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"I try to encourage my students to think, read, and talk science" intelligible identities in university teachers' figured worlds of higher education biology

Katerina Pia Günter[1] | **Ingrid Ahnesjö**[2] | **Annica Gullberg**[1,3]

[1]Centre for Gender Research, Uppsala University, Uppsala, Sweden

[2]Department of Ecology and Genetics, Animal Ecology, Uppsala University, Uppsala, Sweden

[3]Teaching in STEM, KTH Royal Institute of Technology, Stockholm, Sweden

Correspondence
Katerina Pia Günter, Centre for Gender Research, Uppsala University, Uppsala, Sweden.
Email: katerina.gunter@gender.uu.se

Abstract

Higher education biology is often imagined, perceived, and described as having reached gender equality in terms of who gets to participate in disciplinary practices. However, like any other natural science discipline, higher education biology is a world whose landscapes are shaped by (re)productions of historical, cultural, and social norms. We explore these norms through the lens of identity, asking what identities are recognized by university biology teachers at a large Swedish university, analyzing 94 teaching statements written when applying for faculty positions in biology. We argue that in and through teaching statements, university biology teachers negotiate and perform overarching academic and disciplinary norms and discourses with the goal to present themselves as intelligible candidates. As statements of value, they thereby display implicit and explicit identities recognized in worlds of higher education biology. Using a discourse analytical framework, we identified two university teacher identities imagined as intelligible: Research Science Teachers and Facilitating Science Teachers. Research Science Teachers position research and associated masculine-coded competences as anchor points

of biology practice. They consider researchers to be ultimate knowers and consequently to be best suitable for university teaching with the goal to recruit students into research. Facilitating Science Teachers, even though aware of the hegemonic position of research, disentangle imaginaries of what makes a researcher from what makes a university teacher. They transgress dominant imaginaries of research as the ultimate competence for themselves and students, and create spaces for alternative identity work. These findings contribute to a more nuanced understanding of (re)productive processes in science education, providing perspectives of how to together infract intergenerational (re)productions of hegemonic norms of doing science. Additionally, this study provides further evidence that higher education biology is not a gender-neutral higher education landscape.

KEYWORDS

biology, discourse analysis, figured worlds, gender, higher education, science identity

1 | INTRODUCTION

Higher education biology is perceived as more accessible and easier than other natural science disciplines (Wong et al., 2022) and thereby often considered as the most inclusionary university natural science field, within which gendered processes of exclusion are assumed to be absent and equality along the axis of gender has been reached. In contrast to, for instance, physics, a male dominated natural science discipline that is given extensive attention in science education research, qualitative explorations of higher education biology are rather scarce and marginalized. This marginalization has been critically discussed to be a consequence of the assumption that equality can be measured quantitatively, based on female biased undergraduate enrolment (Grunspan et al., 2016). This female bias occurs across national contexts with Sweden being one example (SCB, 2022). We argue that if processes of exclusion toward women and other underserved minority groups were absent within the natural sciences in general and biology in particular, proportions of faculty would be similar to proportions of undergraduates. However, this is not the case. Women and other minoritized groups are still strongly underrepresented in natural science landscapes (UNESCO, 2021) in general and greatly outnumbered by men among biology faculty in, for instance, Sweden (SCB, 2020) and the United States (Sheltzer & Smith, 2014). Biology is consequently not excepted from common patterns of a decrease of women's participation in the natural sciences along the academic career ladder and finds itself in a disciplinary STEM hierarchy (Wong et al., 2022).

Already more than three decades ago, feminist science critics such as Haraway (1988), Harding (1991), and Keller (1985) addressed gendered norms in the natural sciences, broadened debates of gender inequalities, and critiqued male-dominated institutions and cultural practices throughout society (Evans, 1998). Their critique appears relevant even today as higher education sciences remain institutional spaces that recognize and celebrate, and hence reproduce, hegemonies of whiteness, masculinity, eliteness, and secularity (Avraamidou, 2021). Spaces which embrace objectivity and uniformity rather than subjectivity and diversity (Ahmed, 2016) and discursively render gender and culture as irrelevant (e.g., Traweek, 1988). Contradicting science as a cultureless, disembodied, and objective practice, participation in science has been shown to be stereotyped as requiring brilliance and innate raw talent, which is assigned to certain bodies and not to others (e.g., Leslie et al., 2015); bodies can be read as not conforming with what is implicitly and explicitly considered "ordinary" in given science disciplines (e.g., Brickhouse, 2001; Ong, 2005).

The context of biology at a Swedish university becomes particularly interesting from an equality and equity perspective as Sweden has only recently been ranked first on the gender equality index in the European Union (EIGE, 2021). This ranking risks contributing to an amplification of assumptions that marginalization along the axis of gender is, indeed, absent and hence renders work toward more diverse and inclusive spaces as unnecessary. Especially in supposedly equal and inclusive spaces, diversity work risks to remain a "fantasy of inclusion" that quickly becomes a "technique of exclusion" (Ahmed, 2016, p. 112). In order to transgress systemic and systematic exclusions, hegemonic norms of participation, and intergenerational reproductions of their recognition, we need to understand how and where in practices of higher education science in general and higher education biology in particular these very (re)productions take place.

Rooted in feminist and critical pedagogies, research employing the concept of science identity has generated crucial insights and understandings of processes influencing participation in science practices (e.g., Adams & Gupta, 2017; Avraamidou, 2020b; Beijaard et al., 2004; Carlone & Johnson, 2007; Gonsalves et al., 2019; Hazari et al., 2013, 2020; Jackson & Seiler, 2013; Moore, 2008; Ong et al., 2018; Rahm & Moore, 2016). Simultaneously, science identity research has diversified in terms of both education environment and level such as out of school (e.g., Archer et al., 2016), primary (e.g., Archer et al., 2013), middle (e.g., Tan et al., 2013), and secondary school education (e.g., Archer et al., 2017; Carlone, 2003; Hazari et al., 2010; Holmegaard et al., 2014) and has furthermore shaped understandings of tertiary science (e.g., Avraamidou, 2020b; Jackson & Seiler, 2013; Johansson, 2018) and science teacher education (e.g., Avraamidou, 2016; Larsson, 2019, 2021). Despite generating valuable insights in diverse educational contexts, qualitative work on possible and impossible science identities in higher education biology is rather scarce.

In Günter et al. (2021), we identify how university biology students in a Swedish context already on undergraduate level negotiate norms of doing science, disciplinary identities, and senses belonging along gendered dimensions (compare also to, e.g., Le et al. (2019) in the United States). When exploring Swedish biology faculty's conceptions about biology practices, Andersson (2018) shows that research and teaching tasks are segregated meritocratically along the axis of gender. In a US American context, Brownell and Tanner (2012) employing the lens of professional identity find biology faculty's professional identity to be grounded in research performances, leaving little space for teaching, similarly to Andersson (2018). While further work has continued to address undergraduate students' science and biology identity work (e.g., Cole & Beck, 2022; Wong et al., 2022), there is a need for further explorations related to

university biology teachers' identities. In this article, we focus on this population for various reasons.

We understand university teachers to be central links between students and the university as an institution. We argue that their identity performances are at the frontstage of intergenerational (re)productions of disciplinary norms through processes of enculturation. Exploring university teachers' perspectives is therefore essential in order to understand the kind of disciplinary worlds and landscapes students encounter and get enculturated into (or not) through interactions in their tertiary education. Furthermore, university teachers participate in processes of (re)producing implicit and explicit norms through getting recognized for and recognizing (un)intelligible performative acts (Butler, 2006). On the one hand, they themselves were enculturated into the practices and learned to relate to and perform disciplinary norms, while they on the other hand influence students' enculturations through recognition of performative acts; an intergenerational circularity.

Recognized norms and practices, as well as their reproductions may become particularly visible in applications for academic positions, as this process involves negotiating, recognizing, and getting recognized as being a certain kind of person in disciplinary and cultural contexts. At a large Swedish university, applicants for biology faculty positions compose, among other elements, statements about their "teaching vision" and "teaching philosophy" (henceforth summarized as "teaching statements"). In these statements of value, authors relate to, negotiate, and (re)produce overarching and disciplinary norms embedding teaching statements in academic cultural practice. University teachers draw on institutional and disciplinary discourses, discursively display, challenge, and repeat norms both endemic to biology as a discipline and cosmopolitan in science.

In this study, we discursively analyze 94 teaching statements written by university teachers when applying for faculty positions. We explore both normative reproductions and alternative productions, imaginaries that transgress circularities of exclusive science and biology practices. Merging cultural, social constructivist, as well as feminist critique of science perspectives, we explore the teachers' teaching statements with the question, what higher education biology identities are imagined as (un)intelligible by university biology teachers?

2 | THEORETICAL FRAMINGS

In order to capture the complexity of the empirical material used, a multidimensional theoretical framework combining critical discourse theory, as well as the concepts of figured worlds, science identity, and intelligibility has been employed. In the following, we lay out how these concepts were combined.

2.1 | Discourse and figured worlds—Two overarching theoretical concepts

The theoretical scaffolding of this article is first rooted in post structuralist theorizations of language and communication, also known as discourse. Analyzing discourses, "the study of language in use" (Gee, 2014a, p. 8), is grounded in the idea of language to be a vehicle of information and furthermore to gain meaning through its use in historical and cultural contexts. According to Gee (2014a), it is through performances of situated societal discourses that

people get recognized as being "a certain kind of person" (p. 110). Gee thereby connects language to practice and its recognition, the saying-doing-being, and describes how language functions as a tool in social interactions and cultural productions. Discourses, according to Gee (2000), are fluid, ever changing and intertwined with one another, they hybridize and their boundaries are constantly contestable. Consequently, discourses make some identities and activities, ways of being, saying, and doing, (im)possible and function as implicit and explicit guidelines in worlds of social interaction and practice—in times and spaces. Discourses thereby become cultural resources that "originate outside of their performers and are imposed upon people through recurrent institutional treatments and within interaction, to the point that they become self-administered" (Holland et al., 1998, p. 62). Even though often constructed as objective and neutral, as disconnected from human makings (as described in feminist science critique classics such as Eisenhart, 1994; Eisenhart & Finkel, 1998; Haraway, 1988; Harding, 1991; Keller, 1984), the world of academia and its natural science landscapes are embedded in and interspersed by historically and culturally constructed discourses, out of which some are more powerful than others. People within academia negotiate these discourses and ideas about the saying, doing, being, and also knowing in the academic practice and some discourses have become self-administered and valued over others.

It is here theorizations of discourse overlap with figured worlds, the second overarching theoretical concept. According to Holland et al. (1998), a figured world is a "socially and culturally constructed realm of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others" (p. 52). These worlds, as contexts of meaning or cultural realms, are peopled by collective imaginaries and thereby "take shape within and grant shape to the coproduction of activities, discourse, performances, and artifacts" (Holland et al., 1998, p. 51). Gee (2014b) describes figured worlds as simplified imaginaries and "typical stories" that vary between people with different social and cultural backgrounds (Gee, 2014a, pp. 174–175). Drawing on Bourdieu's concept of field, figured worlds make it possible to analyze social constructions and "structure-in-practice" (Holland et al., 1998, p. 58). Holland et al. (1998) argue that both a culturalist and a social constructivist perspective are necessary in order to understand these "as if" realms, imaginaries, or figured worlds, also explicitly in terms of the "ways in which academics come to evaluate their efforts, understanding themselves, and interpret the position they hold in the academy" (p. 59).

Bringing discourse and figured worlds together on the one hand makes it possible to go beyond imagined activities, performances, and discourses that are more valued than others. It fosters a sensitivity for improvisations that push dominant perspectives in figured worlds. On a micro level, negotiating these imaginaries leads to individual identity development (Holland et al., 1998). Analyzing what is negotiated and how allows us to understand higher education biology as a locally situated and socially shaped practice that is influenced by larger, cultural and historical norms, processes on a macro level. In our approach to discourse and discourse analysis, we focus in particular on teachers' identity work, how they negotiate practices and make meaning of figured worlds of higher education biology through language.

2.2 | Intelligible science identities—Combining science identity and intelligibility

"Teaching is a performative act" (hooks, 2014, p. 11), an act in which performances have the power to both uphold structures and to create change. In this work, we consider figured worlds

to shape and get shaped by people participating and performing in the worlds' practices, "through the day-to-day activities undertaken in their name" (Holland et al., 1998, p. 60). While these performances can uphold what has been there before, they can also promote change when contested through improvisations, negotiations of "contradictory discourses" (Holland et al., 1998, p. 17). Understanding identity work as developing perceptions of the self through repetitive acts, rather than as owning a static identity in a core sense of self, is part of the social practice of learning and can be described as a process of becoming "that happens *to* individuals through recognition" rather than "*within*" them (Avraamidou, 2020a, p. 336). Hence, it is also in identity negotiations through others' repeated recognition that reproductions and improvisations take place and get manifested. Carlone and Johnson's (2007) model of science identity builds on this understanding of becoming and developing an identity in practice and combines Gee's (2014a) identity concept with the social context of and participation in a group (Holland et al., 1998). They state,

> "One cannot pull off being a particular kind of person (enacting a particular identity) unless one makes visible to (performs for) others one's competence in relevant practices, and, in response, others recognize one's performance as credible." (Carlone & Johnson, 2007, p. 1190)

Holland et al. (1998) point out that not only cultural contexts have meaning across figured worlds and influence participants' identity work, but also social categories such as gender, ethnicity, race, and class. In this article, we focus on gender and understand gender as an ongoing process, a *doing*, rather than a *being*, with the repetition of acts at the center of the production of gender and gendered norms and in a post structural tradition (Butler, 2006). In the context of gender, Judith Butler highlights that:

> "acts, gestures, enactments, generally construed, are performative in the sense that the essence or identity that they otherwise purport to express are fabrications manufactured and sustained through corporeal signs and other discursive means." (Butler, 2006, p. 185)

Identity performances are discursive and closely tied to their intelligibility, that is to say, ways of performing are considered appropriate or not according to certain dominant gendered cultural norms (Butler, 2011). They can be understood as culturally constructed and gendered organizational activities (Davies, 1996). We draw on Butler's theorizations of performativity and intelligible identities to sharpen our identity lens when analyzing the teachers' teaching statements, not only considering gender to be performative, but also being and teaching in, doing higher education biology to be a performative act. Through performative acts and in discursive repetitions, hegemonic cultural values of being and doing are sustained and reproduced. It is therefore crucial to apply a gender perspective when exploring identities in cultural spaces, shedding light on how gender influences participants' negotiations in figured worlds of higher education biology. As Butler (2006) argues, it is through the very repetitions that we can make repetitive processes visible, which in turn gives us a handle to suggest alternatives to hegemonies. Hence, gendered and in particular inherently masculine repetitions, as well as alternatives to these repetitions, improvisations, are of interest in this study of teaching statements and theoretically connected to what characters, acts, and outcomes are valued in university biology teachers' figured worlds of higher education biology.

3 | METHODOLOGY

3.1 | Data collection

This study explores university biology teachers' written teaching statements from applications for faculty positions at a large Swedish university. In total, we collected 101 applications for 30 announced faculty positions in biology. Our analysis focuses on texts from the one to six candidates shortlisted and called for interviews for the respective position they applied for. In two steps (2017 and 2020), we collected all available interview-group applications from positions announced in biology at this large Swedish university from between the years 2012 and 2020. Seven applications were excluded from analysis since the same individuals applied for multiple positions. In those cases, we chose the chronologically first submitted application. Thus, the empirical material for this study consists of 94 teaching statements from teachers applying for assistant (in Swedish biträdande lektorat), associate (lektorat), and full professor (professor) positions in biology at the Swedish university (Table 1). These categories constitute the main part of faculty at Swedish universities and are commonly referred to as "university teachers." While most texts were entirely written in English, a few texts contained quotes in Swedish and other Nordic languages. One text was written in Swedish only. If needed, quotes used in this article were translated to English by the first author with the goal to preserve their meaning rather than to provide a literal translation.

Applications for university faculty positions are public records in Sweden and can be requested from universities' staff recruitment units. Most advertisements for positions, independent of if it was assistant, associate, or full professor positions, highlight that teaching and research quality and expertise are given equal attention in the assessment process. Hence, three factors make this sample suitable for answering the research question. First, and fundamentally, the applicants as faculty have learned to navigate higher education biology cultures and hence to navigate in figured worlds of higher education biology. Second, we argue that the candidates' texts are produced in order to present themselves as intelligible (and good) university biology teachers in the eyes of an academic recruitment committee. Third, candidates were recognized as intelligible applicants for the position based on all parts of their application. This includes the premise that candidates were chosen or at least not excluded because of their teaching statements and hence their statements were given legitimacy by a committee representing the institutional community. Consequently, the candidates could not only convey an intelligible university teacher identity in their texts and get recognized by the recruitment committee, but they also (re)produce identities they consider intelligible through recognition and thereby contribute to or challenge intergenerational circularities of in- and exclusion.

TABLE 1 Overview of the number of positions, applications analyzed, and gender of the applicants

	Assistant professor (AsP)	Associate professor (AcP)	Professors (P)	Total (*n*)
Positions	14	12	4	30
Total number of applications	44	34	16	94
Texts from female/male applicants	16/28	13/21	8/8	37/57

3.2 | Data preparation and analysis

From the application files, 94 teaching statements were extracted, anonymized, organized by university teacher application category (assistant, AsP; associate, AcP; or full professor, P), and labeled with the respective acronym and a random number. All analyses were done by the first author both manually on printed copies of the texts, as well as in the qualitative data analysis software NVivo (2018). Themes emerging through analyses by the first author were discussed with the co-authors in an iterative process in which we acknowledge, in line with Braun and Clarke (2006), that these themes are not inherent in the material, but come into existence through our active readings and from our positionalities. All authors are familiar with the biology environment and culture at the Swedish university, yet we hold different perspectives shaped along intersecting axes (Crenshaw, 1991) through which we both analyze data and tell stories (Hemmings, 2011). Besides the importance of positioning the selves "in relation to qualitative research" (p. 80), Braun and Clarke (2006) highlight this analytical process to not be linear, but to require reviewing and refining themes, which we have done in multiple steps.

In an initial and open thematic coding step, the three categories of assistant, associate, and full professor were analyzed separately to get an overview of the empirical material (Saldaña, 2021). General themes such as "teaching versus research" (e.g., AsP06, "As a lecturer, I have previously been privileged to teach mainly on PhD or master's degree courses and in topics that are very close to my own research."), "teachers' and students' responsibilities" (e.g., AsP04, "I am there to teach them and they are there to learn."), "teaching goals" (e.g., AsP01, "I will teach them to be [methodical] and self-disciplined learners, shameless discussants, dauntless explorers, and humble sharers of knowledge."), and "hurdles in teaching" (e.g., Ac13, "I firmly believe that one of the most challenging balances to attain as a teacher is one in which the subject material is made accessible and, equally importantly fun for the students, but without compromising the scientific quality of the teaching.") were identified. In this step, we did not find thematic differences among the three teacher categories and hence decided to refrain from a comparative approach to the different application categories. Three further factors influenced this decision: First, teaching, research, and administration are duties that are included in all appointment profiles. Second, the biology departments, in line with the Swedish university as a whole, highlight the importance of (excellent) teaching in their public communications such as their departmental and general university websites addressing all teaching staff. Third, university teachers of all application categories are involved in undergraduate and graduate teaching, as well as in supervision at the Swedish University. Hence, we focus on *how* the population of applicants in a Swedish context *collectively* imagines intelligible identities in worlds of higher education biology. However, when presenting quotes we continue to use the acronyms to provide transparency.

In the second and theory-driven discourse analytical coding step, we focus our lens on stories and identities that are considered typical for worlds of higher education biology. A discourse analytical framework grounded in the concept of figured worlds was employed for instance by Gonsalves et al. (2019) who made visible how becoming engineers negotiated engineering cultures. Similarly to Gonsalves et al. (2019), we concentrate on university teachers' beliefs, values, and typical stories in figured worlds of higher education biology employing Gee's (2014b) Figured Worlds Tool. This tool explicitly operationalizes Holland et al.'s (1998) concept of figured worlds and prompts analyst to ask, "what typical stories or figured worlds the words and phrases of the communication are assuming and invite listeners to assume" (Gee, 2014a, p. 177). It brings attention to the participants, acts, activities, and ways of interacting described

in a rather taken-for-granted manner, making typical stories of what it means to participate in the figured world of higher education biology visible. This also allows for conclusions about what is considered as *not* typical in the figured world of higher education biology, constituting explicit and implicit deviances from the norm, so called improvisations (Holland et al., 1998). Embedded in this understanding, we employ a sensitivity for what competences and performances the teachers recognized for themselves and others, as prompted by Carlone and Johnson's (2007) conceptualization of science identity.

This multilayered and iterative approach served multiple purposes. Methodologically, it led to a reflexive process in which themes were scrutinized and developed along both open and theoretical orientations. Analytically, it provided a flexibility to reciprocally move between the micro and macro level, the individual and overarching cultural level. It was therefore possible to describe imagined landscapes of the figured world of higher education biology in relation to recognized ways of being, that is, exploring dominant norms in scientific cultures and what identities are (un)imaginable within.

4 | RESULTS

In this section, we map out two imagined intelligible identities found in the teachers' teaching statements, the Research Science Teacher and the Facilitating Science Teacher. Through the use of quotes from a total of 21 assistant (48% of total), 14 associate (34% of total), and 5 full professors (25% of total), we root our findings in the empirical material. We draw on quotes from different university teachers in our material to map out larger patterns of characters, acts, and outcomes, as well as competences and performances that constituted imaginaries of the Research Science Teacher and the Facilitating Science Teacher. In the following, we will expound on the two imagined intelligible identities independently, with a short summary when transitioning into the discussion.

4.1 | Intelligible identity I: Research Science Teacher

The first of the two intelligible identities found in the teachers' texts was the Research Science Teacher. Central to the Research Science Teacher identity is the act of transmitting science knowledge and enthusiasm to students as well as infusing them with (good) science and thereby recognizing the performative character of the researcher and scientist as central to the practice. Science, and more explicitly the very practices of science, research, are figured as elite and teaching is described as the gilt edge of a scientist's and researcher's life. Recognized outcomes are to recruit students into science and the practices of research and hence teaching goals to prepare the students for a career in science and research. Caring about the students' content knowledge and future career as scientists becomes pivotal.

4.1.1 | Transmitting knowledge and enthusiasm

The act of transmitting knowledge is a reoccurring theme in the teachers' teaching statements and considered "the obvious task" (AsP03) of the Research Science Teacher. AsP02 writes, teachers have "as their main mission to try to transmit their knowledge to their students",

which implies that the transmission does not necessarily need be successful on the receiving students' end. Transmitting and giving access to one's knowledge is considered an altruistic move as even if one is "willing to share knowledge with students" it does not necessarily mean that the teacher will experience "immediate reward" (AcP11) and success as the receiving end, the students, have a "steep hill to climb" (P01). AsP04 is very specific about the roles of teachers and students and describes that he, as a teacher, is "there to teach them [the students] and they are there to learn." He continues with describing "the flow of knowledge from teacher to student," strengthening the notion of a transfer of knowledge from the more knowledgeable teacher to the (significantly) less knowledgeable student.

Research Science Teachers not only highlight the transfer of scientific knowledge, but also the transfer of enthusiasm about science. P01 emphasizes the importance of enthusiasm for teachers and students and argues that it is through the active researcher's "superior position" that they can inspire and transmit scientific knowledge and research enthusiasm. He writes,

> Based on my experience both as a student, and as a practicing teacher for about 15 years, enthusiasm is the single most important characteristic of an excellent teacher. If expressed well, a teacher's enthusiasm will inevitably spread to the students and half the battle is basically won there. When teachers teach about subjects related to their own research, it most often is connected to a higher level of enthusiasm. It is thus not only the deeper knowledge per se that argues for that active scientists should teach, but also because they may be in a superior position to inspire students, compared to non-researchers.

A battle being "basically won" when science enthusiasm has been ignited and transmitted successfully, is specified by AcP11 who explains that being enthusiastic together with a teacher's high competence "cultivates bright and motivated students." Brightness and knowledgeability were pointed out by the same teacher as being connected to never being wrong or never not knowing. He wrote,

> Although this principle sounds trivial, we often hear a teacher's answer 'I do not know' in response to the students' questions. This answer should be simply forbidden for the teachers. When I teach, I always remember that students will get disappointed if I am not fluent in the field.

P05 emphasizes the importance of obtaining vast amounts of advanced knowledge through being "surrounded by people that know more than" the students. The teacher's responsibility is to be a more knowledgeable other and to provide closeness to the teacher thereby becomes "paramount to learning" for the students from his point of view. Thus, instead of preparing students for their independence and allowing them to explore their own ways of thinking, P05 considers the closeness to and guidance from more knowledgeable others as central to the learning process. P05 figures the teacher as not necessarily supporting students' independent learning and thinking, but rather as a person who through the act of being present and providing close proximity will help the students to get formed and learn.

The Research Science Teacher, a character in the figured world of higher education biology, is an active scientist, a researcher, who does not allow spaces for not knowing, neither for the students, nor for the teachers themselves. This maintains their superiority and is justified by the idea that students expect unconditional content knowledge from the teachers.

4.1.2 | Teaching as the gilt edge of a scientist's life

"I truly enjoy teaching and consider teaching opportunities a gilt edge to the life as a scientist" is how AcP10 commences her teaching statement. P05 similarly describes teaching as "a cornerstone of all university activities." While these phrasings at first glance appear to position teaching as a central and valued academic activity, both teachers position teaching as peripheral in their texts and the activity which one is "second best" at (AcP10). While, on the one hand, the Research Science Teacher presents teaching as something that is valued and that one must like, teaching is, on the other hand, only valued when connected to research. As mentioned in the previous section, teaching is fun when it leads to the recruitment of students into the field and even more so, into research, as voiced by AsP06 who writes, "The most important reason for teaching is the possibility to get more students interested in doing research, since some of these students represent the next generation of researchers." Or as AsP06 puts it, "I have had the privilege of seeing several young students grow into aspiring scientists starting to question the world around them." Students to become scientists is seen as a privilege, as the optimal outcome. Teaching is furthermore imagined as similar to and equally methodological (P03) or pragmatic (AcP12) as research and includes conveying enthusiasm, passion, and excitement about science (AcP07), as lighting flames in students (AcP15), and to allow them find their "inner biologist" (AcP14). Problem solving, as taken up by most Research Science Teachers, is a strategy that links teaching and research and which supports the students' learning of scientific methodologies during their "academic maturing" (AcP16).

For the Research Science Teacher, teaching and research are so closely intertwined that undergraduate teaching and graduate supervision are imagined as overlapping in their purpose and methods. AcP06 elaborates on the value of problem solving to expand on lectures that provide background information. They continue, "this model has been successively developed through the years, and works well both for undergraduate and post-graduate teaching." However, even though the methods are considered valuable for undergraduate as well as graduate students, teaching undergraduate students is depicted as more difficult as students do not have the same strong focus on the very science and scientific method as graduate students. P02 writes, "With undergraduate students it is more difficult to have this focus on science as only a small fraction of them have sincere interest." This creates a tension between the goal of the Research Science Teacher to educate future scientists and researchers, while at the same time recognizing that not all students have a strong science focus and an ambition toward practicing science as researchers. In this situation, however, the Research Science Teacher aims to "spark a genuine interest" (AcP04) or cultivate "a spark of love of research" (AcP13) through the above-mentioned transmission of knowledge and enthusiasm; love for and genuine interest in research to be valued outcomes as well as qualities that university teachers see in themselves.

While teaching is described as similar to research in its methodology, a methodology that when learned by students requires thorough training, deep knowledge, passion, and enthusiasm, teaching is strongly and explicitly connected to being learned through experience. AcP17 wrote, "I was guided by my own experience (...) how my subject ought to be taught to give optimal outcome." It is through experience in the respective subject, through having been taught, and the very act of teaching that the Research Science Teacher acquires the skills to teach. This also includes the experience of having been a student in the respective field themselves.

In this, the gilt edge becomes visible as an act of marginalizing teaching rather than positioning teaching as a central and valued practice. Teaching is a skill imagined to come naturally

and transmitting enthusiasm and being a knowledgeable role model to be the central qualities of a good Research Science Teacher. It visualizes a taken-for-granted idea that a good and enthusiastic researcher will naturally be a good university teacher.

4.1.3 | Infusing (good) science and science practices as elite

Imagined intelligible knowledge is rarely related to disciplinary content knowledge, but to s*cience* and the very practices of *science*; as P02 wrote, "I try to encourage my students to think, read, and talk science." While this process is accentuated, it is rarely explained what it means. Science becomes synonymous with research, and the very teaching of these practices should happen "without it taking too much time" (P02). Students shall seek knowledge and develop a critical mind "as long as the science is good," (P01) which again makes "active researchers" (P03) the best teachers in their figured world of higher education biology. For the same reason it is "important [for students] to meet teachers who are at the forefront of research," who can update the students on recent scientific findings and expand on textbook knowledge in the respective area of expertise. In addition, they facilitate students' doings of research, as it is "impossible to do good teaching without research activities" (P04). In line with the centrality of research, "research-based" teaching is mentioned often, yet rather than being understood as grounding teaching practices in pedagogical and didactical research, research-based is interpreted as integrating learning how to conduct good research and integrating research activities into teaching.

AcP02 concludes her text with the words, "the most important knowledge to transfer to [the students] is, in my opinion, a feeling for how good science should be conducted, understood, and communicated." In this case, it is not only about transferring factual knowledge, but also about transferring a feeling for doing science and in particular doing *good* science. This *feeling for science* can also be rephrased as a tacit way of knowing not only about the content, but also about the very (intelligible) practices of conducting and communicating science. The Research Science Teacher considers certain skills to be crucial for the students and their future, which is a future as a scientist and researcher. Logical and critical thinking were highlighted as a recognized outcome in a research context; scientific writing and scientific reading skills were described as important parts of course syllabi and problem solving was both a highly appreciated teaching method as well as an important scientific skill to be learned by students.

AsP08 highlights that "clear logical thinking and sound reasoning—can never be emphasized enough"; they are valued qualities a student needs to learn in the academic context, mastering the scientific method. AcP02 also emphasizes critical thinking as part of good science practice and highlights, "I think that one important task for teachers today is to develop the students' skill of critical thinking. One important part of that process is to learn how good science is conducted and what a good scientific process is." In all cases, logical and especially critical thinking are described as important outcomes for students to develop. However, critical thinking is solely tied to the context of good research, science, and scientific practice.

AsP01 displays a strong research focus in her text. The courses that she suggests implementing in the future were all "tightly interconnected with research activity carried out in [her] lab." She highlights the importance of learning about protocol development and "state-of-the-art laboratory practices," which "will not only prepare the students to become excellent experimentalists, but also allow them to judge the scientific literature in a more critical way."

Again, critical thinking is recognized as a core competence and valued outcome for students to learn in terms of their own practices and the evaluation of scientific publications.

Learning, according to AcP12, is an apprenticeship with professionals at the highest levels. For the most motivated students, it is therefore important to provide the possibility to manage a research project. This underlines an understanding of only the most ambitious and intelligent students to be suitable for research and hence giving access to the practice in order to stimulate them appropriately. Research Science Teachers emphasize both the quality of the science, the quality of the science practice, and the quality of the scientist, making the scientist a recognized actor and doing science through doings of research as the recognized act in their figured world of higher education biology. P05 emphasizes that "you learn more, when you are surrounded by people that know more than you" and describes the process of developing a regular course into an "elite" course where the *making elite* element means cutting down on exercises and expanding on fewer of them to follow the scientific process from idea to its publication:

> The obvious question immediately represented itself: What should be the elite element in this elite course? Since the basic curriculum that the students must learn is essentially the same as in any other [subject] course, interpreting "elite" as merely larger curriculums, more lab work, more reports and more work in general, would not increase the students learning outcome or make the course successful. Thus, I decided that the elite element should be implemented in the pedagogical style of the course to achieve the ILOs.[1] So, I reduced the number of lab exercises to only two exercises, but expanded these exercises to cover the entire scientific process from idea to publication.

Students are introduced to science practices and to what is understood as *good* science practices, built on the teacher's own experiences. This happens not only for supporting students to understand good science practice, but even more so to make them recruitable into higher education biology. AsP18 is very explicit about the goal for both undergraduate and graduate students to be to recruit them into a specific biology field. AsP18 writes,

> I am committed to actively recruiting both undergraduate and graduate students to draw their attention to the [subject]. This could include organizing outreach symposia during which research groups of a department present their research to prospective students.

Research Science Teachers aim at recruiting certain students into their fields in general and forefront recruitment into practicing research and a research career. AcP13 summarizes, "teaching undergraduate students is particularly fun, especially when this creates enough of a spark of love of research that it leads to their pursuing subsequent doctoral studies."

Research Science Teachers aim at introducing students to good science and science practices, with the aspired outcome to recruit them into research. They consider science as an elite practice, passed on from a more knowledgeable researcher to a research and science apprentice and particular care about the students' scientific development.

While our analysis focuses on if and how biology practices are gendered rather than how female and male university teachers figure worlds of higher education biology, we could find a qualitative tendency of male university teachers to more explicitly and consistently negotiate their identities in a Research Science Teacher manner.

4.2 | Intelligible identity II: Facilitating Science Teacher

The second intelligible identity imagined in university biology teachers' figured world of higher education biology, the Facilitating Science Teacher, recognizes students as learners of science that are to be supported and empowered in their learning process by teachers. As characters in the worlds, students are considered knowledgeable, yet allowed to develop, be guided and make mistakes; hence, the teacher's role is imagined as giving students access to resources and to guide their learning. The Facilitating Science Teacher describes the acts of teaching and learning as two-way interactions that include creative thinking, spaces for interdisciplinarity, and a need for flexibility on the teachers' ends to react to the needs of and interact with students. Students are not necessarily recruited into higher education, but the outcome of higher education to be to support them in making career choices. Central to this intelligible identity is to negotiate the roles of teaching on undergraduate and graduate level as well as developing one's own teaching through both experience and professional pedagogical training.

4.2.1 | Supporting students in becoming critical and creative thinkers

While the Research Science Teacher emphasizes the transfer of knowledge from a more knowledgeable teacher to a less knowledgeable student, Facilitating Science Teachers put focus on the learning process and on students becoming independent learners and thinkers. Explicitly mentioning that they distance themselves from and reject commonly known and valued teachers' goals to recruit students into research, Facilitating Science Teachers support the students when shaping their own education.

Facilitating Science Teachers also aim at providing students with resources along their education. AcP05 writes about his approach to teaching,

> In my teaching, I focus on showing opportunities for students and giving them the tools to search for knowledge and take responsibility for their education. However, I realize that it is important to be clear about what is expected of students to help those who find it difficult to seek knowledge independently.

This shows that the students are provided with tools to be able to maneuver through and shape their education; however, the Facilitating Science Teacher also recognizes teachers' responsibility to be clear about expectations and learning goals. In her statement, AsP17 highlights that she wants students to become independent and "lifelong learners." She talks about "giving students skills that they can use throughout their university career and beyond" and continues,

> I strongly believe students are more engaged with a topic if they are participating in its discovery. Writing something original forces students to discover new things about a subject as well as giving them a sense of ownership for their own discoveries.

While an idea of passing on knowledge as an outcome of higher biology education is an subliminal part of almost all teachers' negotiations, AcP03 highlights that it is important to assist students in becoming courageous and confident to open doors to knowledge and further

education themselves, a metaphor that places students' agency at the center of education. She also emphasizes the outcome of learning to be able to criticize and question what is behind those doors, meaning current knowledge and practices. AcP03 commences her statements with "knowledge shall give the freedom to think in different directions," which underlines the idea that knowledge can make the students independent and allows them to think in their own ways. Furthermore, she sees providing access to methods, knowledge, and tools, and the encouragement to use them as enabling students to change society. According to AcP03, the students' development toward independence can be obtained through gaining students' trust by being compassionate.

Students shall be actively included in the process of knowledge production and be given agency to shape knowledge and their education. Students as characters in the figured world are hence considered knowledgeable participants that can contribute to academic interactions. AsP17 emphasizes "life skills" and that she sees her main goal as also providing students with skills that they can use during and beyond their university education. She writes that it

> is truly rewarding when your students are able to delve deeply into a discussion and challenge your own understanding. As a professor, I use my extensive experience in facilitating discussions to encourage it in my classes.

This shows the two-way learning interaction mentioned above between students and teachers, where the teacher facilitates students' discussions and can also draw on and learn from the new perspectives students share when those discussions occur.

The Facilitating Science Teacher not only focuses on critical, but also on creative thinking, which is often connected to notions of the teacher's task to "serve as an inspirer for the students" (AcP02). Even though very similar to notions of motivating students through enthusiasms common for the Research Science Teacher, inspiration is here framed in a way that aims at giving students the opportunity to mature by thinking independently and critically, finding their own fields of interest, forming their own opinions, developing creative strategies to solve tasks. AcP07 writes:

> I am trying to bring about an open-minded and creative atmosphere, which stimulates the students to be active in scientific discussions. As a supervisor, I support the students' independence and confidence by encouraging them to think by themselves first before asking me and I always ask for their suggestion as to how to solve the problem.

Here, creativity and being impartial are highlighted to encourage students' participation. However, participating is strongly connected to a science context in which both, "independence and confidence" are to be supported by the Facilitating Science Teacher's encouragement and students' independent thinking. AcP03 highlights the balance between structured learning and allowing for creativity when she writes that the "difficulties often lie in being moderately structured and not jeopardize the students' creativity, participation, and influence." AcP03 highlights the norm of university teaching and examination in which not much space is given to creative thinkers who may have difficulties with writing. She writes, "[t]he big problem is not to lose the creative and innovative students who may not always be so good at expressing themselves in writing." Creativity is thereby being understood as getting lost when students are forced to perform academic and scientific acts only.

4.2.2 | Creating spaces for interdisciplinarity and interaction

While the Research Science Teacher focuses on students' future career as researchers within one particular and narrow natural science field, the Facilitating Science Teacher leaves more space for interdisciplinary approaches to education and the students' future. AcP02 mentions both students that want to become experts as well as students who want to become "those who are active in other fields in society, especially regarding environmental issues." AsP17 describes giving students the opportunity to work in an interdisciplinary fashion and writes:

> I will also develop further the graduate course at the department, which functions as interdisciplinary communication platform. I will go through course evaluation and will develop additional parts, where the students not only present projects and discuss scientific articles, but will also have a possibility to design and discuss the interdisciplinary projects.

This teacher focuses on research and scientific methods as well as acknowledges interdisciplinary approaches as she has been trained as an interdisciplinary student herself. Similarly, P18 writes,

> I am especially interested and eager to develop interdisciplinary courses with members of different faculties or departments, which will reflect not only the increasing interdisciplinarity in contemporary science, but also account for the increasing desire of students to acquire knowledge from various fields.

This teacher also highlights the importance of ethical aspects and research ethics in her teaching approach and she very explicitly writes about the students asking for more interdisciplinarity. AsP18 continues,

> Becoming exposed to different training methods and educational backgrounds is extremely important to tackle complex biological problems and, at the same time, increases a graduate's chances on the general job market.

She explicitly mentions both academic and industrial careers in her statement and describes exposure to a variety of interdisciplinary training methods as being crucial for students. AsP14 also writes,

> My own research is very interdisciplinary (...). I think it would be a great benefit to students if they started learning the different 'views' different disciplines have to the same topic.

Facilitating Science Teachers highlight the importance of reacting to students' needs and consequently of adjusting the teaching on both undergraduate and graduate level. AcP01 writes, "it is also important to have a sensitive ear and be flexible to the need of the graduate student" and AsP19 states,

> On a more practical level, I believe the best results are obtained when an adaptive approach is taken to teaching. Specifically, when teachers obtain feedback throughout the semester and modify lectures and teaching methods in response.

In order to allow for adjustments, Facilitating Science Teachers therefore value evaluations during the term, rather than only at the end. Additionally, it is not only important to react to formal feedback, but also to practice informal and constantly ongoing self-evaluation through observation and reflection. One teacher, AcP08, emphasizes that he also thinks "that the teacher must actively observe the learning situation and be ready to modify the teaching based on these observations." Thus, Facilitating Science Teachers recognize their responsibility to actively reflect on how to adjust the teaching in a flexible manner.

This flexibility not only refers to students' in-class learning progression, but also to a sensitivity to and awareness of students' backgrounds. AsP13 writes that:

> challenges typically stemmed in some form or another from the diverse range of student backgrounds, abilities, interests, goals, or learning styles, which requires [the teacher] to be flexible and adaptive when finding ways to communicate with or motivate students.

While "background" was rather often connected to describing teaching challenges, we also found that referring to "backgrounds of students" in many cases was solely connected to students' previous knowledge, learning processes, and goals, which then in turn justifies the use of different teaching techniques. AcP01 also emphasizes the importance of the students' backgrounds:

> Another important thing in teaching is the contact with the students. In the beginning of a lecture, it is important to establish a contact between the teacher and the students to be able to have a dialogue during the lecture. This dialogue is important because different students have different backgrounds so that I might have to adapt the lecture as I go along.

He also connects background to previous knowledge of the students and provides a "variation in methods" as "students are different in the way they process the information that is provided to them" and as they are understood to have different learning processes. However, and as AsP12 mentions, some content is "not necessarily intuitive" and "each student has his own learning style." In contrast to the Research Science Teacher, the Facilitating Science Teacher reflects on intuitive understandings of concepts and tacit knowledge and acknowledges that even something that becomes intuitive understanding and tacit knowledge derives from learning processes as well as different ways of learning.

Adapting teaching in order to meet the needs of students with different backgrounds is imagined as central to the teaching practice, yet we could identify that what university teachers in this study mean by the term background, is diverse. While making adaptations in teaching is portrayed as important, it is also considered to be time-consuming and the limited resources given for a course to often constrain the development of adaptations. AsP20 writes,

> When needed, I will revise my lessons, and try to be flexible with the time constraints of the course. But at the same time, I like to regularly assess my pace in teaching while maintaining the flexibility and have a time-plan for most topics.

In this quote, we can see the tensions between accommodating students with different backgrounds and providing the content with constraints of restricted amounts of time allocated to teaching and teaching development.

4.2.3 | Negotiating teaching roles and developing teaching skills

Facilitating Science Teachers make an explicit distinction between teaching students and supervising students. While teaching students is figured as requiring teaching skills, supervising students is a task involving both teaching and research competences. AcP09 writes:

> Since I am also a researcher, I supervise both graduate and undergraduate students at bachelor and master levels. This type of teaching role differs from the general role of the teacher, since students and project workers usually work alone on a project or are part of a project where they do everything from planning, experimental work, results compilation and comprehensive written and oral presentations.

This teacher makes a strong distinction between the role as a teacher and the role of a supervisor, emphasizing that he supervises students and their degree work in his role as a researcher. Supervision can indeed be considered a "type of teaching" according to him; however, the approach is different from a nonsupervisory teaching approach. The outcome of higher education and the goal for teaching is considered to not only being subsequent training to become a researcher and a recruitment into higher education. However, both the goal of recruiting students into research spaces, as well as using students "as a tool for their own personal career," is something they know "unfortunately occurs" (AcP03) and to be a common practice.

While the Research Science Teachers emphasize their high level of scientific competence paired with the ability to transmit enthusiasm as central to being a good teacher, whereby teaching skills come naturally, Facilitating Science Teachers emphasize the importance of developing their teaching competences professionally. For them, teaching is not considered similar in nature to research and research methodologies, hence familiar and rather easy to maneuver. Instead, teaching and being part of the process of students' becoming "productive members of society" is figured as "extremely difficult" (AsP02) and not only to advance through experience, but rather through professional training. AcP12 writes:

> I believe that pedagogical skills are like any other skill; they can be improved by training and study. Continued pedagogical development is therefore crucial to me, and the possibility to engage in discussions at the department level and to take courses in pedagogy will be an integral part for my personal and professional development.

Acknowledging teaching to be different from supervision and research and to be a skill that needs to be learned is one of the strongest tensions between the Research Science Teacher and the Facilitating Science Teacher. While our analysis does not focus on how female and male

university teachers figure worlds of higher education biology, we could find a tendency of female university teachers to more explicitly and in a more nuanced way negotiate their identities in a Facilitating Science Teacher manner. Especially female university teachers such as AcP03 explicitly oppose competences and performances typical for the Research Science Teacher. One similarity, however, is that most teachers, female and male, Research Science Teachers and Facilitating Science Teachers alike, draw on their *experiences* when having been students themselves.

4.3 | Summarizing two intelligible identities

In our material, we can see different ways in which university biology teachers applying for teaching positions at a Swedish university negotiate ways of being and do identity work in relation to imaginaries of the figured world of biology. These two imagined identities, even though not a strictly exclusive binary, constitute two intelligible ways of being in the world of higher education biology that university teachers in this study drew on in a variety of and in sometimes overlapping ways. Research Science Teachers negotiate their teaching identities in relation to scientific knowledge and research practice. They consider teachers to be knowledgeable actors who pass down scientific competence and the right kind of enthusiasm to less knowledgeable and less enthusiastic science students. When elaborating on their teaching philosophies, they position themselves as researchers who through their research and scientific competence become competent teachers. They thereby aim to familiarize students with elite practices of science with the goal to recruit those that have mastered scientific practices into research. Facilitating Science Teachers are aware of the common imaginary of recruiting students into research, yet oppose this practice and position themselves as supporters for students' aspirations. They consider learning to be a two-way interaction, yet acknowledge their responsibility to facilitate learning and guide students on their paths through higher education. Facilitating Science Teachers do not put research competence on a par with teaching competence, but consider both to be learned.

While these two imagined intelligible identities are different in how they position actors, imagine valuable acts, and desirable outcomes in the figured world of higher education biology, they share positioning science as an anchor in relation to which competences, performances, and recognition is negotiated. Research Science Teachers display taken-for-granted ideas about knowledge production, appropriate emotions, and legitimate practices, while Facilitating Science Teachers explicitly and implicitly reject these norms and suggest improvisations. In the following discussion, we look more closely at these tensions, as it is in these tensions that decisions are made to reproduce or to transgress norms of higher education science and biology practice.

5 | DISCUSSION

Our point of departure is to acknowledge that university teachers, just like university students, find themselves in a constantly ongoing process of negotiation and enculturation. It is, however, also important to recognize that university teachers at same time gain agency and power to reproduce and challenge the very practices they themselves negotiate. The two imagined intelligible identities described here reflect university teachers' negotiations of participation in

academic spaces and thereby make visible what competences and performances in worlds of higher education biology are recognized. These negotiations happening on an individual and micro level are situated in and influenced by discursive and overarching cultural worlds on a macro level. This awareness of identity work's situatedness allows for a discussion on how higher education biology as a world and the people within this world are collectively shaped.

Through our analysis, we could find that imaginaries of what it means to do *science* is a discursive anchor point the university teachers gravitate toward and negotiate identities in relation to. Teaching biology becomes associated with teaching science and scientific practice, which in turn becomes intertwined with research and research practices. The dominant imaginaries of Research Science Teachers explicitly negotiate students' competences as well as the teachers' own competences in relation to research practices. Whereas Facilitating Science Teachers voice an awareness of these dominant ways of being and doing, while at the same time challenging them through improvisations and explicit rejections. In the following, we discuss these tensions and possible consequences with a feminist critical perspective. The process of doing research, understood as starting with project development to being completed with publishing in international journals, is figured as the elite practice, as the practice to learn, perform, strive toward, negotiate, and relate to. Ideas about research are associated with elite and eliteness with unconditional knowledgeability, as one teacher explicitly expresses: One is not allowed to not know. But the question that arises here is, in which role is one not allowed to not know?

Students become positioned as less knowledgeable, while teachers need to relate to ideas about being ultimate knowers through their positions as researchers, transmitting their knowledge instead of decentering authority and creating a learning space in which even "teachers grow, and are empowered by the process" (hooks, 2014, p.21). This becomes expressed when teachers imagine themselves in their role as researchers to be most suitable to teach their research field, which positions a specialist's expertise as superior to the competence to teach. They legitimize themselves as teachers of all degree levels (undergraduate and graduate) through their role as researchers rather than through their role as university teachers. Research knowledgeability, the imaginary of being an experienced competent researcher, becomes positioned as ultimate, them teaching in their roles as researchers making them good teachers. This resonates with Andersson (2018) as well as Brownell and Tanner's (2012) findings, research to be valued more than teaching. However, positioning research on a pedestal as a phenomenon is not unique to higher education biology. It has also been discussed in other higher education natural science contexts such as physics and engineering (e.g., Larsson, 2021) and to be related to dominant masculine norms in higher science education (e.g., Ottemo et al., 2021). One approach to discuss this phenomenon is from the perspective of power, research being collectively valued, research identities being hegemonically recognized as masculine and dominant (e.g., Chen, 2015; Chen et al., 2015) and hence competence assigned to certain bodies. While we need to acknowledge how university teachers' enculturation has influenced their identity work, how they negotiate themselves and others in higher education science spaces, we also need to pay attention to how university teachers reproduce inclusive and exclusive norms in education practices.

Research Science Teachers interpret the world around them through the lens of research as the central legitimate science and university practice. In our material, this becomes apparent as teachers interpret students' backgrounds reductively as previous knowledge that have to be addressed and developed rather than seeing students as whole human beings with their intersectional experiences. A focus on research also becomes apparent through the interpretation of "research-based teaching." Research-based teaching is read by Research Science

Teachers as implementing the very practices of research, teaching how to do research rather than using science education research to inform how to teach. Adjusting to educational backgrounds and hence teaching how to master scientific practices becomes the imagined and recognized goal of higher education, a competence learned through experience rather than by looking into, for instance, educational research. Research Science Teachers thereby become positioned as all-knowing and *whole*, those that introduce students to the very practice in a hierarchical apprentice-master relationship (Lave & Wenger, 1991).

In our analysis, we could find Research Science Teachers to imagine a strong distinction between less knowledgeable students and unconditionally knowledgeable teachers. This not only produces a split between students and teachers, but through compartmentalization of competence may also render invisible and deny students positions of knowledgeability and prevent teachers to be subjects that learn and become more knowledgeable themselves. hooks (1994) highlights that "the objectification of the teacher within bourgeois educational structures seems to denigrate notions of wholeness and upheld the idea of a mind/body split, one that promotes and supports compartmentalization" (p. 16). Research Science Teachers compartmentalize competence by valuing research associated with the mind, with masculinity and elite, imagining the intellectual as an objective interrogator, transmitting knowledge to inferior subjects that over time become "whole" by becoming researchers. In this idea and through drawing on one's experiences as students, as beings that were not whole themselves, intergenerational reproductions of hegemonies that reproduce hierarchies become visible.

Drawing on figured worlds allows us to ask about imaginaries that inform how we see and construct the worlds around us, how we understand social realities and negotiate our identities in day-to-day practices. Hence, the following question arises: What if the collective imaginary of a research culture does not make it possible for Research Science Teachers to position themselves as learners?

Facilitating Science Teachers also negotiate their roles and identities in relation to science and research, which strengthens the finding of ideas about science and science practices to act as pulse generators in higher education biology. They value critical thinking as a learning outcome, negotiate scientific knowledge productions, highlight independent thinking and problem solving; competences associated with science practices. At the same time, they reflect a rigid and institutionalized approach to jeopardize students' creativity, suggesting that rather than caring about the science and its related practices only, they care for the students being able to develop their interests and competences. Hence, while not excluded from relating to scientific practices and research as an anchor point of legitimate university identity, they also negotiate alternatives to this research centrality and its practices, positioning students' personal interests and competences as important, anallowing themselves to learn.

Another prominent example of how Facilitating Science Teachers display awareness of, yet challenge research-related imagined norms, is when dismantling Research Science Teachers' gaze at students as potential future researchers as common. Facilitating Science Teachers here compartmentalize their roles and associated competences as researchers and teachers and liberate themselves from expectations of unlimited knowledgeability. They, on the one hand, acknowledge that their role and competence as researchers benefits students when acting as supervisors for those that aim to pursue a scientific research career. On the other hand, they imagine their role as teachers to be to facilitate learning of individuals that have diverse aspirations, competences, and backgrounds and display an intention to develop an inclusive environment that welcomes all participants. Facilitating learning, the act of teaching, is considered a competence, which has to be learned and practiced. Disconnecting teaching from the role as

researchers, hence allows Facilitating Science Teachers to position themselves as learners and to emancipate themselves from a hegemonic identity performances of an "all-knowing, silent interrogator" as phrased by hooks (1994, p. 21). hooks furthermore reminds us that "any classroom that employs a holistic model of learning will also be a place where teachers grow, and are empowered by the process" (hooks, 1994, p. 21). A prerequisite for this growth, hooks suggests, is to bring personal narratives to classrooms and thereby allowing ourselves to be vulnerable. Facilitating Science Teachers confess to not be all-knowing, they thereby make space for their own and others' learning, allow themselves and others to grow, and thereby produce and reproduce alternatives to hegemonic exclusionary apprentice-master narratives, through being vulnerable. Hence, this prompts us to ask: What if Facilitating Science Teachers could transgress dominant notions of the centrality of research by not putting research and teaching competence on a par, allowing themselves to be vulnerable and to learn?

The privileging of mind over body and the construction and hegemonic positions of certain masculine coded practices (i.e., research) over feminine coded practices (i.e., teaching) has been described as particularly prominent as well as particularly relevant to fields such as physics and engineering (Ottemo et al., 2021), which is challenged by the findings of this study as similar patterns could also be found in a biology context. In a higher education physics context, Gonsalves (2018) describes gendered lines separating research and teaching, a phenomenon that Larsson (2021) explores further, showing that "in a system where the goal of all physics learning is implicitly assumed to be expert physics, choosing to become a teacher means diverting from the expected path" (p. 123). Ideas about interests in teaching become divergent from being an expert, which has been shown to already manifest itself academically during postdoctoral years (Åkerlind, 2009; Chen et al., 2015; Hudson et al., 2018). This may mean that on postdoc level, participants have already been enculturated into practice in which teaching was not recognized by others as an inherent part of doing science at a higher education institution. Teaching is culturally and historically constructed as inherently social, intertwined with matters of caring for students and associated with the feminine, the teaching profession hence feminized (Drudy, 2008; Hjalmarsson & Löfdahl, 2014). Research in contrast, and practices and traits related to research such as objectivity and rationality, have historically been associated with and discursively constructed as masculine, the doing of research hence masculinized (e.g., Gonsalves & Danielsson, 2020; Keller, 1987). This study shows how teacher identities are intertwined with performances of hegemonic science masculinities, recognized identities that, in the current research practice, may invite men to and uninvite women from central participation in recognized practices.

As mentioned above, higher education biology is an arena, which is often perceived as gender-neutral or even feminine, easy, accessible in relation to other natural science practices (Wong et al., 2022). This myth is challenged by our study. Discourses of gender neutrality have been problematized as reflecting science norms of objectivity and value neutrality and thereby rather unmarking and neutralizing underlying masculine performances (Gonsalves, 2014; Salzinger, 2004; Schiebinger, 2000) than proving their absence. We argue that a gender neutrality discourse in higher education biology contributes to making gendered processes of exclusion within invisible and thereby limits the space for challenging the gendered norms by those, as in this case Facilitating Science Teachers, who show awareness of norms and dominant discourses. However, while our findings identify potentially limiting spaces, seen from a feminist perspective, transgressing structural boundaries through improvisations also creates ongoing and possible change. As Tolbert et al. (2021) drawing on Hussénius et al. (2016) highlight,

identities that transgress boundaries, transgressive identities, allow "to work within the current structure while also changing it" (p. 132).

The teaching statements used in this study, were written by eligible university teachers when applying for university positions and hence with the intention to be recognized as competent candidates. They work within the current structure. In that process, the applicants relate to and perform imagined intelligible identities and we could show that participants in higher education biology practices negotiate masculinities, merge and oppose the merging of research and teaching, and position the scientific practice of research as an anchor point in relation to which identities and practices become intelligible. However, Facilitating Science Teachers draw on alternative discourses, negotiating their identities in alternative ways; they also perform femininities when negotiating membership in practices (Paechter, 2003), femininities, which have in parts been made accessible through their own experiences in and of, for instance, interdisciplinary spaces. Materializing these negotiations in their teaching statements, a performative act, Facilitating Science Teachers create spaces for alternative repetitive acts, acts that according to Butler (2006) "affirm the local possibilities of intervention" (p. 201). These alternative acts create possibilities for change toward a less monolithic and more inclusive higher biology and science education.

6 | CONCLUSION AND IMPLICATIONS

This study provides insights into what identities university biology teachers imagine as intelligible in their figured worlds of higher education biology. Through explorations of teaching statements, we describe two recognized identities; Research Science Teachers legitimizing their competence as teachers through their competence as researchers and Facilitating Science Teachers relating to the centrality of research, however, imagining research and teaching identities in nuanced and transgressional ways. Visualizing the centrality of a masculine coded research competence imaginary that is also connected to hegemonic imaginaries of science as elite, this study provides further evidence that norms of masculine-coded science practices are positioned as anchor points in university biology teachers' identity negotiations and hence biology as a discipline to not be a gender-neutral practice. While research on possible and impossible (science) identities in male-dominated natural science disciplines is rather extensive and perspectives on higher education biology marginalized, our explorations point toward broader mechanisms of in- and exclusion, based on imaginaries of who embodies science in identity political and gendered fields of tension (Brickhouse, 2001; Brickhouse et al., 2006). As research practices associated with masculinity are even at the center of imaginations of legitimate participation in higher education biology, the practice jeopardizes to lose and exclude women and other marginalized groups who get directed into negotiating their identities as *other* than the (masculine) norm—across generations. Further problematizing a female bias in terms of undergraduate enrolment to be falsely associated with an absence of gendered processes, the findings of this study suggest a need to continue deconstructing what identities are imagined, available, as well as legitimized and for whom in higher science education spaces in general and biology in particular. Practices of research and teaching are still connoted with masculinity and femininity and subject positions attainable based on who is considered to belong in certain spaces and to do certain tasks, making university teaching spaces paradoxical spaces (Tamboukou, 2000). Our study suggests to continue exploring these paradoxical, interstitial

spaces, spaces in which boundaries of science, science education, and gender dissolve and tensions in participants' identity work arise (Hussénius et al., 2014).

We furthermore demonstrate that university biology teachers, while being aware of the aforementioned norms and negotiating them, imagine alternative ways of being in worlds of higher education biology. bell hooks reminds us that:

> the call for a recognition of cultural diversity, a rethinking of the ways of knowing, a deconstruction of old epistemologies, and the concomitant demand that there be a transformation in our classrooms, in how we teach and what we teach, has been a necessary revolution. (hooks, 1994, pp. 29–30).

The theoretical framework of this article made it possible to map out understandings of how university biology teachers figure and make sense of the academic and disciplinary worlds surrounding them. Recurrently, they draw on experience and *subjective* reflections when negotiating their teacher identities, while at the same time negotiating norms of *objectivity*, a hegemonic and cultural understanding of science practice. It is here, we see the potential of this work to support academic teacher trainers and university teachers in reflecting upon the identities that they negotiate for themselves and others and the identities that they perform and role model for the students that they encounter. How do they contribute to (re)productions of norms of being in educational worlds through the very position they hold? Approaching cultural norms in science practice from an identity theoretical perspective supports developing an understanding for in- and exclusion processes in science education spaces. With this study, approaching identity as worked in figured worlds, combining cultural, discourse analytical, and feminist theory, we provide an example of how identity perspectives can be used to explore university science teachers' identities. While these explorations make visible university teachers' identity work on individual and micro level, it also displays collective sense making of and improvisations from overarching, cultural, macro-level norms of doing science. The findings of this study thereby suggest theoretical and applied implications for university teacher education and also provides directions for further research on participants' identity work in historically, culturally and, socially constructed worlds of higher science and biology education.

To conclude, we acknowledge that negotiating identities is influenced by many factors and to operate along a multitude of intersecting axes of power in identity political spaces in general (Crenshaw, 1991) and in science education as an identity political space in particular (e.g., Avraamidou, 2020b). We believe that if and when teachers are given spaces to reflect on the very norms they themselves negotiate, were enculturated into, and have embodied through repetition, these very norms of, for instance, objectivity and research-centrality can be and are challenged rather than reproduced without reflection. To conclude with hooks' (2014) words, "to teach in varied communities not only our paradigms must shift but also the way we think, write, speak" (p. 11).

ORCID

Katerina Pia Günter https://orcid.org/0000-0002-8520-2642
Ingrid Ahnesjö https://orcid.org/0000-0002-9942-5687
Annica Gullberg https://orcid.org/0000-0002-7828-3173

ENDNOTE

[1] Intended learning outcomes.

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