

Scholarly Learning of Teacher-Scholars Engaging in Interdisciplinary Education

Merel van Goch

Institute for Cultural Inquiry, Utrecht University, The Netherlands

Christel Lutz

University College Utrecht, Utrecht University, The Netherlands

ABSTRACT

Many higher education institutions have put interdisciplinary teaching and learning high on their agenda. We know students learn a lot from interdisciplinary education, and we know scholars learn from their educational scholarship, but what do scholars learn from engaging in interdisciplinary education? I interviewed seven mid-career scholars about what they learned and in what ways their work was appreciated. The findings illustrate that scholars learn about education, students, interdisciplinarity, their own discipline, the university, and themselves, and that the scholars felt their efforts were recognized by their interdisciplinary contexts, but not rewarded outside of those contexts. The study describes academic and personal struggles, pleasures, and joys of scholars starting to engage in interdisciplinary education.

Keywords: interdisciplinary education, teaching and learning, scholarship, scholarly learning, academic teachers, reflection, interviews

INTRODUCTION

“Daunting”, “it has the potential to be fun”, “a learning experience.” When we train academic scholars to teach interdisciplinarity, we invite participants to finish the prompt “Interdisciplinary education is...” These are some of their responses. Scholars’ first endeavors in interdisciplinary education are often outside of their comfort zones. But scholars do undertake these activities, because the experience seems promising, and the scholars are curious about what is to come. Indeed, often when we encounter scholars later, they recall enthusiastic anecdotes of what went well, what went wrong, and what they personally and academically got out of the experience. This sparked our curiosity: what happens when scholars start engaging in interdisciplinary education?

It is known that students gain a lot from interdisciplinary education: they excel in critical thinking, meta-cognitive reflection, problem-solving and analysis, and higher order thinking skills (see, for example, Haynes & Brown Leonard, 2010). There is an abundance of literature focusing on the teacher in interdisciplinary education: practical handbooks on how they should teach (e.g., Boor et al., 2021; De Vink et al., 2017) and theoretical works on why that is the case (e.g., Frodeman et al., 2017). We also know that teaching is a learning experience for scholars, as well as interdisciplinarity in itself (Neumann, 2009). Yet what the scholar learns from engaging in interdisciplinary education remains an underexplored research topic. This study therefore explores the research question: what do scholars learn from engaging in interdisciplinary education? We interviewed seven mid-career scholars on what they learned from their first endeavors in interdisciplinary education.

The ones who teach – here, the scholars – should not be overlooked in educational research (Neumann, 2009; Biesta, 2017). The term scholar is used deliberately in this text. There are many ways to refer to the people working in higher education. When focusing on education, they could be called faculty members, teachers, scholars, teacher-scholars, professors, lecturers, staff, or educators. They can be called researchers, scientists, practitioners, or assistant/associate/full professors. These various terms have origins in different areas of focus, disciplines, and geographical locations. Here, we use scholars, to emphasize the full breadth of work in the academe. While their teaching is the motivation for and the focus of this research, we take a broader faculty development perspective on these scholars and regard their work in research and teaching as potentially integrated (Lutz, 2022).

Anna Neumann’s (2009) influential work on scholarly learning provides the base of this research (and hence, this article does not focus on professional learning, situated learning, or instrumental learning, even though these are also relevant topics in this context). Neumann interviewed scholars to examine what

aspects of their work provided learning for them. Surprisingly – but not surprising perhaps to those who teach (Berg & Seeber, 2018), her participants turned out to learn a lot from teaching: “(...) participating professors associated their scholarly learning with their research activity. Yet a larger number of them related their scholarly learning to their teaching (90% or more)” (p.116). Neumann concludes: “(...) professors’ teaching – of graduate and undergraduate students – may be a richer location for their scholarly learning than is their research.” (p.118). Interdisciplinarity is mentioned in this work, in relation to research: scholars learned from interdisciplinary research as challenges to habits of mind and due to the novel social interactions (p. 195).

But what about interdisciplinary education? That research and education are related – not only in general, but also in scholars’ realities – is described by Ernest Boyer (1990, 1996). He defined four types of scholarship which are related to each other: the scholarship of discovery, the scholarship of integration (i.e., interdisciplinarity), the scholarship of application or engagement, and the scholarship of teaching and learning.

Interdisciplinary education is education in which a complex topic is addressed from the viewpoints of more than one discipline, and/or in which interdisciplinary research is taught (Van Goch, resubmitted; Newell, 2009; Spelt et al., 2009). More and more higher education institutions put interdisciplinary education on their agendas, either developing new interdisciplinary programmes, courses, or lectures, or modifying existing education into more interdisciplinary approaches. As collaborators on other projects on liberal education and on faculty development we agreed on the importance of understanding scholarly learning that happens in the context of interdisciplinary teaching and learning.

Exactly because interdisciplinarity is so ubiquitous in higher education institutions nowadays, it is important to look into what it brings the people who deliver it. This research explores the question: what do scholars learn from engaging in interdisciplinary education? This is a descriptive, exploratory analysis; a first inquiry into this matter. It contributes to our current understanding of scholarly learning, and of interdisciplinary teaching and learning, and thus to the fields of scholarly learning, interdisciplinarity, education and faculty development.

This is the last article in the current special issue on “travelling concepts in interdisciplinary education.” Although the focus of this special issue is on travelling concepts (Bal, 2002) in the interdisciplinary classroom, travelling concepts do not take centerstage in this article: the scholars do. Their journeys and experiences working with and reflecting on travelling concepts in interdisciplinary education provided a rich context which allowed us to examine their learning. Our perspectives are that of insiders on the outside. As a scholar of interdisciplinary education (first author) and of faculty development (second author), we share an

interest in what students and scholars learn in the context of teaching and learning, and interdisciplinarity is a specific context in which learning seems to be magnified. We have ample experience in interdisciplinarity education, as teachers, researchers and consultants, training individuals and groups. Here, we interviewed our peers to explore what they learned from their first endeavors in interdisciplinary teaching and learning.

METHODOLOGY

Participants

To address our research question, the first author interviewed seven mid-career scholars who were experimenting in interdisciplinary education and reflecting on it in preparation of the current special issue. These scholars participated in a workshop in preparation of this special issue on travelling concepts in interdisciplinary education. Throughout the research process, the first author read their abstracts, drafts, and final articles to re-acquaint herself with their education practices, but these written artefacts were not used for this analysis, since our focus is the scholars' learning, and the focus of the articles is their education practices. Their teaching provided the context, and we were more interested in their own experiences than in the teaching itself. We therefore did not focus on travelling concepts.

The scholars were assistant or associate professors at the time of the interviews. Participants all taught at the same research-intensive university, yet they came from various disciplines: humanities, social sciences, and the natural sciences were all represented. They engaged in different types of interdisciplinary education (sizes ranged from a whole programme or minor, to a course, lecture, or activity) and at different levels (bachelor, master, honours). The reasons for engaging in interdisciplinary education were top-down for some scholars and bottom-up for others: for some scholars it was part of their main duties (e.g., they were hired to develop interdisciplinary education), and for others it was something they did next to their main duties (e.g., they sought funding to design new interdisciplinary education, or they implemented interdisciplinary parts into existing education). Some scholars were compensated for the time they spent on interdisciplinary education (as much as 0.2 fte), others 'did it in their own time', meaning they did it on top of their other work engagements. They self-reported as being 'beginners' in interdisciplinary education, and their experience in interdisciplinary education ranged roughly from 0 years to 5 years.

The scholars did not receive any compensation for their participation in this study. Ethical approval for this project was granted by the ethical committee of the Faculty of Humanities, Utrecht University; all participants gave their consent. Inclusion criteria were merely participation in the making of this special

issue. We consider this to be the first exploration of this research topic, which is why it is appropriate that all participants are from the same context; later research could look into the wider context and, for example, compare disciplines, different career stages, or different geographical locations. This study did not set out to do that: we were looking for commonalities, not differences.

Data were collected in the summer of 2021 over the course of three weeks, online via MS Teams. At this moment in time, most interventions had taken place, and the scholars had started writing the chapters. Since we talked about the content of the chapters, which was also the topic of the first author's research, the interviews could be seen as an intervention in themselves, making the scholars aware of their scholarly learning in this situation.

Researcher integrity

This special issue is created by the education committee of the Utrecht Young Academy, a network of early-career scholars interested in academia, policy and society, of which the first author is a member. Members of this committee know each other well. Throughout the research process, the first author reflected on her position as a researcher, and her subjectivity and its influence on the research. Her prior understandings of interdisciplinary education, both as teacher and researcher enhanced the research. Both authors have ample experience with interdisciplinary education, both as teachers and as researchers. We are interested in the topics of scholarly learning and were interested to apply this topic to this sample of people starting to experiment in interdisciplinary education. During the interviews the first author took the role of interviewer, rather than that of expert in interdisciplinary education, and she therefore did not, for example, contradict interviewees. The research was primarily conducted by the first author (design, data collection, analysis, writing), and she consciously reflected on her role during data collection, analysis and the writing phase, using field notes and a research journal. Throughout the research process, the first and second authors discussed the findings, possible codes and themes.

The analysis inherently did include our reflections on certain topics. The findings section of this paper includes excerpts of the data for demonstration purposes. Participants provided feedback on the final paper: they read the final version of this article and gave their approval.

Data collection procedures

Semi-structured interviews were used as a method (Braun & Clarke, 2013), because this was designed to be a descriptive, exploratory study. Ensuring that everyone got asked the same questions enabled us to get a good grasp on the matter. The data collection protocol was developed based on our own experience (which

questions generate elaborate, reflective answers) and on the literature on scholarly learning. The order in which the questions were asked was roughly the same for every interview:

- Why did you develop this intervention?
- How different is this from what you normally do?
- What have you learned about education?
- What have you learned about students?
- What have you learned about interdisciplinarity?
- What have you learned about your discipline?
- What have you learned about the university?
- What have you learned about yourself?
- Do you feel like your efforts are recognized and/or rewarded?
- What surprised you? What would you have liked to know before?
- Is there anything else you would like to discuss?

Before the interviews the first author re-read the abstracts of the articles that the scholars wrote for the current special issue, but these were not used as data. Interviews took 45 minutes to one hour on average; they were recorded on audio and then transcribed.

Analysis

We used a reflexive thematic analysis approach to identify patterns of meaning in the experiences of the scholars. The process of analysis was guided by the thematic analysis phases of Braun and Clarke (2006, 2013, 2021). In all stages, the first and second authors discussed the findings, possible codes and themes, moving back and forth between the six analysis phases.

The first author familiarized herself with the data by immersion (reading the transcriptions and field notes over and over) and critically engaged with the data. Before the analysis she read the drafts of the articles, to re-familiarize herself with the interventions. Throughout this phase she kept adding to her research journal. When she felt she had a good grasp of the data, she moved to the next phase, of data coding, using NVivo. The study's aims were explorative and most of the initial codes were quite semantic. The approach was mostly inductive; she did not work with pre-set codes, but rather the codes were identified in the data. Sometimes codes were deductive, for example when participants mentioned certain didactical or pedagogical strategies. Most codes were semantic, some were latent. Units of analysis differed in size: some were sentences, phrases, words. She also wrote topic summaries per question. This was helpful to immerse herself even more in the data. She then identified themes, and decided to keep the division

between interview topics, because of the exploratory nature of this study. She then developed candidate and final themes, staying close to the data.

When we felt comfortable with the final themes, we moved forward to the writing stage. At this point the scholars had finalized their articles, which we re-read and compared to our analysis of our interviews. During the writing stage, the first author presented this work at two conferences, for different audiences, which helped us reflect on the data, the study and its aims even more. We realized that these data can be useful for different audiences and thus can be analyzed in different ways, with different foci. We decided to stay close to the initial idea of focusing on the scholars and their learning, and, for example, not generating recommendations for faculty developers and higher education institutions for now.

FINDINGS

This section presents the findings on what scholars learn from engaging in interdisciplinary education, generated by interviews. The findings are arranged according to topic (learning about education, students, interdisciplinarity, their own discipline, the university, themselves, and recognition) and are illustrated by direct quotes or paraphrases from the interview data.

What the scholars learned about education

What the scholars learned about education can be divided into two themes: *the need for other didactical and pedagogical approaches* and *the role of teaching in scholarship*. Scholars said they had experienced that interdisciplinary education calls for other didactical and pedagogical approaches than what they previously had been doing, as well as how interdisciplinary teaching and learning differs from that within one discipline. This ranged from specific examples such as teaching activities (“activate a frame of reference before you do anything else”) and evaluation (“evaluate as soon as possible and be honest about it, be open to improvement.”), to more general insights such as: “Create a safe, excited, enthusiastic atmosphere. Trust in the excitement of the encounter. Plan for spontaneity.”

Their experiences in interdisciplinary education made the scholars reflect on the role of teaching in their scholarship. For example, one scholar said:

Interdisciplinary education encourages you to relate your work to other courses and disciplines, to make bridges. You should look at other syllabi in an active manner. Talk to colleagues. It’s very informative to see colleagues teach. Monodisciplinary education would also benefit from this, but there is less reason to do this there.

Another scholar discovered the interdisciplinary in their own, disciplinary teaching. They regarded their teaching as monodisciplinary, but by gaining more experience in interdisciplinarity, they discovered that their discipline is more broad than they previously thought.

One of the scholars reflected deeply on the impact teaching can have on scholars:

Teaching is always a place of anxiety, a place of putting yourself in a vulnerable position. Because you never know when a student in class will actually know more or know different or understand better or whatever than you, which is actually nice, speaks to the intelligence of our students. But when you do this interdisciplinary teaching, there's also the cultural component.

'Cultural', here, was synonym for different disciplines, or fields or cultures within the university or academia. This scholar felt very strongly that this should not be merely the responsibility of the scholar themselves:

If we want interdisciplinary education to succeed between fields distant from each other, we need to address this aspect of training and personal development of teachers in higher education.

What the scholars learned about students

What their experiences teaching in interdisciplinary education taught scholars about students can be roughly divided into three themes: *a broader view of the student body*, *recalibrating the role of the teacher*, and *the right time and place for interdisciplinarity*. Scholars encountered a variety of students in their interdisciplinary teaching environments, which changed their views of the student body. As one scholar put it: "There is not just one higher education student. There are several."

The broader view of the student body made scholars reflect on the students they had taught before, in their disciplinary teaching. One scholar now "discovered there are fun students and that [they] like working with them." With the word 'fun', they meant: "curious, skilled, ambitious, smart, creative, tenacious students, with perseverance, a lot of brainpower, the ability to have a helicopter view, and who are abstract and conceptual thinkers." This scholar had not encountered these kinds of students before, even though they had been teaching for a long time.

Regarding recalibrating the role of the teacher, scholars reflected on how they had been teaching before, and how their interdisciplinary experiences differed from that, and how this influenced each other: "Students can do way more than

you think. You don't have to micromanage them. This is also relevant for my disciplinary education; I'll give them more ownership there too." This scholar was surprised to find that they underestimated their interdisciplinary *and* disciplinary students.

Scholars also reflected on the right time and place for interdisciplinarity: "Interdisciplinarity may not be for everyone. You need basic knowledge about what disciplines are and what your discipline is before you can understand and apply interdisciplinary lenses." This scholar advocated for giving students the chance to grow a solid base in their discipline, as well as a grasp of disciplines in general, before introducing them to interdisciplinarity. Another scholar acknowledged that there may not be one suitable moment for the whole group: "For the majority it's not going to be life-changing. I do it for the one student who will have an aha-moment. That's what it's about."

What the scholars learned about interdisciplinarity

When it comes to what scholars learned about interdisciplinarity, identified themes were: *time and effort*, *conditions for interdisciplinarity*, and *affect and emotion*. Some scholars talked about interdisciplinarity in general, including transfer from teaching to other parts of scholarship – one scholar exclaimed enthusiastically that engaging in interdisciplinary education "opened [their] view to consider interdisciplinarity in [their] research." Others solely talked about interdisciplinarity teaching and learning. Scholars acknowledged that interdisciplinarity is difficult and takes time, both for the teachers as well as the students. This mostly has to do with the collaborative work: taking the time to get to know each other and each other's perspectives, in each step of the interdisciplinary process. For teachers, this adds up to not only extra time for preparation, but also during the teaching itself, and later during assessment and evaluation. One scholar said quite frankly: "If everybody is understaffed and overworked you cannot do interdisciplinarity." They were worried that higher education institutions' focus on interdisciplinarity would be detrimental to their employees. They continued:

I understand better why people in my field don't do interdisciplinary work. I can see why they don't, because I can see the difficulty and I can see also that it doesn't necessarily lead anywhere sometimes. But I think they should do more of that. It is important and humbling.

Many scholars acknowledge that engaging in interdisciplinary education costs more time than disciplinary education, particularly in terms of preparation. They lamented the lack of compensation for this increased time and effort.

The university should acknowledge that interdisciplinarity costs more time; you should get more time to development interdisciplinary education, to go to a Special Interest Group, to develop a network, to talk to each other and read the literature, or do a course. There should be a scenario or protocol for interdisciplinary education to facilitate it. I know there are possibilities, but they don't match our reality in terms of time.

Scholars stressed the significance of support (formal and informal) and facilitation. Some said they felt like they were the only ones 'doing this:' discovering how to approach interdisciplinary education, without proper support, even though they knew that shouldn't be the case. Even scholars who have received money from the university's incentive fund for interdisciplinary teaching thought so. For example, one of them predicted that their project would be short lived, because the incentive fund only covered the first iteration of the newly developed course.

Scholars also talked about the conditions for interdisciplinarity, and they showed interesting contrasts. One scholar said: "An essential ingredient is that you have to respect each other. It takes time, and maybe even being forced to collaborate in an assignment." However, another scholar said: "You can't force it, it's a coalition of the willing. If the willingness is there, the opportunities are infinite." Interestingly, both these scholars considered 'respect' to be an important factor in this regard.

Relatedly, affect and emotion were omnipresent in the answers to this question. Much like the scholar who reflected on the anxiety in interdisciplinary teaching, scholars brought emotions and feelings into the discussion, both positive and negative. One scholar revisited a crucial moment in a co-teaching partnership:

It can seem really easy. And then at a certain point, and that can be sooner or later, and for us, it was actually relatively late, you realize, oh my, we are talking about vastly different things and we're coming from vastly different traditions and ideas about knowledge and science. You feel the ground opening below you. It's so deceptive. It takes a lot of trust and openness to be able to let it sit. It's okay. It's not about convincing the other person, it's about letting it sit. I think it's very important to have these moments and then to also recover from them. Only then are you actually doing the work, because before you are doing it based on a seeming understanding rather than an actual understanding.

They had been collaborating for a number of years, when they both realized they did not assign similar meanings to a central concept. The scholar said that after that moment:

(...), our teaching has maybe lost some of the initial excitement, that's normal in any relationship, but it has gained a deeper meaning. The sessions are better because now we really know what we're doing and why it's important.

This scholar likened the co-teaching relationship to any other relationship, including ups and downs and different transformative moments in the relationship.

What the scholars learned about their own discipline

Engaging in interdisciplinary education brought scholars an *introspective view of their discipline*, as well as an *outsider-perspective*. One scholar found out their discipline is actually more interdisciplinary than they thought, but many other scholars observed that their discipline, or their work in general, is more restricted than they thought. One scholar phrased it as follows:

I am way deeper in my own discipline than I thought. I thought what I did resonated with lots of things, but actually I am hyper specialized and in my own bubble of my own students with our own vocabulary.

Although this realization came from a teaching experience, this scholar also related it to their research:

It's dangerous, that you're into your own discipline so deep. You need to realize this if you want to collaborate [with other disciplines]. This disciplinary grounding really took place for me. I dare to ask questions about other disciplines now. You are allowed to admit there is a lot you don't know.

Teaching interdisciplinarily also made scholars reflect on how others view their discipline. This was not an easy realization. One scholar said:

I learned that my discipline is a niche population, also in terms of students. Of course I knew students in my discipline have a bad reputation but now that I saw them together with students from other disciplines, I realized: oh yeah, exactly, there's a truth to it. I knew we were in a bubble, but now I know what it looks like from the outside.

And another scholar reflected:

What I learned, and that was rather painful and shocking, was that my discipline is always critical. And that's taken as criticism and being a party pooper. I get very upset about it. We're the ones who spoil the fun.

The outsider-perspective on their own discipline was thus very insightful for the scholars.

What the scholars learned about the university

Scholars' experiences in interdisciplinary education also led to learning about the university. The most important themes were *collaboration* and *university politics*. In their answers, some scholars mainly focused on what they learned about the university as an institution in general; others focused on the specific university they are most familiar with. Many scholars elaborated on the difficulty of collaboration across faculties: "It is so important to talk to people outside of your discipline without having a clear goal, and to have a network. But it's difficult to find them." Scholars stressed the necessity of meeting people from outside your building, department or discipline, because it enriches teaching and research experiences, and life in academia in general. The lack of infrastructure (e.g., every discipline in its own building) leads to a lack of opportunities for serendipitous encounters.

Many of the scholars mentioned the importance of networks – formal or informal, top-down or bottom-up – such as the Young Academy all scholars were associated with. Such networks provide the time and space for encounters outside your own building, department or discipline. The scholars stressed that these networks should ideally not be restricted to certain members of the academic community, to prevent gatekeeping and to offer everyone who wants to join the possibility to join.

University politics were also discussed a lot in response to the question what scholars learned about the university. Micromanagement and bureaucracy, for example, were mentioned as hampering innovation in education in general and interdisciplinary education in particular: "A lot is possible if you don't micromanage at the administrative level. There are little villages inside the university where you can do fun stuff without bureaucracy." This scholar did not think these 'little villages' where innovation is thriving will exist for much longer: "...they're vulnerable. I know that's what the university is like, you cannot escape that, but it was nice while it lasted."

Other scholars also mentioned that although incentives such as seed money or incentive funds are nice in the short run, the longer term prospects are not clear. Indeed, money was also an important topic of relevance here:

The structure of our university is not conducive to collaboration, because people in the humanities are paid less per hour than people in the natural sciences, so I'm losing money if I'm teaching to the humanities. I do it in my own time.

What the scholar means with "I do it in my own time," is that they do not include their interdisciplinary teaching as part of their teaching duties. Several other scholars also indicated, as discussed in the section on what they learned about interdisciplinarity, that – in their experience – interdisciplinary education costs more time than disciplinary education, particularly in terms of preparation. This preparation is done in scholars 'own time', at night, or on the weekends. Some scholars said they were happy to do that because it was worth the effort, although some struggled with the workload.

Another important topic was the university's standpoint on interdisciplinarity versus disciplinarity. One scholar said: "Even though the university says we are multidisciplinary, there is still more appreciation for disciplinary research work. I'm on the tenure track and I have to prioritize disciplinary work." Although this particular university puts interdisciplinarity high on their agenda, the individual scholar does not 'feel' this in their day to day life. Indeed, another scholar remarks:

The university should acknowledge that interdisciplinarity and disciplinarity can and should exist in parallel. They should acknowledge that not everyone wants to do interdisciplinarity. Or doesn't have the competences. And that's okay! The university doesn't have to choose and can be good in both.

These statements show that the scholars value both disciplinarity and interdisciplinarity, and acknowledge that both have pros and cons. They would like to see this reflected in the university's strategic vision.

What the scholars learned about themselves

When asked what the scholars have learned about themselves, through engaging in interdisciplinary education, most scholars indicated it was a difficult question. A broad range of answers followed, from insights on (*inter*)disciplinarity to *knowledge and learning* in general.

With respect to (inter)disciplinarity, the general gist was that scholars learned that they had a broader interest than they thought, or would like to know more about other disciplines. One scholar said: “I learned that I shouldn’t cancel disciplines too soon. I rediscovered my curiosity for other disciplines.” This scholar admitted that they were hyper focused on their own discipline and would like to change this in the future. Others didn’t just reflect on their current occupation, but went back further in time: “I’ve learned that I should have chosen a different discipline in high school.” This scholar was discouraged to follow their passion for a particular field of science during high school, and now, after teaching students in this field, regrets this choice. They are advocating for better education and information on different disciplines earlier on in childrens’ school careers.

Scholars reflected on whether they can ‘do’ interdisciplinarity. One scholar reflected: “I learned that I can do this kind of stuff, but not with everybody.” They acknowledged that they initially found interdisciplinarity intimidating, but learned that with the right people it could work. Another scholar said: “I learned that I can and cannot do it. Sometimes I succeed and sometimes I fail miserably. I cannot estimate this well. And that’s fine. I’m learning.” They said they usually can predict quite adequately whether a lecture is going to go well, or how to react to certain situations in class, but in interdisciplinary contexts they have a hard time making this judgment.

Scholars said they learned a lot from their students, both in terms of content, as well as about disciplines and fields of science. One scholar said: “I learned that I know a lot about very little. It has broadened my horizon.” Another scholar related this learning to job satisfaction and joy: “I enjoy broad learning. This is how you can keep learning. It keeps your job fun.” They rediscovered that broad learning stimulates them. One scholar summed it up as follows:

Even though it’s challenging and it’s not rewarded, I would do it all over again. It’s been one of the nicest, most enriching experiences that I’ve had. I learned a lot about teaching, about working with colleagues, working with people from different areas. I wish everybody would try it once.

Whether the scholars feel like their efforts are recognized and/or rewarded

The answers to my question on whether the scholars felt like their efforts in interdisciplinary education are recognized and/or rewarded, can be summarized as an overwhelming ‘no.’ This was an emotional topic for many scholars. In general, the *discrepancy in recognition* between the higher university level, and the grassroots level, or the level of the work floor, is evident in the answers. “Within the interdisciplinary bubble it’s extremely appreciated, because everyone knows the value and what it takes. But they are not my manager,” said one scholar.

They recognized the difference between appreciation from like-minded peers, students and others who have experience with interdisciplinarity (in research or education), and their direct supervisors or managers. Although this external appreciation is nice, of course, it is in stark contrast with appreciation from the people who actually assess these scholars: “My manager doesn’t understand. He is not trained to see or appreciate it. It’s new.” The middle management layer, thus, seems to not see the need for interdisciplinarity and keeps assessing scholars on older views. This is remarkable since interdisciplinarity plays such an important role in the university’s vision. Indeed, the top level of the university does seem to appreciate it, and examples of these scholars’ interdisciplinary education receive appreciation on the institute’s social media. But it does not correspond with new efforts in recognition, reward and assessment of employees. The scholars interviewed here do not seem to experience the realization of these plans yet:

The university thinks multidisciplinary is the norm but it’s not. There are many people who do not like interdisciplinarity, who do not value it and who do not appreciate it. And they are assessing us.

For most scholars, their interdisciplinary work is not discussed at the yearly assessment and development meetings, sometimes because the manager does not know about the work, or does not think it is important; sometimes because the employee does not want to draw attention to it because they know it will not be appreciated. This lack of appreciation has severe negative consequences: from denied access to leadership courses and promotions, to lower job satisfaction:

What this [lack of appreciation] does in the end is that I've also decided for myself that I'm going to allocate more time to research and less to teaching. So I'm not going to do as much of the things that I can do very well and that I like. Because if you won't promote me based on these things, then, well, then I'm going to do less of them, and I'm going to do more of something else. So that defeats the purpose.

This scholar enjoy their interdisciplinary work immensely, they gain a lot of job satisfaction from it, but they have experienced that they will not be promoted if they do not focus more on disciplinary work. So their conclusion is that they will have to stop doing things they enjoy and do well, for the sake of promotion, even though the university says these incentives should not be there anymore.

What surprised the scholars

One of my last questions to the scholars was whether there was something that surprised them. Was there anything they would have wanted to have known before they started their experiments in interdisciplinary education? I asked this question to see if there was anything left undiscussed. In general, the reactions to this question mirrored reactions to other questions, which showed me that we had covered the most important points. Scholars mentioned personal insights, time investment, university politics, and that some aspects of the interdisciplinary teaching and learning were harder and others were easier than expected.

Some scholars reflected on my question on a meta level. One scholar mentioned the limits of interdisciplinarity:

What I learned and what surprised me is that you can go so far with this and then at a certain point with people from a vastly different discipline, there is a point at which it stops. I guess that's just how it is and how it has to be. Ultimately it shouldn't have surprised me. But it did.

Again, this shows an emotional reaction to the experience of interdisciplinarity. Another scholar answered:

The pleasure is in the discovery. It's an emergent process. It is nice that you don't know what's going to happen beforehand. I wouldn't have wanted to know a lot beforehand. That would be too goal-directed and utilitarian.

I ended the interviews asking whether we had covered everything the scholar wanted to discuss about these topics, or whether there were any things they wanted to add. The majority of scholars then again stressed the necessity of formal and informal networks for these kind of efforts, for various reasons. Some scholars would not have met the person they were co-teaching with without the Young Academy network they were involved in; others would not have become enthusiastic about interdisciplinarity without hearing about other people's work. These networks are identified as incubation centers for innovation, and the scholars thought their value is immense.

DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

The current study has looked into what scholars learn from engaging in interdisciplinary education. It shows that scholars learn from these endeavors in numerous ways. It also, importantly, shows that scholars do not feel recognized or rewarded for their efforts beyond their immediate contexts of peers, direct colleagues, and students, despite the university's efforts to improve recognition

and reward structures. The pleasure and joy, both academically and personally, of the scholars' interdisciplinary work are clear, and so are their struggles.

Scholarly learning

This study again demonstrated Neumann's conclusion that learning doesn't stop at some point in scholars' academic career (Neumann, 2009). This cannot be repeated often enough. The scholars' experiences in interdisciplinary education, and the influence of these new experience to their disciplinary educational practices, resemble Neumann's (2009) observations about her participants' experience in interdisciplinary research:

Some professors position themselves to learn outside their disciplinary or field-based communities of practice. This need not mean leaving one's home field "for good." Usually, professors who cross into disciplines and fields that are new to them pursue the new knowledge while remaining anchored in their own. Thus, their "trips out" serve as opportunities to "recontextualize" their learning agendas – to view their continuing topics of study in different ways and in different settings – thereby enlarging their understanding of them. (p. 106)

The mid-career scholars in this study were interviewed in relation to their experiences in interdisciplinary education, but our conversations were not limited to education at all. They mentioned research, for example, and the bilateral relationship between research and education. This corresponds with Neumann's findings that scholars' learning from education seeds into other aspects of scholarship, such as research (Neumann, 2009). Of course, this also relates to Boyer's model of scholarship: a scholar does not just do one trick, but engages in many different forms of scholarship at once (Boyer, 1990, 1996). Crossing boundaries from one type of scholarship to another, or from one type of education to another, thus has the potential to be a learning experience (Akkerman & Bakker, 2011; Bronkhorst et al, 2013). As Diphorn & McGonigle Leyh write, "actively experimenting (...) around interdisciplinarity, has made us better scholars and educators" (this issue).

Interdisciplinary education

With respect to the topic of interdisciplinarity, scholars – through engaging in interdisciplinary education – also learned about their own discipline, and about how various disciplines can differ or overlap. They also reflected meaningfully on their own role in or in-between disciplines. These findings also mirror Neumann's findings on scholars working across disciplinary boundaries (Neumann, 2009),

whose participants also valued the outside-in view interdisciplinarity causes. This increased disciplinary self-reflection will benefit not only scholars' disciplinary work, but also their interdisciplinarity, as "good interdisciplinary work requires a strong degree of epistemological self-reflexivity" (Klein, 1996; in Repko & Szostak, 2017).

The analysis also showed that the discrepancy between the loud and soft voices of interdisciplinarity still persists (Lindvig, 2017; Lyall, 2019). This discrepancy, coined by Lindvig (2017), contrasts "the 'loud and performative voice' of interdisciplinarity that is present at strategic, institutional levels with the 'quiet and productive voice' of those engaged in its daily practice" (Lyall, 2019). The paradoxes at play, described in depth by Lindvig and Lyall, are again evident in the realities of the scholars interviewed in this study. The middle management layer, in between the soft and the loud voices, hampers recognition and reward for interdisciplinary efforts, and even, as evidenced by some scholars' necessary move away from interdisciplinarity to meet disciplinary requirements, are hampering interdisciplinarity in general, despite university's strategic plans to promote interdisciplinarity. Indeed, these scholars also face challenges regarding the value and recognition of interdisciplinarity for their career (Lyall, 2019). This mirrors work showing that interdisciplinary "expertise is often neither properly recognized and reward nor appropriately evaluated or assessed" (Hendren and Ku, 2019; Lyall, 2019; Bammer et al., 2020, in Hoffmann et al., 2022).

The scholars' call for support and facilitation of interdisciplinary education is interesting in this matter. The university where they work actually does have multiple structures in place to support and facilitate interdisciplinary teaching and learning. Why don't these structures reach the scholars, and/or why don't the scholars use these structures? This seems to be a similar situation as Lindvig's observation about the academic literature on interdisciplinary education: "In order to find it, you need to know it exists." (Lindvig & Ulriksen, 2019). Institutionalizing interdisciplinarity is a complex matter (Baptista & Klein, 2022), and this is one part of it.

An important additional issue is the question of what is so special about interdisciplinary education. If this study would have been about scholars experimenting in disciplinary education, or maybe those teaching in higher education for the first time, what would the findings have looked like then? Some of the findings would likely have been similar, others are specific to interdisciplinarity. As Lindvig & Ulriksen (2019) state, we should be wary of attributing certain things to interdisciplinarity that are in fact due to other reasons, but obscured because of the black box of interdisciplinarity (Mansilla, 2005).

Reflection and metacognition

By reflecting on and writing about their interdisciplinary education in their own articles (this issue), the scholars were developing their Scholarship of Teaching and Learning (Boyer, 1990, 1996). In their reflections on their experiences in interdisciplinary education and what they learned, the scholars show epistemological fluency (Markauskaite & Goodyear, 2017) and metacognitive awareness (Flavel, 1976; Hartman, 1998; Weiner, 1987).

These interviews could be seen as a light form of reflection-on-action (Schon, 1983), a small intervention in scholars' practice (Ibarra & Barbulescu, 2010). Informal conversations have been shown to be helpful in learning processes of scholars (Thomson & Trigwell, 2018). Regular systematic reflection on their work, and what it means to them, can bring ample benefits to scholars' academic and personal lives (Lutz, Van Goch, & Baker, 2021; Lutz, Untaru, & Van Goch, 2021; Beer, Rodriguez, Taylor, Martinez-Jones, Griffin, Smith, & Anaya, 2015; Greenberger, 2020; Lin et al., 2018; Neumann, 2009; Rodgers, 2002; Schon, 1983), as "reflection is a key part of any active learning" (Diphoorn & McGonigle Leyh, this issue).

Motivation and emotion

None of the conversations in this study focused on constructive alignment, intended learning outcomes, and other terms that are so common in higher education administration and research. Of course, the interview questions were not explicitly aimed to generate such answers – we did not ask how the scholars designed their education, for example, but focused on what they experienced – but it was remarkable that such topics just did not come up.

This indicated to us that the scholars were indeed experimenting, were teaching and learning from the bottom-up, with intrinsic motivation. As stated in the introduction to this special issue (Diphoorn et al., this issue): the scholars stepped outside of their comfort zone. They jumped, and they encountered highs and lows, and they learned, and it brought them joy. They learned by doing (Diphoorn & McGonigle Leyh, this issue). In our conversations they radiated a contagious passion, enthusiasm, and curiosity – even when they were discussing serious matters and negative experiences. One scholar, for example, exclaimed their interdisciplinary teaching collaboration brought them so much joy after the solitude of the covid lockdowns. Some said the collaborations gave them a sense of belonging. But there was also frustration, as can also be read in other works in this issue (Huysmans, this issue; Kalis, this issue) – which once again shows that "students and teacher don't experience the teaching environment as neutral" (Kalis, this issue). Indeed, these experiences – positive and negative – seem to be

valuable for scholars' academic and personal lives (Berg & Seeber, 2018; Bronkhorst et al., 2013; Meijer, 2011).

Further research

We deliberately chose to interview a small group of scholars who, although diverse in discipline, are relatively homogeneous, since all scholars were employed as assistant or associate professor at the same research-intensive university. We will not claim, therefore, that this analysis can be generalized to all mid-career scholars, even in the Netherlands. It does seem, though, that these results are in line with a growing body of academic and grey literature on interdisciplinarity and the value and recognition of careers (e.g., Lyall, 2019), and the call for supporting mid-career scholars (Baker et al., 2017; Lutz, 2022).

The goal of this interview study was to gain an overview of what scholars learn from engaging in interdisciplinary education, to identify broad themes worthy of further exploration. This work identified many themes that provide ideas for further research. One valuable line of research could delve deeper into scholars' learning. How can scholars make this self-reflection productive? How would other academic demographics respond to these questions? Are there differences between scholars with more or less teaching experience, or between different disciplines? Future research could also look into how interdisciplinary education unsettles scholars' routine expertise, and whether deliberate practice with this new type of teaching and learning may foster their adaptive expertise (Grunefeld et al., 2022). And what do scholars learn from engaging in interdisciplinary research? How, exactly, does interdisciplinary experience feed into disciplinary work?

On the institutional level also many follow-up questions arise: why do infrastructures and incentives not reach these scholars, even though they have high institutional knowledge, as evidenced by their active participation in university life? Such follow-up work could mirror Lindvig & Ulriksen's (2019) question: if a faculty member from any given discipline, with no prior experience in interdisciplinary teaching, is planning an interdisciplinary course, what institutionally available support and facilitation can they find and use? In the time between the interviews were held and finalizing this manuscript, the university has made the interdisciplinary support and infrastructure even more explicit, including the launch of a university-wide interdisciplinary teaching programme aimed at scholars starting out with interdisciplinarity education. Future research could look into the effects of such explicit efforts. And what can be done about the ongoing divide between the loud and soft voices of interdisciplinarity, especially regarding the middle layer who assesses early career researchers? Preliminary work on how

department heads, deans and rectors talk about interdisciplinarity shows high variance and identifies fascinating follow-up questions (Kurtti, 2022).

To conclude, the current study showed that scholars' first experiences with interdisciplinary education provided them with many learning opportunities, personally as well as academically. Interdisciplinary teaching and learning is indeed daunting, fun, as well as a true learning experience.

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MEREL VAN GOCH, PhD, is an Assistant Professor at the interdisciplinary Liberal Arts and Sciences undergraduate program at Utrecht University, The Netherlands. Her research and teaching are both motivated by the goal of providing people with the optimal circumstances to explore and foster their talents and interests. She is interested in how and what students and scholars learn, especially in interdisciplinary contexts. Her research includes metacognition, creativity, and other competences relevant to higher education, and her teaching methods emphasize students' self-directed learning. Email: m.m.vangoch@uu.nl

CHRISTEL LUTZ, PhD, is Associate Professor of Psychology and Director of Education at Liberal Arts and Sciences College University College Utrecht, and Principal Fellow at the Centre for Academic Teaching and Learning, both at Utrecht University, the Netherlands. She teaches on learning and motivation, and as a scholar she is interested in what makes learning communities thrive, for example in student-teacher partnership. She does practice-based research in the field of faculty development. Email: c.i.lutz@uu.nl

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