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Silos to Synergy: Experiences of an Interdisciplinary Trainee Network

Anna Garnett
Western University

Ruheena Sangrar
University of Toronto
r.sangrar@utoronto.ca

Kelsey Harvey
McMaster University
harvek1@mcmaster.ca

Rachel Weldrick
Toronto Metropolitan University

Stephanie Hatzifilalithis
McMaster University

Micheal Kalu
York University

Emily C. Dunford
McMaster University

Audrey Patocs
McMaster University

Tara Kajaks
McMaster University

Abstract: With global increases in older adult populations, there is a critical need for interdisciplinary research to address the complexities of aging. Graduate and post-graduate scholars, within academic institutions, are ideally situated to develop interdisciplinary research skills. Academia provides many opportunities for building relationships, developing interdisciplinary skills and knowledge, and initiating collaborative projects and networks. This quality improvement (QI) project sought to explore how the experiences of graduate students' and post-doctoral fellows' participation in an interdisciplinary trainee network for research on aging informed the development of interdisciplinary research competencies. The QI approach was informed by principles of reflexivity whereby participants reflected on their development as interdisciplinary researchers through their engagement in the network. Key findings included: the contribution of institutions and structures, transcendence of boundaries, and development at the level of the individual and community. Findings highlight the value of investing in trainee development in interdisciplinary collaboration, within and beyond aging research, and can also inform the development of interdisciplinary trainee initiatives in other areas of research, policy, and practice.

Keywords: collaboration; aging; research skills; graduate; post-graduate

Introduction

Interdisciplinarity has been lauded as an innovative approach to educating the next generation of researchers to address the wicked issues faced by society, including those within the field of aging (Finlay et al., 2019; Kawa et al., 2021; Krohn, 2017). Widespread increases in aging populations across the globe are predicted to have extensive economic, social and health implications (World Health Organization, 2022). Concerns about the immediate and long-term impacts of this demographic shift have led to calls for immediate and collaborative approaches to inform strategies and to anticipate challenges arising from aging populations (Cherbuin et al., 2021). Historically, interdisciplinarity has been variably defined depending on the context of application and the disciplines involved (Frodeman, 2017). Within research, interdisciplinarity can be broadly defined as academic activities by researchers from at least two separate disciplines who draw upon a range of theories, methods, data, and concepts from different disciplines to advance knowledge to benefit society (Aboelela et al., 2007; Bridle et al., 2013; Frodeman, 2017; Klein, 2021).

Given the complexity of the aging process, research in this realm can benefit from drawing upon interdisciplinary principles. Across Canada, a country expected to have more than 30% of its population over the age of 60 by 2035, aging-related government priorities echo the need for interdisciplinary collaboration in their research mandates (CIHR, 2020; Government of Canada, 2014). For example, the Canadian Institute for Health Research's Institute of Aging is addressing priorities in aging research through collaborations and multidisciplinary initiatives with research groups such as the Canadian Longitudinal Study on Aging (CLSA), the Dementia Research Strategy, Healthy and Productive Work, and eHealth Innovations (CIHR, 2020). Increasing recognition of the benefits associated with interdisciplinary approaches to address widespread population aging has also led to an increase of interdisciplinary and student-focused funding calls (Cherbuin et al., 2021). For example, the Canadian Frailty Network's Interdisciplinary Frailty Fellowship requires participation in cross-disciplinary collaborative projects with program peers (i.e., graduate students) (Canadian Frailty Network, n.d.).

Beyond the domain of aging, there is growing recognition that introducing interdisciplinarity early in graduate education can better prepare academics to address complex problems going forwards (Berasategi et al., 2020; Brown et al., 2021; Clark, 2020; Sweeney et al., 2015). For example, integrated approaches to graduate education, while not without challenges, have enabled students from diverse disciplines such as life sciences, engineering, and math/physical sciences to benefit from peer education, foster their communication skills, and enhance career preparation (McKee et al., 2021). Furthermore, a European interdisciplinary doctoral program bringing together practitioners and academic scientists resulted in graduates with high employability and who produced predominantly interdisciplinary scientific publications (Serlet et al., 2020). Other documented interdisciplinary approaches within academia include introducing cross-disciplinary courses, providing opportunities for networking across multiple disciplines and formalized reflection within academic training (Fuller et al., 2012; Liu et al., 2017; Siebert et al., 2020). However, within the field of aging, the majority of research on interdisciplinary collaboration has focused on the clinical setting rather than the academic settling. While this interdisciplinary clinical focus is necessary to optimize the design, implementation, and sustainability of health services for older adults, there is also a need to increase interdisciplinarity within academia, particularly with regard to age-related research (Morano & Damiani, 2019).

Research collaborations are not new, for example, the Cochrane Collaboration successfully brings together many disciplines. However, collaborative research approaches can be challenging

particularly when small and large disciplines must cooperate, or the research involves junior researchers. Early-career researchers face pressures to obtain competitive funding which may make them hesitant to share research ideas, their resources are often limited, and the individual performance-based tenure process can discourage engagement in interdisciplinary research (Green & Johnson, 2015; Hall et al., 2006). Moreover, engagement in interdisciplinarity can mean using multiple methodologies, having conflicting approaches to authorship and, as such, researchers may struggle to find a "shared language," all of which can serve to discourage collaborative research (Cooke et al., 2020). Therefore, there continues to be the need for research on the education, development, and fostering of interdisciplinary research, particularly by junior researchers.

Interdisciplinary Research Competencies

Recognizing a need to better prepare graduates and post-graduates to manage societal and scientific issues, the National Science Foundation (NSF), an independent agency of the United States government that supports research and education, developed formal criteria to guide interdisciplinary training (Turner, 2017; Gamse et al., 2013). These competencies were informed by the findings of an in-depth literature review in conjunction with consulting academic experts in the NSF and an advisory committee. The resultant key competencies identified are the ability to: (a) use theories and methodologies associated with multiple disciplines; (b) engage in scholarship and communication across disciplines; (c) explore interdisciplinary research hypotheses; (d) work as a community comprised of individuals with different disciplinary training; (e) appreciate differences and strengths of different disciplines; (f) communicate interdisciplinary research to a range of academic and non-academic audiences; and (e) seek feedback on interdisciplinary group functioning (Gamse et al., 2013; Hesse-Biber, 2016; Klein, 2008; Larson et al., 2011; Lorenzetti et al., 2022). The historical basis for these competencies came from a report authored in 1995 by the National Academy of Sciences' Committee on Science, Engineering, and Public Policy highlighting the need to prepare graduates to work well in team environments and work across a range of fields and communicate complex ideas to laypersons (Gamse et al., 2013; National Academy of Sciences, National Academy of Engineering, Institute of Medicine, 1995). While graduate students engage in in-depth focal learning, their academic training also presents opportunities for development of broader constructs associated with interdisciplinarity such as communication and collaboration (Thompson, 2014). Participation in informal information sharing and at conferences presents ideal opportunities for students to communicate to a variety of audiences and build collaborations (Kuzhabekova & Temerbayeva, 2018). Crucial elements of collaboration include communication, self-reflection, and respect for cultural variation in disciplines. Mentorship can assist trainees to advance their thinking and share research approaches, and peer-to-peer mentorship can enhance productivity and provide informal practice opportunities in interdisciplinarity (Bansal et al., 2019; Eise et al., 2019).

Interdisciplinarity within the Context of a Research Institute – An Exemplar

One Canadian university has brought together multiple disciplines across all its faculties to form an institute for aging research. Impetus was provided by both the university leadership and donor interests with a shared objective to leverage existing strength in aging research to build interdisciplinary research partnerships, using a solution-focused design thinking framework (McLaughlin et al., 2019). The institute's governance consists of experts located in academia and within the private sector who, together, established a mission to promote the health and life

expectancy of older adults through interdisciplinary research, education, and collaboration with a diverse group of stakeholders (McMaster Institute for Research on Aging, 2023).

In accord with the institute's goal of fostering interdisciplinary research and education, an informal interdisciplinary trainee network was established for undergraduate and graduate trainees. Guided by an initial structure administered by the institute, the network's growth and direction were student driven allowing for flexible growth and development in response to trainees' identified interests and needs. Meetings occurred monthly and featured activities such as informal research presentations, informal peer mentorship, interdisciplinary conference participation, and collaboration to develop new interdisciplinary research. Much of the interdisciplinary exposure for the Institute's trainees happens within an informal trainee network, a strategy that has been identified as a successful way of promoting student engagement and learning (Ainsworth & Eaton, 2010; Harvey et al., 2022; O'Shea & Vincent, 2011; Stone et al., 2013). To date, the literature primarily documents the impacts and outcomes associated with formalized interdisciplinary trainee programs that have structure and oversight from an institutional body (Liu et al., 2017; McKee et al., 2021; Serlet et al., 2020; Siebert et al., 2020). Yet there remains a gap in knowledge and understanding of how informal trainee networks can influence graduate trainees' development of interdisciplinary competencies specific to aging-related research. Therefore, the purpose of this inquiry was to examine: *How can trainee experiences, as members of an informal interdisciplinary trainee network on aging research, inform the development of interdisciplinary research competencies?*

Methods

Project Design

A quality improvement (QI) approach was used to guide this inquiry because the intent was to both gather information on the network functioning but also to ensure there was a continuous process of growth and development within the network (Berman et al., 2018; Faiman, 2021). Specific aims of the inquiry were to increase understanding of how trainees' experiences helped them to develop interdisciplinary research competencies and to explore whether the trainee network provided a suitable venue for the development of the competencies.

This process of inquiry incorporated principles of reflexivity, a process of critical reflection concerning both the self and others (Lincoln & Guba, 1985; Taylor & White, 2000). The reflexive process aims to help an individual achieve a level of understanding and self-awareness as it relates to an experience. It also encourages the individual to become aware of potential underlying assumptions regarding their experiences. Reflexivity is a formal construct within qualitative research but can also be inherent to interpersonal engagement within social settings and as such it is impossible to be "unreflexive" (Lynch, 2016). Increasingly, reflexivity has been used within QI projects in order to be more responsive to the needs of participants and the goals of the organization or institution (Nielsen et al., 2022; van Loon & Zuiderent-Jerak, 2012). In order to practice reflexivity a researcher must engage in an ongoing process of evaluation to assess how their own subjectivity and the current circumstances exert influence on the evaluation process they are engaged in (Olmos-Vega et al., 2022). For the purposes of this project, trainees practiced reflexivity as they explored and described their experiences of being an active member of an interdisciplinary trainee group in aging. In consultation with the university research ethics board, it was determined that this process of evaluation was in alignment with a QI initiative rather than a formal research study and therefore received full exemption from the research ethics board.

The Interdisciplinary Trainee Group

The interdisciplinary trainee group was formed to fulfill one of the McMaster Institute for Research on Aging (MIRA) strategic priorities to support training and capacity building among trainees (graduate students and postdoctoral fellows) in aging research (McMaster Institute for Research on Aging, 2017). After direct consultation with trainees regarding their requirements for training-related support, the Institute initiated its trainee network in 2017 with the goal of supporting trainees in four ways: (a) communication support and information sharing (e.g., aging related events, calls for abstracts, and external funding opportunities in aging, and supporting an Institute trainee blog); (b) encouraging trainee-driven structured events (e.g., community knowledge translation opportunities, speed-mentoring sessions with affiliated researchers, research fairs, competitions and showcases); (c) funding opportunities targeting trainees engaged in interdisciplinary research on aging, and; (d) supporting regular, informal networking among trainees (e.g., monthly meetings of the trainee network).

The Institute brought together academic advisors across faculties, provided funding for regular meetings, organized formal activities such as research events, and provided personnel support. For example, the institute research coordinator and administrative support team were instrumental in facilitating inter-member communication and fostering the growth of the trainee network membership. Regular meetings were part of the core fabric of the network; each meeting showcased a trainee presentation of their own planned, ongoing or completed research, followed by peer discussion among attendees. Initially administered by Institute staff, these meetings were subsequently chaired and managed by the Institute's trainee network executive committee. Attendance was voluntary, allowing for self-directed exposure to new colleagues and research approaches. Discussions during meetings were organic but contributed to trainees' development as collaborative researchers. For example, conversations ranged between exchanging funding and conference resources, to problem-solving shared challenges in research design (e.g., participant recruitment, methodological issues), and organizing networking and educational events. The QI project was initiated by the network members as the first formalized assessment of the network with an expressed goal of understanding how the group was performing and identify areas for ongoing growth and development.

Data Collection

The Institute's trainee network executive committee included an item in the group's monthly newsletter inviting members who were interested in sharing their experiences with the trainee network to participate. Six doctoral students and two post-doctoral fellows responded to the call and formed an interdisciplinary reflection and writing team (See Table 1 for a summary of team member characteristics). The team, including the Institute's research coordinator, met as a group on two occasions to refine the project's objectives and research question. All student participants were asked to write about their experiences of being part of an interdisciplinary trainee group.[1] Specifically, team members were provided with instructions to describe, using a reflexive approach, their experiences of being active members of the Institute's trainee network. There were no word count limits or specific questions provided. Participants were encouraged to reflexively write about anything they perceived to be relevant.

[1] Although a team member, the Institute's research coordinator did not provide a reflection on engagement in the network from a student perspective. They participated in all meetings and discussions.

Table 1. Team Member Characteristics.		
Faculty Affiliation	Level of Study	Number of Participants
Science	Post-doctoral Fellow	1
Health Sciences	PhD Nursing	1
Social Sciences	PhD Social Gerontology	3
Health Sciences	Post-doctoral Fellow	1
Health Sciences	PhD Rehabilitation Science	2
Institute	Research Coordinator	1

Analysis

Once team members had written about their experiences, all 8 response narratives were anonymized then compiled into a master document/list. The master list was uploaded into a shared online folder that was accessible to all members. The analysis of this QI project was guided by thematic analysis, a flexible analytical approach that can be adjusted to meet different types of projects but, it also allows for a fulsome description of the data (Braun & Clarke, 2006). As per this approach, including direct quotes from project participants is key to illustrate the information contained in the data informing the project (Braun & Clarke, 2006).

At this stage, the team met as a group to begin preliminary data analysis drawing on the principles of thematic analysis whereby units of information are first organized into codes and then thematically similar codes are organized under broader groupings called themes (Braun & Clarke, 2006). Participants split into two groups (i.e., group A and group B), and each group examined the four reflections to identify key concepts and emerging ideas. Members of each group sorted these concepts and emerging ideas into codes, individually at first, and then discussed the potential codes with their group in an iterative process. Once complete, groups A and B reconvened as a large group to create a preliminary list of codes which were classified as major and minor codes. The major codes became the resultant overarching themes that answered the research question, and the minor codes informed these themes. The codes and developing themes were refined at a subsequent face-to-face meeting. The two teams then worked together to ensure that all members agreed with the application of the codes and emergent themes. Once a consensus was reached, key quotations for each theme were identified.

Results

Four main themes emerged from the thematic analysis, including: 1) *Institutions and Structures*; 2) *Transcending Boundaries*; 3) *Sense of Community*; and 4) *Personal Development/Enrichment.*

Institutions and Structures

The McMaster Institute for Research on Aging, as a structured and institutionally sanctioned organization, was the catalyst for the trainee group to form and cohere. Without the power and structure provided by the Institution, the trainees would not have been presented with multiple opportunities to develop competencies necessary for becoming interdisciplinary researchers (such as having the opportunity for networking, as will be outlined in the theme *Sense of Community*). The recognition of the benefit gained through structure can be seen in the following quotes:

> Albeit still in the first year, the structured nature of the trainee network within an established institute played a strategic role in capacity building and I believe provided us with the momentum needed to build a successful trainee group. (Respondent 8)

> …each meeting presentation is relatively unformatted which also provides interesting and different presentation styles and allows creative information dissemination. (Respondent 1)

The current academic structure ties students to a home department, discipline, and advisor, thus encouraging siloed disciplinary specialization. Trainees expressed that the network was successful in its aim to promote interdisciplinary conversations. This approach included semi-structured meetings; the focus of which was on fostering a collaborative learning environment for the trainees. However, the unstructured format was not without some criticism. The highly formalized and institutional structure of the trainee network replicated some of the pitfalls faced by interdisciplinary researchers in both academia and health care/ community service. For example, one respondent said:

> I came into academia with assumptions that multidisciplinary collaboration would not be much different. This was not always the case. Indeed, the balance of power and the institutional and disciplinary constraints were much more apparent, and at times problematic, in academia…. My experience with the trainee network is that there was a much stronger influence 'from above' with regards to oversight when the network first formed. However, this shifted to where, by the end of the year, the trainee network was much more equitable, in that students were taking on more leadership. (Respondent 4)

Transcending Boundaries

Initially, some trainees felt tension and unease navigating the unknown territory of interdisciplinary collaboration,*"…it wasn't an easy start – none of us were part of any similar group."* (Respondent 7)

The trainee network played a vital role in challenging some trainees' preconceived ideas of the problems with interdisciplinarity by creating a space that was open to explore disciplinary boundaries and challenge their perspectives. Some students felt such comfort with the trainee network that they described it as a forum where disciplinary boundaries were completely removed or diminished. Trainees described this process as one in which their contributions to scholarship were contextualized as part of a larger, more holistic part of understanding aging:

> As a PhD student and early graduate researcher in the social sciences, I largely remain mono-disciplinary and that ultimately contests my capacity to understand the holistic nature of the aging process. Over the course of this past year, being integrated into a multidisciplinary trainee network has provided me with the opportunity to contextualize approaches of various disciplines. (Respondent 8)

The ability to transcend disciplinary boundaries was also attributed to the fact that trainees all came together with a common research interest on aging:

> These meetings have provided me with a space to meet and interact with other trainees from all academic levels and faculties, most of whom are also researching a component of aging. As aging is a multifaceted condition, exposure to other forms of data collections, analysis and subject recruitment is paramount. (Respondent 1)

Not only were trainees able to learn about the contributions by other disciplines toward aging scholarship, but also about how other disciplines conduct research. For example, one respondent noted, *"Where there are parallels in topic, there may be differences in methods, and where there are similarities in methods, there are new applications in aging-related challenges."* (Respondent 2)

These opportunities were not only a benefit to the trainees' personal development, but also skill development as knowledge mobilizers as the trainee network provided an avenue for communicating about aging research and receiving feedback. For example, students beyond the trainee network also benefited from learning about what unfamiliar disciplines contribute to working with older adults:

> [I] delivered [a] lecture to undergraduates participating in a program aimed at designing tech "solutions" to problems with aging. [The] Lecture/presentation [was] aimed at preventing ageism. This led to great conversations and discussions with new connections…This was an opportunity that certainly would not have arisen had I not been a part of the trainee network. … I was able to provide important social science research with students from engineering and business backgrounds, many of whom had not previously considered how to go about their work in a way that was not ageist. Indeed, many of these students learned about the concept of ageism for the first time that day. As such, I found this opportunity very valuable and was happy to be able to share social science research in this way. (Respondent 6)

By the end of the first year, trainees met several scholars and peers outside of their discipline and were able to establish interdisciplinary relationships. Trainees' abilities to transcend their disciplinary boundaries resulted in career development opportunities, such as speaking invitations and post-doctoral fellowships, that may not have been available to them had they remained within their disciplinary silos. For example:

> …the development of relationships with academic leaders in the field of aging resulting from my involvement with the institute have enabled me to secure a post-doctoral supervisor outside of my discipline and to develop a research project including the submission of multiple applications for post-doctoral fellowships." (Respondent 5)

> "…viewing my PhD through the transdisciplinary lens would help bring different professionals to contribute to developing a model that any of the health care professionals can use. (Respondent 3)

Trainees felt that their contributions to their own disciplines were stronger as a result of their participation in the interdisciplinary trainee network initiatives. Not only did trainees express that their personal perspectives were enhanced, but their increased knowledge base would inform the future research within their own disciplines and help them to translate their research more widely.

Sense of Community

Opportunities for interaction and the development of healthy social ties only develop where people have the chance to meet and 'feel the warmth' of a 'neighborhood.' If an interdisciplinary 'neighborhood' feels insecure and unsafe, people will not leave their 'homes' to enjoy them. The social nature of the trainee network's meetings and events provided the trainees with the opportunity to build a support system and develop a sense of community. One respondent noted,

"The trainee network provides the venue for relationships to form and be maintained in a way that is 'fun.'" (Respondent 6)

While this sense of community extends beyond the trainee network meetings and events, more work is needed, as the social connections outside of network activities were not compelling for some trainees. For example, one respondent noted, *"Many Institute trainees outside of my department remain as acquaintances, only working together/ sharing tips/ references/ resources with extra effort."* (Respondent 7)

Patterns of trust between trainees and across the structure of the institute facilitated a shared sense of cohesion in a non-judgmental space. Trainees felt comfortable communicating with one another, providing one another with feedback, exploring subject matter and methods outside of their disciplines, and fostering truly interdisciplinary relationships. For example, Respondent 6 noted, *"These meetings have also created a space to ask for advice and feedback on current projects from various perspectives."*

Meeting formats allowed for trainees to practice public speaking or discuss challenges in their research projects in a safe environment. Even though each meeting may have hosted a different set of trainees, the "social venue" (Respondent 7) created an atmosphere where trainees could push the boundaries of their comfort zones without repercussion. This sense of community, specifically, engendered collaboration among trainees with the common aim of helping each individual develop professionally and academically, as well as enhancing the group as a whole.

Personal Development/Enrichment

Trainees expressed a myriad of benefits with regards to their own personal enrichment and professional development as early graduate researchers. These opportunities in which some trainees engaged included: presentations, community engagement, mentoring, networking across disciplines, career advancement, leadership development, development of interdisciplinary collaborative skills, feedback on work-in-progress, continuing education (webinars, conferences, etc.), mentoring, and, of course, free breakfast on meeting days. For example:

> Becoming a member … has been instrumental in enhancing my PhD career, fostering the growth of my professional networks both within and beyond the network and developing my curriculum vitae as a junior researcher in the field of aging research…. Direct benefits to my career include the opportunity to work with other members of the network to facilitate an ongoing program of monthly meetings with presentations by trainee researchers, which has provided a valuable leadership experience. (Respondent 5)

Of these benefits, networking was expressed frequently across trainee reflections. The frequency by which fostering new professional relationships not only underscores the importance placed on networking, as both a skill and as a vital component of personal development, but points to the important role the institute trainee network played in fostering interdisciplinary connections between trainees and mentors alike. This growth in interdisciplinary connections can be seen in the following quote:

> When the [International Scientific Advisory Committee] visit[ed], we (trainees) had a morning session with the international scientific directors. Meeting and having a chat with [academic], from the [University name], expose[d] me to [the] concepts of social and health inequality. This has shaped my reflection on how these concepts relate to two components of my PhD project-financial and cultural gradients as a determinant of mobility for older adults. (Respondent 3)

One vital and reciprocal benefit was the ability to engage in knowledge translation activities, both as presenter (to the trainee group, to other students, and to the greater community) and as receiver of the knowledge disseminated. For example:

> These events were great and really hit home the concept of knowledge translation, which is a key skill many researchers fail at. The opportunity to present a poster and demo some carotid ultrasound imaging at the MIRA event was a unique experience, and really underscored how discussing research with members of the general public is so very different than speaking with other researchers…. and allowed me to grasp how important our research really is. (Respondent 1)

These opportunities for personal development lead directly to tangible benefits for some trainees, such as applications for funding and/or the next stage of one's career. Others were able to take on more involved roles with the trainee network in order to engage in activities to build non-traditional skills that can be overlooked in traditional graduate programs, such as creating an online blog. For example:

> Through this opportunity I have been involved in creating the trainee network blog where we highlight the research of individual trainees. While it is still in its infancy, this has been a valuable learning opportunity which I would not have had during my postdoc fellowship. (Respondent 1)

Some trainees even expressed that the networking and opportunities for collaboration went so far as to extend to faculty relationships, thus transcending beyond the level of the trainee:

> Through the trainee network, my supervisor and I have initiated a collaboration with a new Professor in the Department of Engineering…we can provide…our ultrasound images collected from older adults with and without chronic diseases, coupled with extensive patient characteristics. We have also been assisting… on understanding basic cardiovascular physiology, while they have been teaching us about basic mechanical engineering. We hope to have a collaborative publication(s) soon. (Respondent 1)

Many positions within and outside of academia now expect graduates to understand and to adapt to meet contemporary challenges and potential changes in the research environment (Beausaert et al., 2013). Actively seeking out information, training, and attending events keep students' skills and knowledge up to date. Time devoted to understanding what influences personal perspectives and the benefits or pitfalls of one's personal ontological and epistemological positions is well spent. It is also important to be aware of how one's lens affects other people and their research. Knowing how to collaborate whilst simultaneously creating individual opportunities is an invaluable skill in the workplace and beyond. The Institute's trainee network therefore created a unique space and place for learning and growth that fostered and encouraged experimentation with opportunities to develop participants' professional and personal academic skills.

Discussion

The current QI project sought to explore how graduate students' and post-doctoral fellows' participation in an informal interdisciplinary trainee network on aging informed their development of interdisciplinary research competencies. Participants described the influences of institutional and informal structures on their personal and professional development, as well as on the development

of their disciplinary and interdisciplinary competencies. Although trainees developed a range of interdisciplinary skills, findings suggest that trainees experienced the most development across the following interdisciplinary competencies: engaging in scholarship and communication across disciplines; appreciating the differences and strengths of different disciplines; communicating interdisciplinary research to a range of audiences; seeking feedback on interdisciplinary functioning.

An overarching contributor to trainee development was the benefit of a structured and institutionally recognized framework for research on aging to guide the trainee network in its earliest stages of development. While the Institute trainee network was driven from the top down early in its administration, the network has developed its own governance and process for facilitating trainees' capacity building and professional growth. In order to promote effective learning, an environment must promote motivation and a sense of continuous evolution, while allowing the learner to maintain control of personal development (Englehardt & Simmons, 2002). The organizational space, thus, avoids control and predetermined process, but can be understood as a distinct influential layer, facilitating learning and growth (Englehardt & Simmons, 2002). Within an aging environment, interdisciplinary students are removed from the traditional, mono-disciplinary, experience of education, as Clark (1994) found that gerontology students are enculturated into dominant academic norms and principles wherein disciplinary contributions, individualism, and competition are paramount. As a result, students with interdisciplinary training experiences can better value teamwork, collaboration, and contributions from a variety of disciplines.

In the case of the current QI project, the Institute's mandate included structured programming related to evidence dissemination within academic and community-based venues. Creating spaces for trainee involvement at such events allowed participants to develop key interdisciplinary competencies such as communication across disciplines, collaboration across disciplines, and knowledge translation with academic peers and non-academic audiences. Members of the institute trainee network could self-select which events they wish to participate in as well as their level of engagement in each (e.g., organizational, attendance, presenting research). For example, participants discussed the benefits of self-directed engagement towards developing their attributes and skills as researchers engaged within the communities they study. Unstructured or non-formal approaches to interdisciplinary education in aging may be ideal for fostering the use of adult learning principles such as an emphasis on self-direction, engagement in active learning and drawing upon prior experience (Knowles, 1968; Palis & Quiros, 2014). A more loosely structured approach to interdisciplinary education allows for evolution of the learning process as participants work together to define individual and shared learning needs in an efficient manner with limited oversight at the level of faculty and administration. Non-formal programs have taken a grass-roots approach to developing collaborative researchers in aging. Using a semi-structured context, and fostering trainee-led programming driven by adult-learning principles, has enabled the trainees in the context of this QI to develop specific competencies of inquiry, collaboration, and communication that meet their respective needs as developing interdisciplinary aging researchers.

Project findings supporting the importance of transcending disciplinary boundaries, a crucial interdisciplinary competency, are also consistent with literature that suggests that individuals must undergo a process of moving beyond disciplinary constraints before their competencies as researchers and educators in the complex field of gerontology can be maximized (Bass, 2013; Finlay et al., 2019). The Institute trainee network in this QI project sought to bring together trainees from multiple faculties and disciplines, creating an environment that encouraged them to explore their own disciplinary constraints while concurrently gaining a better understanding of other disciplines and research programs in the field of gerontology. Participants readily identified that the exposure to different disciplines within the trainee network encouraged them to recognize, and even breakdown, disciplinary boundaries.

Within literature, the value of interdisciplinary approaches to address complexities of aging is well recognized, but implementation of these approaches in education has seen challenges. Pedagogical challenges include the need to overcome siloed educational approaches, disciplinary specific language, and discordant attitudes regarding methodological approaches, and at the conceptual level, students' disciplinary world views (Carr et al., 2018). To optimize interdisciplinary education, research suggests integrating structured didactic experiential learning opportunities with those that are more informal or loosely structured (Allen et al., 2006). Without imposing disciplinary constraints on interdisciplinary collaboration, trainees can focus on their shared interests, such as a better understanding of social or physical well-being across the aging trajectory. Optimizing a teaching approach in interdisciplinary education can foster collegial, respectful interactions across faculty, staff, and students to learn from each discipline with common goals in mind (Allen et al., 2006). Accordingly, participants in the current project found that the non-formal group structure readily facilitated engagement with other trainees and faculty members within the group and beyond to the greater Institute membership. For example, findings from this project highlighted the positive experiences of the learning opportunities offered by the monthly presentations made by trainees or guest lecturers from a variety of departments and faculties. Moreover, these informal gatherings provided opportunities for network members to practice soliciting feedback from their interdisciplinary peers, an important interdisciplinary competency. Indeed, the fluid and non-formal nature of the presentations created a space for trainees to examine, challenge, and transcend disciplinary boundaries.

The third theme identified in the QI project, *Sense of Community*, suggests that, for interdisciplinary collaborations to continue beyond the semi-structured margins of a group like the Institute's trainee network, ongoing efforts to maintain engagement would be necessary. While participants spoke to the value of the group in facilitating interdisciplinary relationships to form and coalesce, others perceived that incentive to engage in academically fruitful collaborations required undue effort. Actualization of interdisciplinary engagement occurred in instances of participating in knowledge dissemination or case-based problem-solving activities, for example. These findings echo those of Bridle and colleagues (2013) who emphasize that providing opportunities for interdisciplinary engagement is important for optimizing education. As such, intentional calls for projects that bring together trainees from multiple disciplines serve to catalyze the development of learners' collaborative networks. Specifically, encounters that articulate concrete products or outcomes of collaboration can spur training in aging research to co-create novel ideas and sow the seeds for future research partnerships. The institute has developed terms of reference that enable institute trainees to remain involved with the network as they move forward with the next steps of their career development. Being able to maintain relationships created during their training will allow new researchers to further build on the collaborative partnerships they developed through the trainee network.

Outcomes of personal development and enrichment resonated across participant reflections on their experiences as members of the institute trainee network. Of note, was the emphasis that trainees placed on the value of networking across disciplines, both among the trainees and via other institute-led initiatives such as funding calls for graduate students and participation in community-based knowledge translation events. Outcomes of these encounters included successfully obtaining interdisciplinary doctoral or post-doctoral fellowships, manuscripts, and engagement with leaders in aging research at international conferences. These venues provided tacit learning experiences for trainees to draw upon knowledge gained in peer presentations. For example, one participant described benefits of hearing interdisciplinary peers' approaches to participant recruitment to designing their own thesis studies. Receiving successful funding to conduct interdisciplinary research as a graduate student or post-doctoral fellow can be a catalyst for budding researchers to seek out

such projects in their future programs of research. Increasing the availability of funding calls tailored to interdisciplinary research is also important to sustain long-term advances in the field of interdisciplinary aging research (Garg et al., 2018). Given the growth in government mandates of interdisciplinary research in aging (Hennessy & Walker, 2011), ensuring future scholars have the foundational competencies to successfully respond to these calls for funding should be a priority for academic institutions. Additionally, there is increasing recognition that programs directed to graduate students and those in continuing education should incorporate curricula that foster direct interdisciplinary engagement at the levels of practice, policy, and management (Morano & Damiani, 2019). These multi-level programs are well-placed to help the next generation of researchers and professionals dissociate the disciplinary silos inherent at the departmental and administrative level of many research and health organizations (Morano & Damiani, 2019). Researchers and clinicians who are able work within an interdisciplinary framework are better positioned to address the aging-related knowledge gaps and clinical issues widely predicted to increase globally over the coming years (World Health Organization, 2015).

Limitations

This QI project had some limitations. The current cross-sectional reflection represents a self-selected subset of the greater Institute trainee network. Therefore, those who participated may have been predisposed to present a particularly engaged perspective on the value of an interdisciplinary trainee network. Importantly, the results of this QI project must be understood within the context in which the project was conducted and as such the findings should be contextualized by the parameters that influenced the trainees' experiences, such as the educational model (e.g., publicly funded university), geography (e.g., availability and type funding models for interdisciplinary research), and health system (e.g., publicly funded).

Of note, trainees from the Faculties of Engineering, Business, and the Humanities were not represented in this analysis. The lack of representation from these disciplines presents an opportunity for further exploration. From the perspectives of research, important findings are coming from partnerships that consider the ecological aspects of aging moving beyond the traditional medical model aging and drawing on the skills of disciplines in the social sciences such as sociology and geography (Ferraro, 2007). The early under-representation may also reflect the readiness of some disciplines to engage in interdisciplinary research. For examples, health-related disciplines such as occupational therapy, medicine and nursing frequently collaborate within clinical settings so research collaborations may be more organic than other more traditionally siloed disciplines. Since the conduct of this inaugural QI project, the trainee network has substantially grown and diversified, in part due to targeted outreach strategies by the Institute to engage underrepresented disciplines such as engineering and business. Going forward it will be important to continue engaging in QI types of initiatives to ensure trainee network members have opportunities to optimize their interdisciplinary skill development.

Implications

Interdisciplinary trainee networks have potential to enhance the positive benefits of interdisciplinary research as early as during post-secondary training. Albeit focused on aging-related research, the institutional strategies employed to establish a trainee network fostered professional growth and self-governance among future researchers. As society experiences a growing number of complex or wicked problems, the need increases for researchers who have the interdisciplinary skills to respond. Yet, resistance to instituting interdisciplinary programs persists across academic institutions (Kawa et

al., 2021). The experiences of this trainee network highlight its benefits in helping trainees develop skills in communication and collaboration across a range of disciplines, and engagement with a range of audiences. Areas for targeted growth include strategies to increase knowledge and application of a variety of methodologies and theoretical constructs and supporting trainees to develop and implement research projects directed by interdisciplinary research hypotheses. Overall, the Institute's oversight to help initiate the informal trainee network was well received. Other Institute initiatives such as graduate and post-doctoral funding geared towards interdisciplinary researchers may well provide the aforementioned skill development but were beyond the scope of this project to evaluate. The Institute may also be well-placed to offer methodological training and workshops to trainees, thereby supporting an identified need for their interdisciplinary competency development.

Conclusion

The current QI project aimed to understand how graduate and post-graduate trainees' experiences with an interdisciplinary trainee network in aging informed their development of interdisciplinary research competencies. Positive experiences of building collaborative networks and individual competency development in scholarship activities were emphasized by project participants. Facilitators and barriers to engaging in interdisciplinary collaborations were also highlighted by project participants, with some participants finding that the initial emphasis on institutional structure in this non-formal educational approach hindered their development of interdisciplinary competencies. Outcomes of this QI project suggest that structured and non-formal approaches can be successfully used to training the future generation of interdisciplinary aging researchers.

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