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BOARD # 422: Post-graduation outcomes of and supervisor satisfaction with graduates of a National Science Foundation Research Traineeship (NRT)

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Post-graduation outcomes of – and supervisor satisfaction with – graduates of a National Science Foundation Research Traineeship (NRT)

1. Introduction

The University of Kentucky (UK) NRT – which is in its sixth (no-cost extension) year at the time of writing – aims to enhance graduate education by integrating interdisciplinary research and professional skill development within a diverse, inclusive, and supportive academy. Specific interventions (e.g., career and multidisciplinary research symposia, transferable skills and multidisciplinary courses forming part of a graduate certificate, interdisciplinary research proposals and projects, as well as field trips, internships, and international experiences) enhance graduate student interest and preparation for a diverse range of STEM career pathways in the public and private sectors, including academia, government, nonprofits, and industry.

The first of several previous contributions provides an overall description of the UK NRT and its evaluation [1]. Subsequent contributions have delineated in more detail the description, assessment, and outcomes of individual NRT components, including i) an onboarding event, a career exploration symposium, and a multidisciplinary introductory course [2]; ii) a transferable skills course, an interdisciplinary research proposal and project, and a multidisciplinary symposium [3]; and iii) a graduate certificate, field trips, internships, and international experiences [4]. The UK NRT aimed and succeeded at increasing the number of underrepresented minorities in STEM careers, the strategies for – and outcomes of – recruiting diverse graduate students being documented in its most recent contribution [5]. In the present contribution, the career exploration programming of the UK NRT will be described. In addition, this contribution will provide the experiences and perspectives of NRT graduates, as well as those of their hiring managers and supervisors by proxy.

2. Existing literature and gaps in the knowledge base addressed by this report

Previous reports support the need for expanded career-focused activities for STEM graduate students to successfully transition into the STEM workforce [6, 7]. However, one common and consequential gap in STEM graduate career programming is a lack of focus on careers outside of academia [7]. Based on quantitative and qualitative data provided by trainees, the structure and components of the UK NRT were successful at creating a sense of community and provided ample opportunity for career skill building both internally and externally [3, 4]. Trainees consistently remarked appreciation for – and utilized – the multiple opportunities provided by the UK NRT to explore careers beyond academia, particularly in non-profits, startups and established industry, as well as in government agencies and national laboratories.

Whereas previous contributions from this NRT provided the description, assessment, and outcomes of career readiness components [2, 3, 4], the evaluation was limited to a brief timeframe. For example, professional skills were introduced through the transferable skills course, as well as reinforced in other program components (like internships) and subsequently evaluated via Likert scales on post- and follow-up surveys, trainee focus groups, and course evaluations. Based on the proximal outcomes reported in previous contributions [2, 3, 4], the

career preparation components achieved the intended outcomes. The focus of the present contribution is on the longer-term, distal outcomes from the retrospective viewpoint of trainees who have searched for jobs and/or successfully launched their careers.

3. Methods

3.1. Assessment and evaluation

As part of the external evaluation, trainees who were close to graduation or had graduated and were seeking for or had secured employment were invited to participate in an interview to discuss how – if at all – the UK NRT influenced their academic goals, job search, and career pathway. Ten trainees were contacted, and all ten agreed to participate in a 30-minute interview. The interviews were conducted virtually and were recorded and transcribed for accuracy. The interview transcripts were analyzed through inductive coding and thematic analysis using MAXQDA (VERBI Software, 2024).

Interviewees represented all three cohorts of the UK NRT and began participating in the program in either 2020, 2021, or 2022. Most participants reported majoring in biosystems and agricultural engineering, whereas others reported majoring in agricultural economics, forestry and natural resources, power systems engineering, and chemistry. Although most participants had already graduated, a few were still finishing their degree at the time of their interviews. Those participants reported that they initially joined the NRT planning to complete a master's degree; however, due to their positive experience with the UK NRT, particularly with transdisciplinary research, they decided to pursue a doctorate.

4. Results

A total of five themes emerged from the analysis of the 10 interviews, namely: 1) the UK NRT influenced participants to change their education goals; 2) several UK NRT components prepared trainees for the job search and the workplace; 3) graduates cite the UK NRT as the most influential factor behind their career successes and aspirations; and 4) the perspectives of hiring managers and supervisors on NRT graduates.

4.1 The NRT influenced participants to change their education goals

Most trainees learned about the UK NRT and applied to the program through their academic advisors, while a small number of students said they learned about it through other means, such as conferences and other students in their academic departments. Several participants reported they originally intended to earn a master's degree; however, once they were in the program, the exposure to Ph.D. students and the UK NRT program itself were factors that influenced their decision to pursue a Ph.D. When asked what specifically made them decide to do so, one trainee shared: "When I went into my master's I wasn't sure if I wanted to do a Ph.D. or not, but by the time I finished my master's, I was pretty determined to get a Ph.D., especially with the grant writing [experience]." Another graduate stated, "The NRT experience, I think, ultimately helped me, they kind of set me up for what I'm doing with my Ph.D. work now."

4.2 Several NRT components prepared trainees for the job search and the workplace

Trainees reported that learning professional skills (e.g., communication, conflict resolution, entrepreneurship, funding procurement, leadership, management, mentoring, outreach, research, research ethics, teaching, and teamwork) in an NRT course and practicing those skills throughout the longevity of the program prepared them for the workplace. Some trainees incorporated specific examples of their professional skills in their resumes and job interviews, particularly communication, grant writing, research, teaching, and teamwork.

The transdisciplinary nature of the NRT was initially intimidating for some; however, trainees reported this as being helpful in learning how to work with people who have different expertise and skills. Most trainees cited the value of seeing how other researchers and disciplines approach the same problem from different perspectives. Additionally, trainees reported that the transdisciplinary research made them better prepared for job interviews and helped them make connections in the workplace. One participant said: "[Interdisciplinary research] is always one of the things listed as what you need to do to get these jobs. And so, I was able to show real life experiences doing that." Trainees suggested that the transdisciplinary experience also provided opportunities to make professional and personal connections through meeting professors and peers in different programs.

In addition to learning new skills and gaining confidence in themselves and their abilities, the participants reported feeling supported and inspired by the UK NRT and the individuals they interacted with. A few students reported they felt their departments were lacking in certain areas, and the UK NRT helped fill those gaps in ways they would not have been able to without the program. One participant stated: "After a very stressful day at the department, I know that I'm going to discuss grants, to meet new friends and discuss [things with students in other departments]. That was the first reason why I started the program."

Trainees also mentioned that several other activities facilitated by the UK NRT positively impacted their job search and career outcomes, including field trips, building a publication record, as well as attending conferences and presenting their work.

4.3 Graduates cite the UK NRT as the most influential factor behind their career successes and aspirations

Interview participants were in various stages of their educational journey and career trajectory. As such, some reported currently working as postdocs, engineers, and economic agriculture coordinators in academic, non-profit, government, and the private sector across several states throughout the United States. Graduates cited the NRT as the most influential aspect of their graduate education, and they expressed confidence in reaching future career aspirations. Several participants had a good idea of the work they would like to do as part of their career trajectory. Among them, a few participants had specific job titles they aspire to hold one day, including chief of natural resources at a park, lead researcher at a national lab or government organization, and tenure track professor. Others were comfortable with not quite knowing their exact pathway and embraced the flexibility of opportunities which could present to them in the future.

Participants reported working in diverse settings on challenging initiatives from teaching undergrads to conducting research. Areas of expertise included ecological restoration, water scarcity challenges, conservation of natural resources, and reforestation of the Appalachian landscape, all of these being research topics of the UK NRT. Additionally, some graduates were involved in community engaged research to bridge gaps among scientists, community needs, and policy makers. These responsibilities require graduates to work in the classroom and in the field, as well as using different technologies to meet job expectations. Interview participants expressed high job satisfaction primarily due to their belief that their work was impactful in a positive direction. Graduates also found satisfaction in their ability to work in other fields with confidence due to their transdisciplinary experiences. One participant commented, "[Having experience with transdisciplinary teams] helped me be a more well-rounded person because when I'm looking for jobs and stuff like that, I'm not just streamlining myself to chemistry or the small niche that I'm in. I'm like, well, I might not have a degree in that, but I've worked there."

4.4 Perspectives of hiring managers and supervisors on NRT graduates

A limitation of this contribution was the inability to directly interview hiring managers and supervisors. The initial impetus for attempting to collect data from them was due to trainees reporting positive comments that they were receiving during interviews and during workplace meetings with their supervisors. Hiring managers noted the value of trainees demonstrating their professional skills by providing concrete examples on their resumes (research, proposal writing, funding procurement and management, conference presentations, etc.). Supervisors of UK NRT graduates noted their ability to work in multidisciplinary teams to problem-solve. Trainees and graduates connected these responses directly to their experiences in the UK NRT and credited the program with giving them confidence during the job search process and the start of their careers.

Conclusion

Participants overwhelmingly reported they would recommend the UK NRT program to other students and would like to see the program continue and expand. Participants reported that they would specifically recommend the program to students who are interested in a Ph.D. A few participants shared recommendations for improvement surrounding additional support to connect with professors, more emphasis on government and industry work, and additional representation among majors in the program. Participants largely reported feeling grateful to have participated in the UK NRT program. In summary, UK NRT graduates reported experiencing a high-quality education, having opportunities to practice technical and professional skills, making personal and professional connections, exploring multiple types of jobs, and particularly enjoying the transdisciplinary nature of the program. One graduate reflected, "I think it's important for people to interact with people that are outside of their immediate scope of influence because that's the way it's going to be throughout most of your career."

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