competencies by instructing and reinforcing motivational-organizational, self-regulation, and social-relational skills. Yet, despite the value, impact, and trainability of these psychosocial skills, they are not typically included in the traditional PhD academic curriculum and are not explicitly covered within the framework of a guided mentorship. Increasingly, academic institutions rely on their career and professional development offices and the programs they offer to cover these skills.

Aware of this trend, the National Institutes of Health (NIH) Common Fund supported the Strengthening the Biomedical Research Workforce program to provide grants for the creation of innovative professional development programs. These "Broadening Experiences in Scientific Training" (BEST) awards, issued in 2012 and 2013, enabled institutions to create novel programs to enhance and complement traditional training (Lenzi et al., 2020). In addition, the NIH Office of Intramural Training and Education developed the Becoming a Resilient Scientist program. Launched in 2021, this five-part series of lectures and small group discussions developed skills needed to thrive in "high-knowledge environments." The program was put together with a focus on wellbeing, and initial data shows that the program appears to "increase resilience, self-efficacy, and self-awareness, while decreasing self-reported anxiety, depression, perceived stress, and presenteeism" (Han et al., 2023). However, these programs are peripheral to the curriculum, non-mandatory, and considered by many in academia as supplementary skill training.

3 Challenges in integrating psychosocial competencies into graduate education

Incorporating the teaching of psychosocial skills into the graduate curriculum presents several challenges that hinder their effective integration. First, academics often resist acknowledging the importance of these skills, viewing them as a "distraction from other academic priorities, in particular research" (Chamorro-Premuzic et al., 2010). More generally, career-readiness skills have rarely been part of graduate training—even for students who ultimately end up as professors. This gave rise to books like Bento (2004), which provided the tacit rules for succeeding in an academic job to budding faculty members in the social sciences. This mindset can create barriers to incorporating psychosocial skill development into coursework and educational initiatives.

Secondly, the variability in training methods across different research groups and academic settings results in inconsistent development of these skills among graduate students. While mentors may possess valuable expertise in their field, they may not always have the specific qualifications or experience to effectively teach these particular skills. Without standardized approaches and guidelines, the effectiveness of psychosocial skill development initiatives remains limited.

Thirdly, students frequently perceive their learning environments primarily in terms of formal disciplinary subjects, overlooking the value of soft skills development (Chamorro-Premuzic et al., 2010). Further, students may be apprehensive about incorporating anything that would increase their workload and possibly add time to degree completion, despite evidence to the contrary (Brandt et al., 2021). This perception can lead to a lack of engagement and initiative in actively cultivating psychosocial competencies, when not explicitly part of their graduate school curriculum.

Finally, career and professional development programs, which are relied upon to address these skills face significant challenges, including limited financial resources, insufficient personnel, and resistance from faculty (Graduate Career Consortium Benchmarking Report, 2019). Additionally, career and professional development offerings vary widely across institutions and programs. Without a set of standards or guidelines, and with a lack of specific evidence- and competency-based curricula, it is challenging to ensure consistent and comprehensive training in psychosocial competencies, despite findings that these skills had a significant impact on career success (Sinche et al., 2017).

However, a growing effort is underway to develop and evaluate outcome-driven curricula aimed at building these skills. One major effort is being led by the Center for the Improvement of Mentored Experiences in Research (CIMER), a program based at the Wisconsin Center for Education Research in the School of Education at the University of Wisconsin-Madison. The goal of CIMER is to "improve research learning experiences and mentoring relationships" by developing, implementing and studying "measurable, evidence-based curriculum" (CIMER, 2024). Their mentor- and mentee-focused curricula include topics such as developing effective communication, building personal self-efficacy, fostering independence, and enhancing work-life balance.

Another effort is a comprehensive professional development program for postdocs offered by the Postdoc Academy. Its Succeeding as a Postdoc online, self-paced course with four modules, including Finding Success as a Postdoc, Building an Actionable Career Plan, Developing Resilience, and Working Effectively in an Intercultural Environment, were designed to build skills in "career planning, collaborative research, resilience, and self-reflection" (Sun et al., 2023). Evaluation of this course found that participants reported significant improvements in their perceived skills after completing the course, including improved self-perception of their skills to work collaboratively, be resilient, self-reflect, and plan careers.

A current initiative, pd.|hub, which describes itself as "a community-driven initiative involving stakeholders across science, higher education, and workforce development," is focused on supporting and then disseminating evidence-based educational approaches to career and professional development training in ways that will support the adaptation and implementation of these approaches at other institutions. The goal is to create a "curated set of educational models." The initiative has recently released its Foundations of Career Exploration for PhD Scientists. Content includes sessions that cover building skills such as resilience, time management, and self-reflection.

This shows there is a growing awareness of the need to develop the psychosocial skills of PhD trainees. Further, integrating this effort into the formal PhD education program would ensure consistent and comprehensive development of these skills. The graduate school can play a vital role as it has been found that when professional development is a "strategic priority" of the institution (Denecke et al., 2017), the graduate school is the primary driver behind the creation and availability of these programs. Incorporating such proficiencies into the curriculum "is a viable solution to bridging a wide gap between the graduate students' skills and the demands of the work environment" (Andrews and Higson, 2008). Institutions can help students excel academically and become adaptable, resilient, and versatile professionals by focusing on intentional psychosocial skill development.

3.1 Psychological interventions

While the idea of incorporating psychological interventions into the academic framework might seem daunting, especially within the well-established and demanding PhD training model, even small, targeted initiatives can significantly enhance students' psychosocial skills. Yeager and Walton (2011) reviewed several studies that showed that even brief, targeted psychosocial interventions can create lasting positive change in students. In these studies, students were introduced to or taught psychosocial skills. They also engaged in short exercises that encouraged them to reflect on and reinforce the concepts. Some examples of these "small" interventions Yeager and Walton (2011) reviewed include studies where:

1 First year college students' academic resilience was strengthened by watching a video of more advanced students discussing how working harder improved their grades. Results: One week later, students performed better on GRE test; a year later, students' college GPAs were higher (Wilson and Linville, 1985).
2 College students countered stereotype threat by writing letters to middle school students about how intelligence is something you can develop and grow with effort. Results: By end of academic year, GPAs rose and underrepresented students reported feeling more engaged with the college and had a stronger sense of belonging (Aronson et al., 2002).
3 In a one-hour session, first year college students read results of a survey that found that many new college students feel they do not belong when they first start, and then wrote letters and gave a speech to supposedly incoming first-year students about how their concerns about fitting in had evolved throughout their first year. Results: Students achieved higher GPAs from their sophomore to senior years in college and 3 years after treatment, they reported feeling happier and healthier (Walton and Cohen, 2011).
4 Middle school students' possible selves were made more salient by participating in 10 workshop sessions where they wrote about and did exercises to envision their future selves as academically successful. Results: 2 years after this intervention, students GPAs were higher and they exhibited fewer depressive symptoms (Oyserman et al., 2006).

These approaches had both an immediate and a long-term impact, enhancing students' attitudes and behaviors well beyond the classroom. These interventions were effective because they focused on shifting students' thoughts, feelings, and beliefs from the students' perspective. Specifically, they helped students rethink how they see themselves as learners and had students take an active role in the learning process, rather than passively receiving information.

4 Unique programming at Einstein

Recognizing the impact of both brief and more in-depth interventions, the Graduate Division of Biomedical Sciences at the Albert Einstein College of Medicine (Einstein), a graduate school in the Bronx, NY, with a student population of 234 PhD students and 71 MD-PhD students in the PhD phase, has applied this approach to help PhD students cultivate psychosocial competencies. We have been developing a curricula tailored to address the unique needs of students at different stages of their PhD training. As part of our program, psychosocial skill development has been integrated into some required courses. We began this effort in small steps, adding sessions such as time management and proactive thinking to the orientation course for new PhD students for the first time in 2021. We added a session about effective communication to the advanced RCR course in 2022 and developed a stand-alone but mandatory Newly Declared Mentors and Mentees Training in 2022. The idea was to offer programs that specifically addressed the needs of students at relevant times in their academic journey (see attached Supplementary File 1 for a list of class and workshop learning objectives).

Integrating the content into existing mandatory courses, such as orientation and RCR classes, ensures that students engage with the material as part of their required curriculum. This *meeting-students-where-they-are* approach reduces the burden of additional coursework and capitalizes on their existing academic commitments.

When unable to incorporate the content into required courses—particularly for 3rd- and 4th-year students, who have no mandatory coursework, and for 5th-year students, whose advanced RCR course is brief—in-person, mandatory workshops were offered as a substitute. These workshops were non-credit-bearing, but attendance was mandatory for all students, as required by the graduate division. Making participation compulsory ensured availability and accessibility for all students.

While workshops may not be the ideal pedagogical approach for every student, they ensure active participation and provide an engaging and interactive setting. Students are present and directly involved in discussions and activities, which improves learning outcomes, increases motivation, and enhances engagement (Saunders

and Wong, 2020). And, as Yeager and Walton (2011) suggest, making students active participants rather than passive observers is key to effectiveness. Other alternatives, such as online, self-directed, or asynchronous courses, may be worth exploring in the future.

4.1 First-year PhD students

At Einstein in addition to the regular biomedical sciences curriculum, there are three required courses that focus on teaching and developing psychosocial skills. Through the mandatory *PhD Orientation Course* (2 weeks), the compulsory *Learning to Be a Scientist* (8 weeks), and the NIH-required RCR course (13 weeks), new PhD students develop skills such as time management, proactive thinking, resilience, emotional intelligence, self-awareness, self-efficacy, and communication and collaboration skills (Supplementary File 1). The goal is to build skills that first-year PhD students need to succeed in their graduate program. These integrated and additional elements provide students with the necessary resources for a strong start to their academic journey.

4.2 Second-year PhD students

In the second year, the PhD program aims to develop skills to ensure success of students' newly formed mentoring relationships and to prepare them for their qualifying exam (Supplementary File 1). In the mandatory half-day workshop for mentors and mentees in new mentoring relationships, mentors and mentees identify personal identities to build awareness of the impact of identities on the mentoring relationship and develop effective communication skills through self-assessment and practical exercises. At the end of the workshop, mentoring pairs meet one-on-one to align expectations about the practical, ethical, professional, and personal aspects of their mentoring partnership.

An optional two-hour interactive seminar is available to help second-year students prepare for their Qualifying Exams. Students learn effective study techniques, time management strategies, and ways to enhance their confidence. The workshop also addresses common anxieties and offers tips for handling exam pressure.

4.3 Third-year PhD students

The mandatory half-day workshop for third-year students facilitates self-reflection to help students evaluate their current progress, strengths, and areas for improvement in their PhD journey (Supplementary File 1). It guides them in setting realistic and achievable goals to ensure continued academic and professional development, while encouraging a future-focused mindset to align their efforts with long-term career aspirations.

4.4 Fourth-year PhD students

The program for fourth-year students focuses on exploring future career paths by having students reflect on their evolving interests and goals (Supplementary File 1). The mandatory half-day workshop emphasizes the development of skills such as self-awareness and emotional intelligence, which are crucial for navigating career planning. Additionally, the program aims to equip students with effective career exploration strategies, including developing networking and communication skills.

4.5 Fifth-year PhD students

Fifth-year PhD students take a 6-week, NIH-required advanced RCR course to which we have added two supplementary classes to develop psychosocial skills. In one class, students identify personal communication styles and learn strategies for maintaining open and productive communication. The second class teaches students how to receive critical feedback and how to positively integrate the feedback to enhance their capacity to handle criticism and grow from it (Supplementary File 1). By fostering these essential psychosocial skills, these classes help students grow more collaborative and supportive professional relationships, which are vital for their success in research and beyond.

Fifth-year students are also invited, although not required, to sign up for a Mentoring Up course for advanced PhD students and postdoctoral research scholars. Mentoring Up is based on CIMER's (Center for the Improvement of Mentored Experiences in Research, University of Wisconsin-Madison) mentorship training program and it is designed "to support development of the skills needed to successfully navigate the research training environment and proactively manage their mentoring relationships." Students learn how to align expectations within mentoring relationships, promote equity and inclusion, and resolve conflict. Furthermore, by emphasizing personal and research self-efficacy, the course helps foster independence and encourages students to proactively pursue opportunities to enhance their career readiness and growth.

Currently under development is a mandatory half-day workshop for fifth-year students to guide them to further explore and plan their post-PhD career paths. The workshop will engage students in self-discovery to gain clarity on their values, interests, and strengths, and aid them in making informed career choices.

5 Project status and preliminary data insights

This project is still in its development phase, and this paper has focused on explaining the reasoning behind incorporating psychosocial skills into the lifecycle of PhD training. A review by the Institutional Review Board (IRB) of the Albert Einstein College of Medicine at this time determined it does not constitute human research under federal guidelines, as it was designed to evaluate and improve existing educational programs through participant feedback on aspects such as workshop relevance, overall satisfaction, learning outcomes, and perceived impacts. As we continue to refine our program, we will improve how we evaluate its impact, which involves standardizing participant feedback, formalizing our data collection process, and accurately measuring competencies—a task that can be complex (National Research Council, 2012).

Our current approach involved anonymously surveying participants after each class or workshop that focusd on

developing psychosocial skills to assess program effectiveness, relevance, and overall satisfaction. Participants were provided multiple opportunities to complete the survey: a QR code was displayed on the final slide of sessions, included in handouts (when available), and sent via follow-up emails to encourage participation. To maintain high standards of data security and confidentiality, all responses were collected anonymously using Qualtrics, a secure online survey platform. An anonymous survey link ensured no personal identifiers, such as email addresses or IP addresses, were captured. Additionally, the "anonymize responses" feature was activated for each survey, and all data were encrypted during transmission using HTTPS and securely stored in compliance with industry-standard security protocols.

The insights from participant feedback were used to inform program improvements. Early feedback from participants has been encouraging. Preliminary data indicates strong positive responses to the programming. Several examples are included below.

Responsible Conduct of Research (RCR): Surveys were administered to first-year PhD students, who took the RCR course in 2023 and 2024. The cohort consisted of 67 first-year students—35 first-year students in 2023 (including 2 MSTP students) and 32 in 2024. A total of 111 survey responses were collected across all 4 courses during these 2 years, as each student responded to a survey for each course. Analysis shows that 72% of respondents rated the classes positively (excellent, very good and good), 87% found the topics very or somewhat relevant, 87% had a better understanding of the topics, and 80% indicated it was likely they would use the information (see Figure 1 and Supplementary Table 1 for more information).

This feedback provides insights into the workshops' perceived value and relevance among first-year students across both cohorts. Respondents shared that they:

- Learned practical information.
  - *"Immediately applicable knowledge literally starting the day of - very impactful."*
  - *"Self-awareness and assessment through different parts of the lecture great suggestions make me think about alternative ways in challenging situations."*
  - *"It is great to learn strategies to not only cope, but to thrive in this setting, early in one's career. This session offered many valuable resources and strategies to do just that!"*
- Gained greater personal insight.
  - *"Maybe I'm not as self-aware as I thought I was."*
  - *"It's always helpful to draw attention to being mindful of our emotions and how we deal with different situations."*

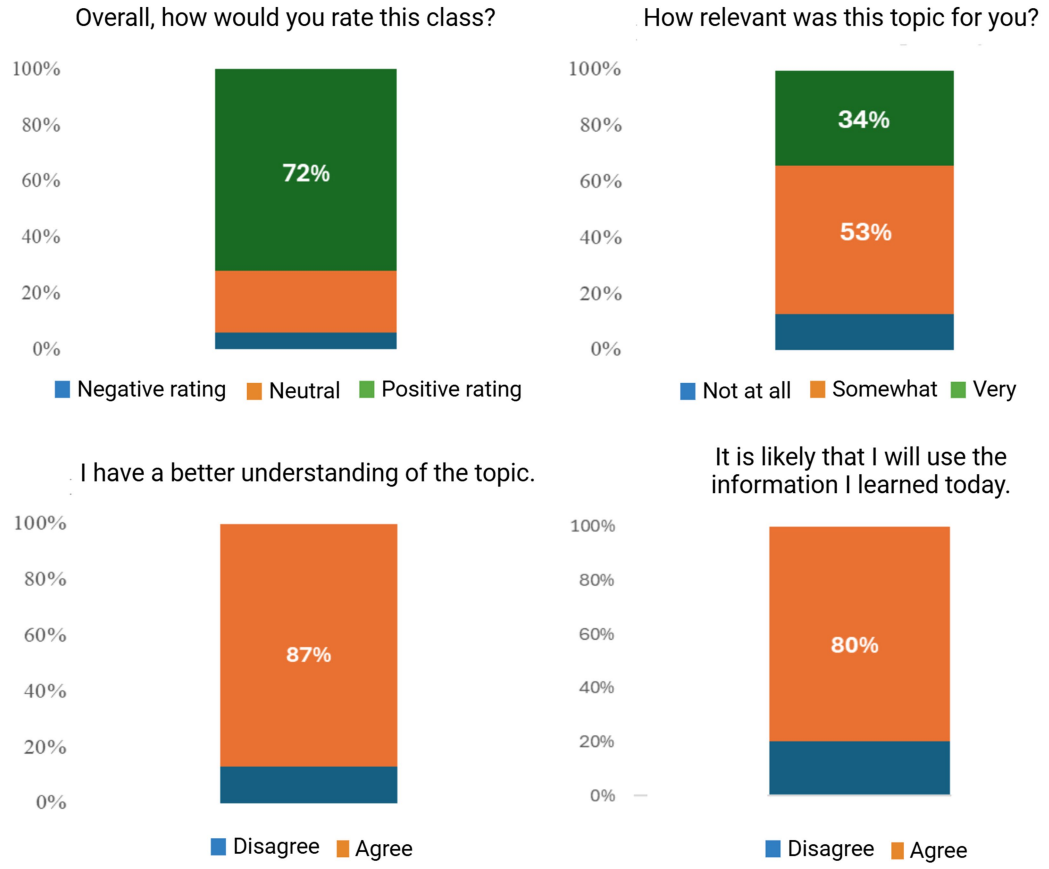

FIGURE 1
First-year PhD students' ratings across 4 RCR course additions by feedback area [Created in BioRender. Safer, D. (2025). https://BioRender.com/k57u124].

- Were motivated to take action.
  - *"It made me think about the future so I can identify the things I need to start working on right now to get to where I want to be."*

Newly Declared Mentors and Mentees Workshop: Second-year PhD students, who had recently chosen a mentor and joined a lab, participated with their mentors in a mandatory half-day training workshop designed to support new mentoring relationships. Post-workshop feedback surveys were provided to both mentors and mentees. Total attendance at the workshop across both years included 87 mentees (44 mentees in 2022 and 43 mentees in 2023) and 82 mentors (42 mentors in 2022 and 40 mentors in 2023).

Fifty-seven mentees (30 in 2022 and 27 in 2023) and 48 mentors (26 in 2022 and 22 in 2023) completed the anonymous survey. Combined across both years, 79% of mentees and 75% of mentors reported that the workshop met or exceeded their expectations, and 75% of mentees and 75% of mentors found the training relevant (see Figure 2 and Supplementary Table 2 for more information).

One year after the 2022 workshop, a follow-up survey was sent asking participants to reflect on the workshop's impact on their mentoring relationships. Nineteen mentees and 28 mentors responded to the anonymous survey. When asked about the impact of the workshop on their mentoring partnership, 78% of mentees and 64% of mentors reported a positive, lasting effect on their mentoring partnership (See Figure 3 and Supplementary Table 3).

Additionally, 84% of mentees and 86% of mentors indicated they continued to meet to discuss workshop-related topics, highlighting the workshop's sustained influence (see Figure 4).

Mentees shared their thoughts:

- *"I think sitting down with your mentor and laying out expectations was helpful as I was starting into the lab and now I know exactly what to do/expect."*
- *"It was nice to have an official time to discuss these things."*
- *"I like having the notes from our discussion. I want to sit down with my mentor to review them… so it's helpful as a place to start and makes me feel empowered to have these conversations going forward."*
- *"This was a very helpful, and useful tool to start of my in lab experience…I am very happy in my working environment because of this mutual understanding of expectations, which only helps me perform better as a scientist."*

Mentors shared their thoughts:

- *"I think the workshop is good for everyone. It really helps to open up such discussions. I think it should be required for everyone who accepts trainees, regardless of when the mentor has taken it previously."*
- *"I think the experience was helpful to get on the same page before the official start in the lab."*
- *"This was a great and impactful experience."*

Reorientation: Where Are You Now? This workshop was evaluated through anonymous surveys administered after each half-day mandatory workshop in both 2023 and 2024. Total attendance at the workshop across both years included 105 students (51 in 2023 and 54 in 2024).

A total of 75 third-year PhD students (40 in 2023 and 35 in 2024) completed the survey. Overall, 80% of respondents rated the event positively, and 80% found the training relevant to their needs (see Figure 5 and Supplementary Table 4).

Respondents shared their thoughts:

- *"I learned specific strengths that I can take advantage of and build upon when working toward the completion of my PhD."*
- *"I learned about my strengths and I plan to remind myself of them as a way to boost my confidence."*
- *"To take a step back and plan smaller achievable goals."*

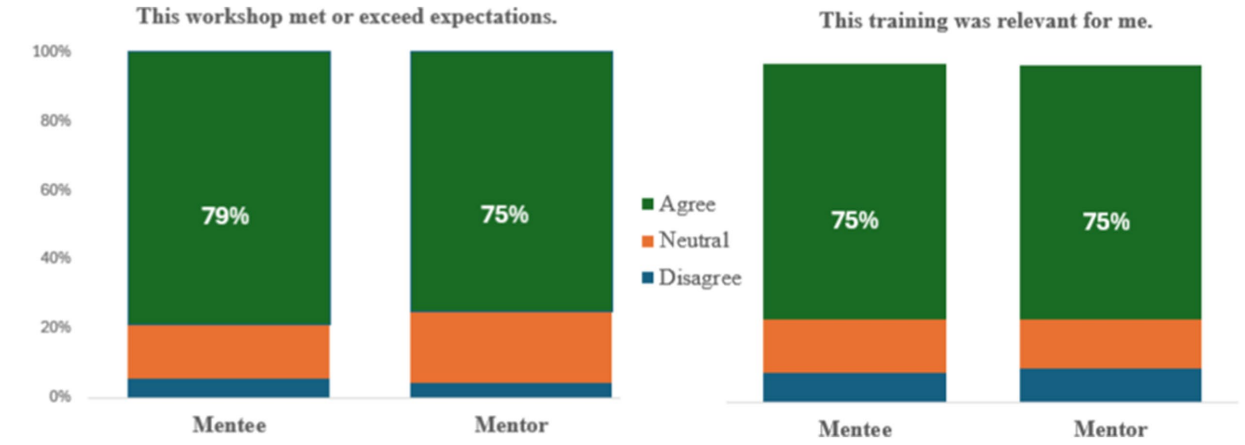

FIGURE 2
Mentors' and mentees' feedback on expectations and relevance of mentorship training [Created in BioRender. Safer, D. (2025). https://BioRender.com/x64a267].

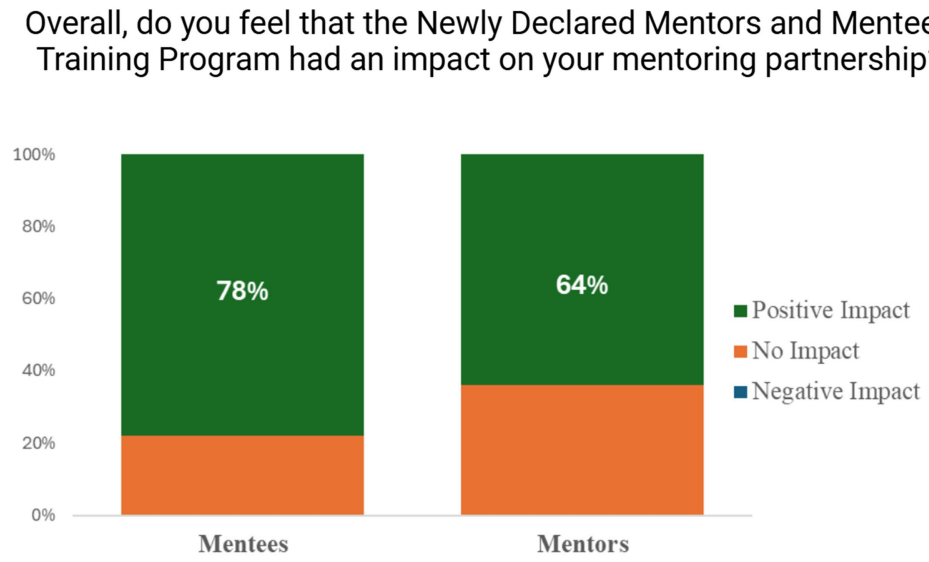

FIGURE 3
Mentors' and mentees' ratings of impact of training program workshop on mentoring partnerships at 1-year follow-up [Created in BioRender. Safer, D. (2025) https://BioRender.com/o56d735].

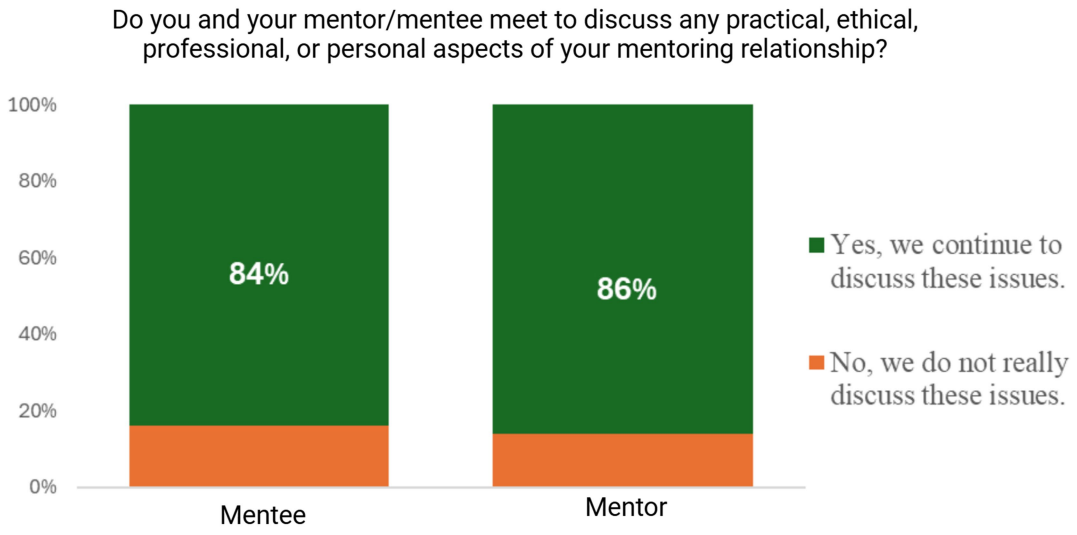

FIGURE 4
Mentors' and mentees' reports of ongoing discussions on mentoring topics at 1-year follow-up [Created in BioRender. Safer, D. (2024) https://BioRender.com/n54k370].

6 Discussion

6.1 Advantages of integrating psychosocial competencies into PhD programs

Incorporating and aligning psychosocial competencies with the PhD curriculum offers a range of significant benefits for graduate students, as these skills go beyond academic knowledge and technical expertise. By focusing on developing psychosocial competencies, involving motivational-organizational, self-regulation, and social-relational skills, graduate programs have the ability to equip students with the tools they need to navigate complex professional environments effectively and ensure that students are better prepared for their future roles in the workforce, whether in academia, industry, or other career settings.

Although the data is preliminary, it suggests that we are on the right track in offering effective programs that are positively impacting students. Moving forward, it will be essential to continue refining these programs based on participant feedback and outcomes to ensure we provide valuable support for students as they navigate their academic and professional journeys.

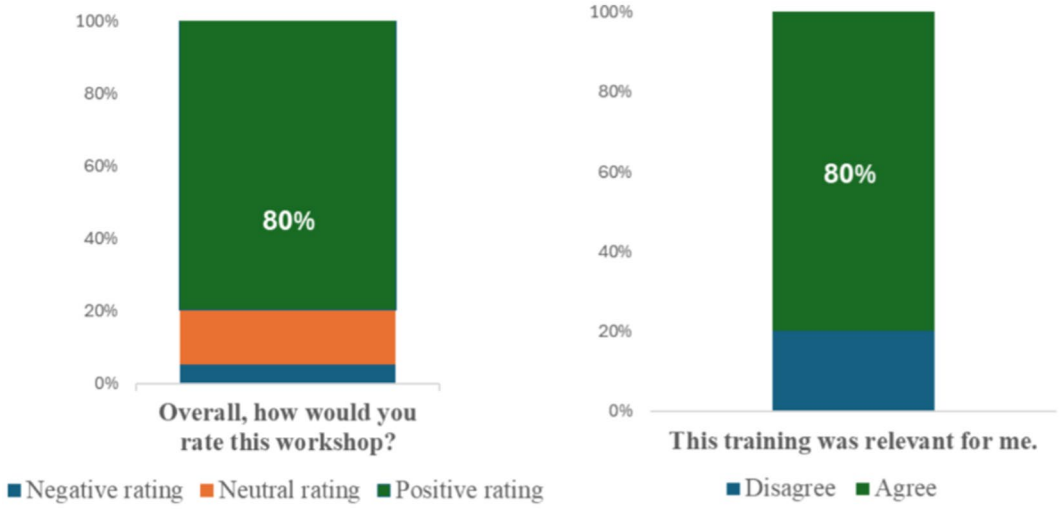

FIGURE 5
Third-year PhD students' feedback on overall rating and relevance of reorientation [Created in BioRender. Safer, D. (2025) https://BioRender.com/o35l271].

Further, we need to confirm that our program is effectively fostering the psychosocial skills we aim to develop.

Psychosocial skill categories: Classifying psychosocial skills into categories, as suggested in this article, can guide future program development. The categories (motivational-organizational, self-regulation, and social-relational skills) can serve as a useful framework for:

- Evaluating outcomes by establishing specific metrics within each category to track student growth and identify areas needing additional support.
- Designing targeted interventions to address specific skill gaps identified through assessment.
- Providing faculty with clearer guidance on how to support students' development in each area.
- Expanding programming to meet the unique needs of students in diverse academic disciplines.
- Preparing students for versatile careers and varied work environments.

Impact of small interventions: our goal is to help students build psychosocial skills in a way that is not onerous for graduate students, their mentors, or the graduate division itself. It is important to realize that incorporating the development of these skills does not require a large-scale intervention; nor does it necessitate that PhDs add to their already heavy academic burden. Instead, it is possible to integrate these essential skills into the current training model. Embedding psychosocial skill building into required courses and mandatory, one-time annual workshops or short-term training events can create a flexible and accessible approach that ensures equal access. Making these lessons interactive allows students to engage with the information in a meaningful way. Considering students' needs at their particular stage of training and tailoring the content to match their experience level enhances its relevance and impact.

In-person vs. virtual impact: It may be worthwhile to explore if there are any differences in impact between in-person and virtual formats, as this could provide even greater flexibility for the graduate program while still maintaining a requirement for participation. It may also be worth considering incorporating online or app platforms for supplemental, asynchronous training to allow individuals to revisit and reinforce their psychosocial skills. However, given that many PhD students do not proactively seek out additional professional development—especially when such training is optional and often not recognized as valuable—this approach may not ensure success.

In conclusion, it is crucial to recognize the importance of a balanced approach to PhD training that includes both discipline-specific academic skills and psychosocial skills development. While academic knowledge is essential, the cultivation of psychosocial competencies is equally vital and it could be accomplished without extensive interventions. By embracing this integrated approach, graduate programs can better prepare students for success in their fields and the real world.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

This study involved the collection of anonymous and voluntary feedback from students via post-event evaluation surveys conducted after classes or workshops as part of a commonly accepted educational setting. The data collected was limited to general satisfaction questions and did not include any personally identifiable information

or sensitive topics. As such, this research does not constitute human subjects research under the U.S. Department of Health and Human Services regulations (45 CFR 46). The participants voluntarily provided their feedback via an anonymous Qualtrics survey (accessed via an anonymous QR code), ensuring no risk to their privacy or well-being.

Author contributions

DS: Conceptualization, Methodology, Project administration, Writing – original draft, Writing – review & editing. VF: Conceptualization, Methodology, Writing – review & editing. AM: Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2025.1474588/full#supplementary-material

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