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## Doctoral students' experiences of being affiliated with an interdisciplinary graduate school in aging and health

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### ABSTRACT

The aim is to describe the development of a novel interdisciplinary graduate school, using the Swedish National Graduate School for Competitive Science on Ageing and Health (SWEAH) as a case example. We explore doctoral students' perceptions of being part of SWEAH and provide implications for practice. Written self-reports reflecting 78 students' experiences and perceptions were analyzed using thematic analysis. The findings reveal that affiliation with SWEAH is highly valued. The students emphasized the tailored courses and learning activities and reported that it was instrumental in deepening their knowledge and broadening their research perspectives. The findings demonstrate how students navigate between disciplinary and interdisciplinary contexts and become enculturated with intellectual mindset and understanding of the importance of network building. The graduate school adds an interdisciplinary layer of learning, influenced by peers and researchers, and demonstrates the importance of community building within interdisciplinary environments and how it can be achieved.

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## Introduction

Because no single discipline or research orientation can address the complex demands that the aging population places on healthcare and social service systems (Keijsers et al. 2016), it is a necessity to apply interdisciplinary perspectives to research on aging and health. To achieve this, researchers need training to be well prepared for interdisciplinary collaborative research targeting the improvement of medical treatment and care for the aging population and health and quality of life (Little et al. 2017; Clark 2020) in the broadest sense.

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Addressing this demand, the development of doctoral education programs and careers is therefore receiving increased attention within the political sphere as well as in higher education institutions (HEI) (Andres et al. 2015). However, curriculum development and program evaluation efforts targeting interdisciplinarity within doctoral education programs are scarcely described and lined with challenges (Holt et al. 2017).

Doctoral students involved in or exposed to interdisciplinary research are often expected to develop and harness both disciplinary and interdisciplinary competencies, as well as to understand and master diverse knowledge bases (Dooling, Graybill, and Shandas 2017). Little is known about the experience of doctoral students as they navigate between disciplinary boundaries and interdisciplinary educational contexts during their studies. In order to shed light on how these programs can contribute to the preparation of students for interdisciplinary endeavors within the broad field of aging and health research it is of great interest to explore how interdisciplinary doctoral education is perceived by students. Along these lines, this paper aspires to contribute with new knowledge and insights with potential to nurture the development of ongoing and future initiatives in doctoral education, primarily within aging and health but also in related fields of inquiry.

### ***Definition of interdisciplinarity***

In this paper, we use interdisciplinary education and learning activities to denote the interaction and changes in understanding that occur when students from different backgrounds come together and learn from, with and about each other in research on aging and health. In applying this approach, we take advantage of diverse disciplinary backgrounds as they exchange, expose and harmonize theories, models and methods with each other. We refer to problem-oriented interdisciplinarity, which addresses complex problems of societal relevance where discipline-related issues are less important (Jobst 2002).

### ***Study aim***

This study aimed to explore doctoral students' perceptions of what it means to be part of an interdisciplinary graduate school. The overall ambition was to describe the establishment and development of an interdisciplinary graduate school, using the Swedish National Graduate School for Competitive Science in Ageing and Health (SWEAH) as a case example. Moreover, we conclude by exploring the implications of the results and provide recommendations for HEI and supervisors who are tasked with preparing junior researchers for careers in interdisciplinary research on aging and health.

### ***Graduate schools in Sweden***

To enhance recruitment and the efficiency of doctoral education programs, the Swedish government has invested in the development of graduate schools and made significant changes to regulations during the latest decade (Swedish Government Inquiry 2004; Elmgren et al. 2016). Doctoral education programs aim to prepare junior researchers for employment in the wider societal job market. In the Swedish higher education

system, doctoral students apply for positions in open competition and receive full-time salaries for four years of studies. Additionally, state-funded universities do not charge any tuition fees. Graduate schools that incorporate interdisciplinary and networking aspects started to appear in Sweden during the 1980s and increased in number during the 1990s. This development of multi- and interdisciplinary graduate schools is a current and evolving trend. Yet, at present in Sweden subject- or discipline-specific graduate schools still are most common, and the prerequisites for the development of graduate schools differ among faculties and HEI across the country (Swedish Higher Education Authority 2020). Moreover, the definition of what a graduate school actually is remains very broad, which adds to the complex national picture.

### ***The establishment and development of SWEAH***

The establishment of SWEAH in 2014 was a novel initiative to form an interdisciplinary, national (rather than only institutional), collaborative and student-driven graduate school, financed by the Swedish Research Council. The overarching goal of SWEAH is to promote networking and ensure access to a base of researchers for future studies within aging and health, thus addressing today's challenges in the area of active and healthy aging. SWEAH engages doctoral students, supervisors and postdocs at 16 HEIs across Sweden – work that is coordinated by one of the partner universities – and provides an interdisciplinary doctoral education program in aging and health. A maximum of 50 doctoral students can participate during the same time period. To date, 78 PhD students have been affiliated with the program, 31 of which had graduated as of June 2020.

SWEAH does not hold any student positions. It instead serves to complement and provide added value to the disciplinary education programs provided by the students' home HEI. The home HEI actually employs the students and provides supervision. SWEAH offers unique opportunities for interdisciplinary courses and learning activities. Students are thus trained for future careers and interdisciplinary research, thereby responding to societal demands and current research policies (Swedish Government proposition 2020).

### ***Conditions, policies and boundaries of SWEAH***

SWEAH is governed by a board that meets 2–3 times per year. The board is led by an external chair, that could be a former politician or a senior academic engaged in ageing matters. The board includes partner representatives, i.e. academic staff and doctoral students' external members represent the public and ageing organizations, with an interest in research on ageing and health and one member who is a scientific expert on higher education. The board is responsible for the budget, quality assurance and initiation and follow-up of strategic plans concerning e.g. selection of courses for funding, and affiliation of new partners. The operational management team consists of a coordinator, study coordinator, and administrative and communications officers. A curriculum group consisting of representatives from a partner HEI, pedagogical experts, doctoral students and the SWEAH operational management team develops core curriculum courses and other learning activities. In addition, an international external advisory board (EAB), internationally composed group of academic experts within

higher education, has been engaged twice, acting as ‘critical friends’ to help SWEAH optimize its activities.

Doctoral students who are involved in research on aging and health and interested in interdisciplinary research at a partner HEI can apply for affiliation. Each year SWEAH ordinarily receives 10–20 applications from doctoral students representing a variety of disciplines and subjects. An expert group recommends or rejects applications based on the applicant’s motivation and the relevance of their thesis project for interdisciplinary research on aging and health. Normally, the annual number of new affiliations is around 10–12 doctoral students. After a decision is made by the board, the doctoral student, his/her main supervisor and department head sign a learning contract, which regulates engagements and obligations. Affiliated doctoral students are required to enroll in at least two of SWEAH’s core curriculum courses and to participate in other organized learning and networking activities. To meet the challenges presented by the geographical dispersion of students, an online learning platform constitutes a crucial tool. The students gather for two student days per year, which are planned in cooperation with the student representatives and hosted by a different partner HEI. Each affiliate gets an annual allowance for costs related to the learning process and the thesis project (currently SEK 20,000, USD 2,300 per year). In addition, affiliates are able to apply for travel grants for international research exchange. Affiliates are also required to submit an annual report, including information about their learning activities and personal reflections on the support and contribution of SWEAH.

### *Main learning strategies and principles*

SWEAH offers interdisciplinary courses and learning activities, such as workshops and seminars, tailored to different research traditions (Table 1). The pedagogical principles use modern social and practice-oriented theories of learning (Biggs and Tang 2011). In an effort to provide students with the opportunity to acquire knowledge and skills useful for their future career as a researcher, their own experiences constitute an essential

**Table 1.** Overview of the learning activities offered by SWEAH.

Core curriculum courses for doctoral students, 3 credit points	Other scheduled learning activities for doctoral students	Postdoctoral learning support <sup>a</sup>	Postdoctoral course <sup>a</sup> , 5 weeks of full-time work spread over 10 months
Theories of aging	Additional courses in cooperation with partner universities	Assistant course leader for core curriculum courses	From junior to senior researcher in research on aging and health, followed by a mentor program
Gerontology, from multidisciplinary to integrative perspectives on aging and capability	SWEAH conference 2019, arranged and performed in collaboration with students	Assistance to the study coordinator	
Theoretical perspectives on methodological choices in research on aging and health	Biannual student days, addressing different themes and hosted by partner universities	Responsible for PhD student activities and member of the planning group Chair of SWEAH planning group Conference 2021	

<sup>a</sup>To give the full picture of the scope and program of SWEAH, while not addressed in the present study this overview includes the postdoctoral facet of the Graduate School.

basis for their learning process. That is, active learning that enhances students' higher order thinking and metacognitive skills and stimulates motivation, as well as creative, critical and problem-solving thinking, is promoted (Brodin 2016; Sinclair, Barnacle, and Cuthbert 2014; Mantai 2017). To ensure that SWEAH is truly a student-driven, creative and collaborative endeavor, a structure for student engagement has been developed. As student representatives are being part of the formal academic work through engagement in the board and operational groups, SWEAH students influence and take an active part in strategic decisions and course development, supporting their academic career development (Walker et al. 2008). While not addressed in the present study but mentioned here to give the full picture of SWEAH's scope and program, the Graduate School includes a postdoctoral program, which aims to prepare and support junior researchers to become independent senior researchers (Table 1).

### *Rationale for interdisciplinary learning activities*

Based on SWEAHs pedagogical principles and social and practice-oriented theories of learning, the doctoral students study how the interplay between theoretical and methodological perspectives impacts the understanding of aging within different research fields. Lectures, workshops, seminars and self-studies are examples of developmental, active and motivating learning activities, also involving peers and colleagues (Mantai 2017). In their assignments, students must demonstrate a systematic and thorough understanding of the interdisciplinary nature of aging research and how to apply that in their own and fellow students' research. That is, the ambition is to offer a variety of development opportunities, stimulate creative and critical discussions as well as problem-solving in both formal and informal learning situations (Brodin 2016; Sinclair, Barnacle, and Cuthbert 2014; Mantai 2017; Walker et al. 2008). Assignments based on the students' own experiences involve analyses of their thesis work where strengths, weaknesses and the potential for cross-fertilization are illuminated. In accordance with SWEAH's strategies and principles, interaction including peer-review is often used. Students jointly engage in critical discussion of the possibilities and limitations of their work and provide constructive feedback on the theories applied in their fellow students' work from other disciplines and research specializations in order to enhance the shaping of their research identity (Mantai 2017; Rashid 2021).

For the purposes of the present study, targeting doctoral students' experiences of being part of an interdisciplinary graduate school, we focused on the students' perspectives as expressed in written documentation collected as part of their graduate school experience. Guided by the following research questions we explored their perceptions, beliefs, opinions, goals and values in their applications to SWEAH and during their time in the SWEAH program:

- How did doctoral students experience their own engagement and learning in the collaborative, interdisciplinary context of SWEAH?
- What goals, values, experiences, beliefs and actions were described by the doctoral students?
- How did doctoral students describe the contribution of SWEAH to their preparation for interdisciplinary research?

## Method

### *Procedure and material*

Inspired by a case study approach described by Yin (2003), the dataset of multiple written sources was collected from 78 doctoral students in the form of applications, self-reports and evaluations over time (all written in English), subsequently merged into one case study. For details on and the proportion of documents reviewed, see Table 2. Since students engaged in different courses and events matched sets of students were not possible to achieve. Rather, the unit of analysis consisted of all 78 students' open-ended answers and reflections reflecting the students' own experiences and perceptions of opportunities and challenges during different stages of their SWEAH affiliation. Doctoral students enrolled in the context of SWEAH come from different partner HEI and represented a diverse range of research subjects as well as age groups and sex, which is described in Table 3.

The author constellation consists of the coordinator of SWEAH, the former study-coordinator and an expert in higher education (also part of the board of SWEAH). The present study-coordinator, a SWEAH alumna and one member of SWEAHs EAB (expert in higher and doctoral education) are additional co-authors.

### *Data analysis*

The first (CL) and second author (MH) (former and present study coordinators for SWEAH) applied the stepwise procedure for a semantic thematic analysis according to Braun and Clarke (2006). First, both authors read the self-reports to become familiar with the data. This was followed by an initial coding step to describe students' experiences, goals, beliefs and actions. Aspects that appeared frequently in the students' written statements formed initial codes and were then discussed between the two authors. In the next step of the reading of the self-reports, the initial codes were used as a lens to search across the entire dataset to find repeated patterns and (semantic) meanings. Notes generated a transparent analysis scheme, including merging of codes and creation of preliminary themes. Codes and preliminary themes were discussed

**Table 2.** Overview of data sources that were used to analyze SWEAH students' experiences, perceptions and opinions.

Data source	Number (n/out of possible n)	Response rate (%)	Time of collection
Motivation for applying to SWEAH <sup>a</sup>	78		Before affiliation to SWEAH, 2014–2020
Progress reports <sup>b</sup>	68		Annual reports, 2015–19
Course evaluations <sup>c</sup> (based on 6 courses evaluations)	77/ 112	50–80	After course completion
Final evaluation <sup>c</sup>	20/28	71	After thesis defense
Evaluation after 8 student days	149 /187	56–90	Biannual events, 2016–2020
Evaluation after SWEAH's scientific conference <sup>c</sup>	15/ 25	60	One occasion, 2019

<sup>a</sup>Freely formulated personal motivations were used. Compulsory for all applicants according to guidelines in the affiliation call.

<sup>b</sup>Responses to one open-ended question reflecting students' descriptions of engagement and SWEAH support during the year were used. Compulsory for all students that were active in SWEAH during the year.

<sup>c</sup>Three open-ended questions reflecting students' values and suggestions were used.

**Table 3.** Characteristics of doctoral students affiliated with SWEAH during 2014–2020; number of partner universities represented each affiliation year and doctoral students' research subjects.

Year of commencing affiliation	No. of affiliated students	No. of men/women	Age range	No. of partner universities represented <sup>a</sup>	Research subjects for doctoral studies <sup>b</sup>
2014	13 <sup>c</sup>	3/10	32–55	6	Health and Medical Sciences, Social Law, Medicine and Biomedicine, Epidemiology, Gerontology, Social Work, Packages Logistics, Information and Communication Technology
2015	11	1/10		5	Odontology, Nutrition, Sociology, Psychology
2016	19	1/18	30–42	7	Social and Welfare studies, Geriatric Epidemiology, Health Sciences, Health Care Sciences, Neurobiology, Psychology, Clinical Medicine, Biomedicine, Computer Science and Engineering, Social Gerontology, Neurobiology, Physiotherapy
2017	9	2/7	29–52	5	Psychology, Neuroscience, Geriatric, Occupational Science, Geriatric Epidemiology, Social Gerontology, Medical Science, Health Science
2018	9 <sup>c</sup>	3/6	29–41	5	Social Science, Social work HR, Health Science, Medical Science; Neuroscience, Medicine, Medical Science; Neurobiology
2019	7	2/5	28–37	6	Health Science Gerontology, Nursing, Health Sciences, Epidemiology, Ageing and Social Change, Political Science, Health Sciences; Occupational Therapy
2020	10	4/6	26–37	7	Disability Science, Health Sciences, Health Sciences Gerontology, Geriatric Epidemiology, Medicine, Molecular Epidemiology, Health Care Sciences, Communication, Civil Law
<b>TOT</b>	<b>78</b>	<b>16/62</b>			

<sup>a</sup>Out of a total of 16 SWEAH partners.

<sup>b</sup>According to OECD classification.

<sup>c</sup>Two students affiliated 2014 and one student affiliated 2018 terminated their SWEAH affiliations and contracts.

between CL and MH and then revised. The next step involved identifying possible patterns and themes from the codes across all documents, which was jointly conducted by the two authors. In order to establish trustworthiness, another author (CM; SWEAH alumna) was engaged in a subsequent step to discuss and agree upon the final theme presentations. As a final step, the remaining co-authors read the emerging findings and provided critical comments for optimization of the analysis and the evolving text. The presentation of the findings was organized in three themes (The learning environment, Drivers of affiliation, and Network building and networking) with two sub-themes each. Themes and sub-themes are reported in this paper and illustrated with exemplifying quotes to illustrate and contextualize the findings.

### Ethical considerations

According to current Swedish legislation regarding formal ethical approval, such cannot be obtained for this kind of research. Nevertheless, we followed the principles of the

Helsinki declaration for research involving humans, to the extent those were applicable for the present study. For example, informed consent to use the material in the present study was obtained from all doctoral students whose written material was used, the identities of students were removed, and all data were treated with confidentiality.

## Findings

### *The learning environment*

#### *The framing of SWEAH enhances interdisciplinarity*

The doctoral students perceived SWEAH as a platform for interdisciplinary interaction. They emphasized the importance of being involved in a creative, stimulating interdisciplinary learning environment and reported that they were able to gain new, broader and deeper perspectives on their thesis work and future research. The interdisciplinary learning opportunities within aging and health were highly appreciated by the majority of informants. Some students reported that the courses provided greater insight through the use of research literature that they likely would not have encountered without SWEAH. The findings reveal that students valued the presentation of syntheses of theoretical approaches and the new theoretical knowledge acquired through the courses, though this was seen as a challenge by some of them. Students reported that the experience of presenting, articulating and discussing their own and others' research in an interdisciplinary environment was invaluable for increasing their confidence as researchers. Reflecting upon conceptual definitions and theoretical backgrounds supported their critical thinking. However, some discussions between students were characterized by polarized or opposing views, and senior teachers with experience in interdisciplinary research then needed to clarify and explain. Other informants highlighted the importance of being part of a well-established network and learning how to take the right approach, communicate and cooperate in an interdisciplinary context. As one respondent describes:

*I believe that a multi- and interdisciplinary context is important. To see things from different angles enriches the research. Partly due to the fact that more things are taken into account, but also when different disciplines come together, new questions arise and perspectives are broadened (motivation for applying for affiliation, 2015).*

Some students emphasized that their personal experience and research perspectives contributed to SWEAH's interdisciplinary approach and increased their overall understanding and knowledge. In addition, students valued the opportunity to meet in new arenas outside their home universities and the exposure to new perspectives. As mentioned by one SWEAH student after an interdisciplinary student day:

*I think I can learn a lot and maybe also contribute with my own experience and knowledge. I feel there is a lacking component in my current PhD program although I work with very competent researchers, I need more input, and as a fairly new student, it is sometimes difficult to find the courage to reach out to the aging research community for additional expertise (evaluation after student day, 2017).*

Prior to commencing the affiliation, some concerns were expressed regarding the challenge of meeting the diverse wishes within an interdisciplinary environment. In the

beginning of their affiliation, some students expressed that it took some time to become acquainted with the mission of SWEAH and how they could contribute. Some felt insecure about what to expect, as expressed by two students:

*It will be challenging to meet the needs of a very diverse group but very important for the school to be relevant for all whom [sic] are affiliated.*

*The participants are very varied ... it does seem to pose a possible difficulty to provide courses that can be directly useful to all participants in SWEAH (evaluation after student day, 2016).*

### **Building confidence through tailored learning methods and activities**

The students emphasized the importance of the opportunity to attend tailored courses, workshops and lectures with a specific focus on aging and health. They reported that the courses were instrumental in deepening their knowledge and broadening their perspectives on aging research and methodologies. Some students reported that learning activities that used a peer-review approach and small group discussions were beneficial and increased their interest and motivation to seek additional knowledge outside the scope of the courses. In addition, the experience of presenting their work to fellow students provided some with increased self-confidence. It was seen as a very valuable experience to be part of an inclusive and positive environment, getting feedback and enhance critical thinking. As said by one student:

*I have attended some of the SWEAH courses during previous years, which have given me tools and new ways of thinking and working with aging and health (progress report, 2018).*

A few newly affiliated students described the student-driven learning approach as challenging. What it meant and implied and what expectations they could have on the content and structure of the interdisciplinary learning environment. Personal changes in terms of growth into the environment of SWEAH and increased engagement over time are also described, illustrated by the following citation:

*This year, I have felt a lot more involved in and a part of SWEAH, and it has been very clear to me what it can mean to be a part of a graduate school like this (progress report, 2019).*

Several student evaluations show that they developed a holistic view of the research area, which contributed to a 'SWEAH spirit' where the arsenal of learning activities, structure and organization contributed to becoming a better and more confident researcher.

*The courses offered by SWEAH also provided valuable opportunities for me to gain knowledge beyond my own research area and to get familiar with other research fields and methodologies. All these experiences have helped me get a broader picture of aging and health in general, which was definitely useful for writing the introduction and discussion of my thesis (final evaluation after thesis defense, 2019).*

### **Drivers of affiliation**

#### **Value-driven motivation – ensuring increased competencies**

Some informants stressed that the long-term benefits of their affiliation were increased competencies and the ability to address societal challenges and complexities from a broader, interdisciplinary perspective. They emphasized the importance of improving

health and social services for older people on the societal level. SWEAH was seen as a good environment for in-depth discussions and an avenue for future collaboration between professions and cross-border research. Several informants highlighted the ability of SWEAH affiliation to make research on aging and health more visible, to generate new research ideas and drive the overall development of the field forward:

*Building a network among students and researchers from strong Swedish universities and institutes, SWEAH will strengthen and increase visibility of the important aging research that we are conducting (application for affiliation, 2019).*

### **Instrumental motivation – personal growth and increased independence**

Students reported that their research areas demand an increased knowledge base and interdisciplinary perspective, which was a driver of their desire to be part of the graduate school. They reported personal benefits, such as access to valuable feedback and input for their research, and that their disciplinary and methodological comfort zones were challenged. As two students described:

*To meet others in Sweden with the same questions I have and how are they dealing with that is very helpful (evaluation after student day, 2017).*

*For me, it is a challenge to go out my comfort zone and to discuss and take other perspectives (course evaluation, 2017).*

Access to aging research and insight into national and international developments in the field were considered important aspects of the instrumental motivation for affiliation. Students also highlighted the importance of being a part of a learning environment without their supervisors, creating a network of their own and forming their own opinions and insights about theories and methods, also for the upcoming postdoc period.

*I very much like SWEAH to be an extra “contact area” away from my research team. It gives me the opportunity to explore radically different ways of looking at what I am doing with the supervisor not there (evaluation after student day, 2019).*

Several informants described the advantage offered by access to extra funding for conferences and other events, which helped them pursue the interdisciplinary research field. As part of their early career development and learning, they were thus able to gain new, broader and deeper perspectives on their PhD work and future research.

*... the financial support from SWEAH has made it possible to attend congresses, purchase literature and receive financial support for language review before submitting articles to scientific journals. The opportunity to attend congresses has also created an arena where contacts with other researchers in the same area could be linked. Thus, the support from SWEAH has facilitated the research activities and made them smoother (evaluation after student day, 2019).*

### **Network building and networking**

#### **Strategical networking is imperative for the future**

The networking opportunities within SWEAH were highly valued by all students. Some perceived that networking would be imperative for building up their own academic

networks rather than being dependent on their supervisors for network building. They valued opportunities to establish national and international contacts that could nurture future collaborations and career development.

*I have formed a network of fellow aging researchers. This network might not have helped me so much in my PhD studies, but I am sure it will prove very valuable in my future research career (final evaluation after thesis defense, 2020).*

### **Personal networking leads to increased insights and confidence**

Some students reported that their personal development regarding networking was a valuable experience. The ability to meet and share ideas, thoughts and experiences in an informal, social context provided and facilitated by SWEAH was seen as a positive element. These networking opportunities could be a revelation and source of inspiration, facilitate new insights and provide confidence in the pursuit of a career in aging and health research. When informants reflected on this after graduation, they discussed the value of the network they had built up during their studies.

*The networking is always the most valuable – that is, networking plus lectures. I think it is the combination of learning activities and to get to know and socialize with the others. And not to underestimate that we get to visit other research groups in Sweden (after defense, 2019).*

*It would be great to keep in contact and networking with SWEAH in the post-doctoral research as well (after defense, 2020).*

## **Discussion**

Our findings reveal that the affiliation with a national, interdisciplinary graduate school is highly valued by doctoral students. The graduate school contributes an extra dimension or layer of learning in an environment characterized by informational, social and emotional support – the ‘SWEAH spirit.’ The findings demonstrate how the doctoral students navigate between disciplinary and interdisciplinary contexts and become enculturated into the graduate school context with a shared intellectual mindset and shared understanding of the importance of community and network building as part of the academic trajectory of early career researchers.

Interestingly, they emphasize the possibility to interact with PhD students and researchers with different disciplinary orientations, independently from their supervisors, which seems to be an important driver towards self-confidence and a deepened interdisciplinary understanding. This facet of the findings relates to the importance of community building and align well with US studies around socialization into researcher communities (Gardner and Mendoza 2010) and the formation of intellectual communities (Walker et al. 2008; Mantai 2017). Where previous studies have focused on community building within disciplinary environments, our study adds to the literature by showing how community building within interdisciplinary environments is equally important and, more surprisingly, equally possible.

In accordance with Rashid (2021), SWEAH students place high value on the interdisciplinary learning environment, which permeated all three themes of the findings. These contrast with the uncertainty and stress among doctoral students in other

interdisciplinary environments reported by Brodin and Avery (2020) and Turner et al. (2015). It has also been shown that students in such environments may feel a lack of cohesion, uncertainty about expectations and that they do not really belong anywhere (Boden, Borrego, and Newswander 2011; Gardner et al. 2012). This was not found in the present study. Overall, the SWEAH students emphasized the importance of the interdisciplinary nature of the program. This is likely because many of them have a mono-disciplinary context at their home universities, and the mix and complementarity added by SWEAH is seen as an asset rather than a threat. That is, the SWEAH activities do not necessarily interfere with mono- or multidisciplinary ambitions within the PhD thesis projects as such. As demonstrated by the findings (e. g., in the sub-theme valued driven motivation) the graduate school provides an interdisciplinary context on the overall level that supports the development of confidence as a researcher when exposed to the perspectives, theories and methods of other disciplines. Moreover, there is considerable variation among the PhD students as to what extent they bring in interdisciplinary perspectives in their projects. One interpretation is that the efforts made to consciously design and facilitate a cohesive environment that challenges existing plans but does not force anybody to groundbreakingly change their PhD projects has resulted in a context that is truly supportive towards interdisciplinarity in the long-term. To what extent this is a valid interpretation cannot be demonstrated unless we follow-up the SWEAH alumni during their postdoctoral career path.

Though students who enter SWEAH come from different backgrounds and with some doubts and hesitations, they describe that they develop new, broader and deeper perspectives that support their critical thinking. It should, however, be kept in mind that as being able to express an ambition to develop interdisciplinary thinking related to their projects is a prerequisite for being successful in the competitive affiliation process, the SWEAH affiliates have a positive mindset in this respect already from the start. That said, the findings nevertheless show that interdisciplinary ambition sometimes is a challenge and concern when it comes to meeting the diverse needs and preferences of different students with various disciplinary backgrounds.

Gibbs and his international team (Gibbs 2015) argued that interdisciplinarity in professional practices, including nursing and social care, is central for an understanding of knowledge practices in professional contexts. The present study shows that this also holds true for research communities. Our study shows that SWEAH helps students create an awareness of opportunities presented by structures beyond their immediate research teams. Specifically, the students perceived a heightened sense of agency and self-efficacy due to their SWEAH affiliation, which motivated them to seek out additional resources and opportunities through student-driven learning, as well as economic, social, interdisciplinary and pedagogical benefits. These findings are well in line with Vitae's Research Development Framework (2010), which is a model based on empirical data suggesting that besides theoretical and methodological knowledge, aspects such as communication methods, collaboration, self-confidence and networking are necessary for a successful career. Efforts have been made to create models that can provide guidance to doctoral programs and support doctoral students in their learning in interdisciplinary research environments, and not least to avoid doctoral education attrition, which is a significant problem in Canadian and US universities (McAlpine and Norton 2006; Bosque-Pérez et al. 2016). McAlpine and Norton's integrative framework of nested contexts

(2006) highlights relationships and factors that influence the outcome of doctoral education. That is, the complexity of navigating between structural realities (institutional and societal demands) and doctoral students' personal perspectives, agencies and nature of learning, which also change over time.

Our findings show that students benefit from various sources and forms of support. A recent study explored the importance of socially embedded support systems in the learning environment of doctoral programs in Denmark and Finland (Cornér 2020). Besides the support from supervisors and research teams, the informal social and emotional support from the wider research community and peers seems significantly important in the ability to navigate challenges concerning interdisciplinary research training (Brodin and Avery 2020; Holley 2015; Mantai 2017). This is well in line with our findings, where students expressed a high degree of appreciation for learning activities that included peer review and feedback from scholars representing different disciplines.

### ***Methodological considerations***

As to the scope of the present study, it should be kept in mind that students' written self-reports constitute only one, albeit most central, source of information regarding the complex matters under study. That is, the students' perspectives should be complemented with those of supervisors and teachers to get a more complete picture. Moreover, due to the study design, it was not possible to examine how individual student perceptions changed during the doctoral education journey. However, former doctoral students from SWEAH are currently being interviewed to collect data for a forthcoming study aiming to explore long-term effects and implications to further expand the understanding of the complex phenomena involved.

The analysis was performed by two SWEAH study coordinators (CL and MH). Given their preconceptions and familiarity with the learning environment, this can be considered both a limitation and strength. On the one hand, they were familiar with the context, but on the other hand, they were potentially biased. Trustworthiness and credibility were ensured through the involvement of one SWEAH alumna (CM) and one member from the EAB (SB), who applied a critical friend approach as co-authors of the present study. Moreover, the findings are based on statements from highly motivated students who were successful in the competition to be affiliated with SWEAH. This might have affected the findings, pointing students towards less critical, more positive responses. While students might have different goals and motivation for seeking affiliation, those who were affiliated perceived SWEAH as supportive for their career development and networking activities. Asking students more complex and integrative questions might reveal other aspects of navigating through and collaborating in the interdisciplinary SWEAH context.

### **Conclusions**

In conclusion, the graduate school used as the case example in this study adds an interdisciplinary layer of learning, influenced by peers and other researchers representing different disciplines, to the doctoral students' own supervisors at their home HEIs. SWEAH strives for interdisciplinarity and influences the students' self-confidence to

navigate and thrive in the cohesive learning environment provided, but has limited opportunities to impact the actual thesis work. Likely, the benefits lay in the potential to foster a future generation of scholars well prepared for interdisciplinary research endeavors beyond what is possible in traditional disciplinary environments.

### **Implications and recommendations**

Lessons learned in the development of SWEAH can inform future interdisciplinary graduate school endeavors, and the strengths and weaknesses identified may be applicable for other learning environments. Based on our findings and experiences, we found that:

- A safe learning environment is important to nurture interdisciplinarity – a community that enables intellectual input, social and emotional support, which supports and enables critical discussions between peers in an inclusive and respectful climate.
- Students need stimulation to enhance relational and situated learning experiences. That is, the creation of opportunities to develop knowledge and skills from interaction with others and to use peer review and the students' own thesis work to build their assignments.
- An online platform is indispensable for a graduate school with national coverage.
- Networking opportunities independent from supervisors are invaluable – ensure that physical meetings are part of the curriculum and do not underestimate the social and informal aspects of networking and community building.
- Student -driven planning is essential, but what this implies is not evident for the students – involve them early on and throughout all planning and evaluation.

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