

Connected or Conflicted? Doctoral Students' Evolving Perceptions of the Teaching- Research Relationship

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ABSTRACT: For doctoral students aspiring to a faculty career, perceiving connections between the core faculty activities of teaching and conducting research is essential for professional success. Using the conceptual lens of professional socialization, we explored how doctoral students' experiences concurrently serving as teachers and researchers influenced perceptions of the teaching–research relationship. We used semilongitudinal interview data from two early career doctoral students who began and ended an academic year with markedly changed perceptions of the teaching–research relationship. Findings pinpoint the importance of the faculty supervisor's stance toward the teaching–research relationship and departmental practices related to teaching and research assignments.

Doctoral students who join the faculty ranks after graduation will face an increasingly tense and competitive academic workplace. Heightened expectations for scholarly productivity, coupled with insistent calls for teaching effectiveness, have profoundly affected the nature and pace of academic work (Austin & McDaniels, 2006; McAlpine & Amundsen, 2011; Peters & Olssen, 2005). In response, many doctoral students initially committed to the pursuit

of a faculty career are deterred by the prospect of an expanded workload and lack of work-life balance (Miller & Stone, 2011; Sears, 2003). Those who remain committed to joining the professoriate desire greater work-life balance in the academy (Quinn, 2011). These concerns are particularly true for those considering careers at research-intensive universities (June, 2009). However, in light of the increased focus on research productivity at teaching-oriented institutions (Remler & Pema, 2009), concerns about work-life balance have become prevalent for many considering professorial careers across a range of institution types.

A response to these concerns may lie in reenvisioning the faculty role from an obstacle course of compartmentalized obligations to a holistic role defined by integrated professional tasks. This integrated approach has been embraced by those who study future faculty preparation. Austin, Connolly, and Colbeck (2008) urge faculty and administrators to create learning environments in which their doctoral students can become “integrated professionals”—individuals who understand, value, and incorporate into their work a range of commitments and activities” (p. 70). This integrated approach would thus necessitate a close coupling of the two core professorial tasks of teaching and research.

Given that tomorrow’s faculty are drawn from the ranks of today’s doctoral students, insight into the development of these students’ perception of the teaching-research relationship is needed but is rarely found in extant literature. As discussed further, most doctoral students are engaged in research, and many provide instruction in the classroom or laboratory. Often, these students are simultaneously engaged in research and teaching activities, and it is likely that their perceptions of these activities as being connected or conflicted are shaped, perhaps irreversibly so, during doctoral training.

DOCTORAL STUDENTS AS TEACHERS AND RESEARCHERS

Internationally, doctoral student engagement as teachers and researchers is common in higher education institu-

tions. Some estimates suggest that graduate teaching assistants (GTAs) instruct almost half of U.S. undergraduate courses (Branstetter & Hendelsman, 2000), while a study of UK GTAs found that they taught more than 70% of a department's small group seminars for early career undergraduates (Muzaka, 2009). Institutions employ GTAs to increase class availability, cut instructional costs, and provide funding and teaching experience for GTAs (Harland & Plangger, 2004; June, 2011). GTA assignment often occurs when students begin their graduate programs (Luft, Kurdziel, Roehrig, Turner, & Wertsch, 2004), and lack of GTA teaching experience is common (Harland & Plangger, 2004). For this reason, many universities now offer GTA training (e.g., Calonge, Chui, Thadani, Mark, & Pun, 2011), although training varies in duration and scope (Luft et al., 2004).

GTA obligations vary widely, ranging from full responsibility for developing and delivering instruction and assessments to more limited responsibilities, such as grading papers or responding to students' e-mailed questions (Prieto & Meyers, 1999). Not only do the instructional duties vary widely across GTAs, but investigations also suggest that GTAs' responsibilities within their respective departments are often poorly defined (Flora, 2007; Muzaka, 2009). Variation in GTA responsibilities may limit the kinds of experiences incurred, in turn influencing GTAs' knowledge and perceptions of the faculty role. Furthermore, GTAs often struggle to balance their simultaneous roles of student and teacher (Cho, Kim, Svinicki, & Decker, 2011) and may receive mixed messages about the value of teaching from their faculty advisors and peers (Austin, 2002; Jones, 1993).

In terms of doctoral students' research experiences, most students are extensively involved in research during doctoral training, as "the PhD, at its heart, is a research degree" (Golde & Walker, 2006, p. 10). Studies consistently report that between 35% and 50% of students serve as graduate research assistants (GRAs) during their doctoral tenure (Hauptman, 1986; Nettles & Millett, 2006). In general, GRAs are more plentiful in the sciences than in the humanities (Bowen & Rudenstine, 1992; Nettles & Millett,

2006). Faculty grants, more prevalent in the sciences, fund many available GRAs, and these assistantships may lead to shorter degree completion times and higher completion rates than other funding sources, such as teaching assistantships or self-support (Ehrenberg & Mavros, 1995; Seagram, Gould, & Pyke, 1998).

THE TEACHING-RESEARCH RELATIONSHIP

Dialogue around the teaching-research relationship is neither new nor uncontested. Studies using quantitative proxies for teaching and research, such as the number of published research articles and teaching evaluations, suggest that any existing relationship is tenuous at best (Feldman, 1987; Hattie & Marsh, 1996). While many faculty profess belief in a robust relationship between teaching and research (Brew & Boud, 1995; Robertson & Blackler, 2006), these activities can appear to compete or conflict, as time allotted to one is perceived as decreasing time available for the other (Colbeck, 2002; Robertson & Bond, 2001). Colbeck (2002) found that balancing teaching and research is difficult even for those judged to be excellent teachers and researchers. Furthermore, "the perception of difficulty seems to decrease substantially with rank" (p. 6), as a lower percentage of full professors (33%) perceived experiencing difficulty with this balance as compared to assistant professors (68%). Thus, balancing (much less integrating) teaching and research appears difficult for many faculty, especially those beginning their careers.

Overwhelmingly, however, representations of the modern university in current literature strive to emphasize the vitality of the teaching-research relationship. For example, Goldin and Katz (2008) stated, "The modern university is . . . a production center in which the research of one part enhances the teaching and research of the other parts" (p. 263). A recent past president of a U.S. university opined, "Great universities should be great dispensers . . . [and] . . . creators of knowledge. New knowledge comes from research, and one

of our reasons for doing it is that good teaching and good research go together" (Spirit.gmu.edu, spring 2009). Schapper and Mayson (2010) cited "the catchy 'sound bites'" (e.g., "twin peaks of excellence") used by senior administrators at a large research-intensive Australian university to describe the aspired relationship between teaching and research (p. 641). Thus, higher education institutions strive to portray teaching and research as mutually sustaining, regardless of the reality of this portrayal in daily faculty activities. What is an indisputable reality, however, is that for most faculty, the pace of work has noticeably increased (Austin & McDaniels, 2006) and time is a limited resource (Remler & Pema, 2009). For future tenure-track faculty to be successful in the face of increasing demands and time pressures, perceiving teaching and research as synergistic is critical, and, as we contend, begins during doctoral training.

CONCEPTUAL LENS AND CONTEXTUAL BACKGROUND

This study frames the consideration of doctoral students' experiences within the conceptual lens of professional socialization. Doctoral training represents a time of intense professional socialization, defined by Austin and McDaniels (2006) as "a process of internalizing the expectations, standards, and norms of a given society, which includes learning the relevant skills, knowledge, habits, attitudes, and values of the group that one is joining" (p. 400). Socialization models commonly depict stages roughly aligned with time points within a doctoral program (e.g., Gardner, 2009; Weidman, Twale, & Stein, 2001). For those at the start of their doctoral tenure, learning programmatic and disciplinary expectations is balanced with a consideration of whether these expectations align with and support personal expectations for professional development. As Golde (1998) observed, these students contemplate such questions as "Do I belong here [in this program]?" and "Do I want to do this [disciplinary] work?" (p. 56)

Faculty advisors are thought to be pivotal in doctoral socialization. They "do more than simply stand and point the way.

They accompany their protégés through the entire process [of graduate study]" (Hawley, 1993, p. 53). In engineering and the sciences, laboratory-based research teams are common (Cumming, 2009; Parry, 2007). Thus, for students in those disciplines, other faculty, postdoctoral fellows, and more senior doctoral students who collaborate on research may also serve as important disciplinary models and mentors (Maher, Gilmore, Feldon, & Davis, 2013). Others further removed from the activity of the laboratory, such as departmental or college staff and course instructors, are also part of the socialization process. Finally, doctoral students are often introduced to those outside their institutions but inside their disciplines through participation in multi-institutional collaborations or attendance at professional conferences. We posit that it is through interaction with these various socialization agents that doctoral students develop perceptions and behaviors that reverberate throughout their professional careers.

In this study, we explore how doctoral students' concurrent experiences serving as teachers and researchers influence their perceptions of these two primary faculty activities as connected or conflicting. Our exploration is part of a larger project examining the impacts of science, technology, engineering, and mathematics (STEM) graduate students' teaching and research experiences on the development of their research skills (Feldon et al., 2011). As this larger study unfolded, we observed that some students experienced changes in their perceptions of teaching and research as connecting or conflicting activities. To explore why, we identified two doctoral students—both of whom expressed interest in a faculty career, and both of whom experienced marked change in their perceptions of the teaching–research relationship over an academic year. We then explored and compared their teaching and research experiences within the year to draw inferences about their influence on students' perceptual changes in the teaching–research relationship. Our study is guided by an overarching question: How do doctoral students' experiences serving concurrently as teachers and researchers influence these students' perceptions of the teaching–research relationship?

METHOD

Site

Our study was situated at a large research-intensive university (Carnegie classification RU/VH [research university/very high], formerly known as R1 [Research 1]) in the Southeastern United States (Carnegie Foundation, 2014). Study participants were recruited from programs in the departments of biological science or civil engineering. The biological science program annually enrolls approximately 15 doctoral students and trains them for careers in research, teaching, and scientific leadership." The civil engineering program annually enrolls approximately 55 doctoral students and prepares them for careers in research and teaching. In both programs, GTA service is optional; GRA service is expected and available only through external funding secured by individual faculty. Most doctoral students in these two programs are supported through GTAs, GRAs, or both throughout their doctoral career.

Study Design, Implementation, and Analysis

As Merriam (2009) notes, qualitative research reveals how individuals interpret and attribute meaning to their lived experiences. As such, a qualitative approach underpins this study's effort to understand how doctoral students understand and describe their complex and variable doctoral experiences related to the study research question. Specifically, we use a case study qualitative approach, appropriate when the goal, as it is in our study, is to "investigate a contemporary phenomenon within its real-life context" (Yin, 2009, p. 18). The experiences of two doctoral students served as the comparable cases for this study. Each student was a GTA while conducting supervised research as a GRA. Narrative data from students were gathered through semistructured interviews conducted at the beginning and end of an academic year. To deepen our understanding of students'

experiences, we also interviewed each student's faculty supervisor in spring of the academic year.

Interview protocols, developed after a review of relevant literature, addressed students' perceptions of teaching and research experiences. For example, questions related to teaching experiences elicited perceptions of how students' teaching assignments were determined and what sort of faculty advisor and departmental support was provided for their teaching activities (Griffiths, 2004; Hattie & Marsh, 1996; Marsh & Hattie, 2002; Robertson & Bond, 2001). Likewise, questions related to research experience elicited perceptions of how students' research assignments were made, as well as what sort of faculty advisor and departmental support was provided for their research activities (Deem & Lucas, 2006; Griffiths, 2004; Marsh & Hattie, 2002; Robertson & Blackler, 2006). All interviews were audio recorded and transcribed. We then applied a constant comparative method to analyze transcript data whereby similarities and differences in the participants' responses were fully explored (Strauss & Corbin, 1990).

The two doctoral students were selected because each was an extreme example of student perceptual change about the teaching-research relationship. Extreme or atypical cases are valuable because they "elucidate the upper and lower bounds of experience . . . and are essential for understanding the range or variety of human experience" (Abramson, 1992, p. 190). Case profiles included Kelly and Andrew (both pseudonyms).

Kelly was a first-year biology doctoral student. At the start of her doctoral studies, she had limited informal teaching experience and more extensive formal research experience. In the fall, she was "passionate about the connection" between teaching and research. By the spring, she described this relationship by saying, "Teaching and research are just two different things." She was the study's negative extreme case, in which teaching and research were seen as increasingly conflicted activities.

Andrew was a second-year civil engineering doctoral student. With no prior research or teaching experience, in the

fall he perceived a "tenuous" relationship between teaching and research. By the spring, he described this relationship as "symbiotic. . . . Teaching helps you be more streamlined . . . more systematic, all things you can apply to research; research helps you be up-to-date on your content, which you can apply to teaching." He was the study's positive extreme case, in which teaching and research were seen as increasingly connected activities.

RESULTS

Students' Experiences as Teachers and Researchers

Each student's teaching and research experiences over an academic year are presented to provide a holistic case study portrait.

Kelly's case. As a new GTA with no formal teaching experience assigned to teach two introductory biology lab sections, Kelly described herself as "nervous" but "really motivated to be someone students remember as making them excited about biology." However, published research, not teaching, attracted her to her doctoral program. While conducting supervised undergraduate research, Kelly discovered that a university faculty member "had published some interesting work in my field—his name kept popping up. . . . That made me want to come here to work with him." Upon earning admission, Kelly was selected to serve as a GRA in this faculty member's lab, and he agreed to be her faculty supervisor. He assigned her to work on a "communal project looking at blood samples and determining population structure."

When the academic year began, Kelly perceived a fairly strong teaching-research relationship. As she explained, both activities aim to increase understanding about biodiversity:

There is definitely a relationship. The lab focuses on biodiversity and ecological relationships. . . . What I study is not a topic that comes up in introductory labs, but understanding biodiversity and ecological relationships is what we are trying to

instill in these students. One aspect of my research is trying to understand the genetic component to that, so in that way, we [students and I] both have an inherent desire to understand.

Kelly's GTA service began with communication about her teaching assignment: "The first semester I was just shoved into this [teaching assignment]. I got an e-mail a few weeks before school started saying, 'You are going to teach this course' and I said, 'Ok, no problem.'" Kelly attended a mandatory half-day university-sponsored GTA training session before her lab sections started. Beyond this, Kelly was required to attend a weekly GTA meeting at which she "step-by-step learned the learning objectives every week as I was teaching it [the introductory biology laboratory sections]." She stated that her faculty supervisor was uninvolved in her teaching assignment, a statement confirmed by her supervisor, who added, "Kelly put a lot of time into her teaching her first semester. She actually told me she wanted to devote her efforts to teaching because she wanted to do a good job. I didn't have any problems with that."

In Kelly's second semester as a GTA, she elected to teach the same lab course and to serve as a "prep GTA . . . who works one-on-one with the coordinator to help facilitate the activities every week and prepare all the materials for the other GTAs." In this capacity, she suggested minor content reorganization based on her previous semester's teaching experience. She again observed that her faculty supervisor was uninvolved with her teaching, an observation confirmed by her supervisor:

Now [at the end of academic year], Kelly is learning she can strike a balance between working in the lab and teaching at the same time, which is good. [She had] more interest in her research in the spring than in the fall. A lot of this is just getting along with the people in the lab and finding out where you are in that hierarchy; it takes a semester or two to learn that.

In both semesters, Kelly reported that about half the material that she taught was broadly related to her specific research interests. However, her faculty advisor reported that

little from her teaching assignment related to her developing research agenda.

Kelly's first semester as a GRA was spent on a communal project within her faculty supervisor's laboratory. She initially described her relationship with her supervisor as "very hands-off. . . . He is behind the scenes and not actively involved in what I am doing." Her faculty advisor validated this perception by saying, "We [in the lab] are pretty much trickle down. I have senior graduate students, senior undergraduates and so on. I am not directly involved in day-to-day activities." His memories of Kelly during her first semester were limited to "She was around but she wasn't doing a lot of lab work."

In her second semester as a GRA, Kelly asked her supervisor for permission to pursue a research project that she described as "a mini one that was half-baked and that would help me get my feet wet. He [supervisor] had some data lying around that had never gotten properly analyzed. So he was like, 'Here it is. Analyze it.'" Her supervisor recalled, "In the spring semester, Kelly came to me and said, 'Just give me some work to do, give me some practice.' . . . She's pretty ambitious. I like that." Kelly described spring semester interaction with her supervisor: "He is there to give guidance and advice when I need it, but he is very hands-off." Her supervisor concurred, "I am pretty *laissez-faire* when dealing with graduate students."

At the end of the academic year, Kelly recognized benefits to involvement with teaching and research, saying, "There is something to be gained from teaching while you are researching." However, almost immediately afterward, she said,

But teaching and research are just two different things—what I do when I am teaching is really something different than what I do when I am researching. When I research, I read . . . write, when I teach, I develop lesson plans. And then there's grading. There is really nothing you can do to change grading that will make it part of my research.

Ultimately, Kelly concluded,

Teaching is important, but you can really sense the pressure from the university to put out grants and publications. You really feel that is a priority in our department, which is totally understandable. But I feel like for every person focused on grants, there should be someone focused on the students. It is hard to expect someone to split their time equally and give so much attention to both—you are only one person.

Perhaps not surprising, at the conclusion of her first academic year, Kelly envisioned a career path that neatly divides teaching from research:

When I do finally decide it is time for me to teach, I'd like to be in a liberal arts setting at a smaller university. I feel like there is a lot of pressure here at this university to do both teaching and focus your research, and I would like to partition those sections. I want to focus on my research for a while and then when that is done, I would like to scale it back and focus on my teaching . . . so, for the first ten years out of my PhD, focus on research, and then focus wholly on teaching.

Andrew's case. Andrew, now in the second year of his doctoral program, had begun graduate studies with little formal research experience and no formal teaching experience. In his first year, he served as a GRA and worked closely with a more advanced doctoral student to learn lab techniques. Andrew also completed two courses with his faculty supervisor, and they shared several conversations about teaching throughout Andrew's first year of graduate education. Andrew's supervisor recalled,

We have talked many times about the classes that he's [Andrew's] taken with me. Often we got onto topics like, "That's why I did this on these exams" or "That's why I gave you one week to do this and not one day." Almost indirectly we have talked about some of my teaching approaches.

Andrew's supervisor also recalled,

I knew almost from the get go when I started working with Andrew that he was very interested in the educational side of

getting the degree. I think he would like to go into academia to be an instructor to focus on education.

At the start of his second year, Andrew learned that his GRA duties would continue and that he would serve as a GTA for his faculty supervisor, leading two lab sections. He recollected his supervisor asking a few days prior to the semester's start, "I need someone to TA these labs. Do you want to do it?" Andrew responded, "Yeah, I want to do it." Thus, Andrew began an academic year that would for the first time include both teaching and research responsibilities. At this point, he perceived the teaching-research relationship as "tenuous—not that pronounced. . . . They have a different set of skills."

Andrew received no formal GTA training prior to leading lab sessions and confessed to knowing little about the content or structure of the lab, describing it as "something to do with materials; I don't know." However, he anticipated establishing positive relationships with students while maintaining high expectations and was committed to "doing everything I can so that the students will actually get the point." As the fall semester unfolded, he regularly met with his supervisor to discuss how to deliver the lab instruction. Andrew described these meetings: "My supervisor told me what experiments he wanted students to run and if there were any special addendums to that experiment that he wanted students to review or pay special care to." In the spring semester, Andrew did not receive a formal teaching assignment. However, he chose to unofficially assist in instructing a lab section whose content aligned with his research interests. Andrew also occasionally substituted for his supervisor in the classroom and found it rewarding: "That is one of the things that has taken me more towards teaching."

As a GRA in the fall, Andrew worked in his supervisor's lab on an investigation convened prior to his arrival. He described the topic of this investigation as "very constricted" but recounted that he had some flexibility over smaller subsequent decisions about, for example, soil sample selection.

His supervisor described the project: "Basically, we are trying to create a database of different soils." He indicated that he provided Andrew with substantial guidance with respect to their lab work:

From the beginning, I have been working with Andrew quite closely to make sure that we have the proper equipment, the equipment was calibrated, he knew the procedures, so on and so forth. How to document the data, how to present the data . . . I am able to get down to the lab quite often to check on him. So I would say our research interactions are fairly frequent because of the type of work he's doing in particular.

As Andrew became more involved in his GRA work during the spring semester, his knowledge of the project grew, and he began to coordinate and delegate the tasks of undergraduate researchers in the lab:

I am working with undergraduate [students] right now, and at the beginning, they hadn't done many of these tests so I had to walk them through it. They said, "You know what? For me it is better if you just give it to me in a series of steps and complete steps instead of just giving me the rough idea of the task and then kind of fill it in." So instead of just giving them a basic overview of the tests, [now I tell them], "First you are going to do this and second this, this, and this" and maybe at the end just walk them through it without all the details—a simplified version—to make sure they got everything.

Andrew's supervisor corroborated this recounting:

We've had several undergraduates work on this project doing tests for us. So Andrew has to essentially train students how to perform tests appropriately. He has a lot of teacher sense that when he's showing them how to do something, he'll say, "Why do we do this? What's the next step?" Andrew certainly seems to have that sense of being able to interact with students, being sure they are grasping it. I've had multiple observations of that.

By the end of the academic year, without hesitation, Andrew identified numerous connections between teaching and research. He felt that conducting research helps in be-

coming "very acquainted with the current stuff that is going on," which "of course helps you out with teaching." This increased knowledge, he thought, helps one anticipate student mistakes: "I can tell the students what the easy part is, what the hard part is, what they should really watch out for." In addition to a shared knowledge base, conducting research "shows that you are very passionate about the areas" that translate into teaching: "It would show that I am really interested in it [civil engineering] and that I am really current on that topic." Andrew also saw ways in which teaching informs research, primarily in terms of organization. He shared,

When you teach, you become more streamlined in your thoughts and more organized and more systematic. That helps you when you apply it to research because you have a more complete grasp of the subject . . . So I think it is a symbiotic relationship.

Andrew's supervisor reflected,

Andrew's teaching experiences have been . . . directly related to the research he's doing, and that is not always the case. In his case, in the lab he taught, he demonstrated experiments and procedures that are exactly what he's doing with his research.

At spring semester's conclusion, Andrew clarified his career goals:

Over the last few months, I have been looking for more of a career in teaching afterwards. I know most professors, especially in engineering, look at teaching like that thing they have to do in order to do research. I am kind of looking at it the other way around, that the research is the thing I have to do to get to do some teaching.

DISCUSSION

How do doctoral students' experiences serving concurrently as teachers and researchers influence their perceptions of the teaching-research relationship? To respond to this

question, we delved into two students' experiences: one who began the academic year perceiving a close relationship between teaching and research and one who began the academic year perceiving these core academic duties as disconnected. By academic year's end, each student's perception of this relationship had radically shifted. While we cannot draw broad generalizations based on two students' experiences, a close consideration of them may allow us to pinpoint the influences most prominent in shaping future faculty members' perceptions of teaching and research as being connected or conflicted activities. In turn, drawing attention to these influences may elicit and support deeper dialogue around how current doctoral education practices prepare, intentionally or not, future faculty to compartmentalize or combine their multiple academic identities.

On the surface, Kelly and Andrew had relatively similar teaching and research experiences. Placement into their respective fall teaching assignments was sudden and haphazard, but both received structured pedagogical guidance. Kelly attended a required weekly GTA meeting at which she "step-by-step learned the learning objectives every week as I was teaching it [the introductory biology laboratory sections]," while Andrew met regularly with his faculty supervisor to discuss how to deliver instruction. At the conclusion of the fall semester, both appeared eager to maintain their teaching roles. Kelly agreed to not only continue to teach a lab course in the spring but to also serve as the "prep GTA" to facilitate weekly teaching activities of other biology GTAs. Andrew chose to unofficially assist in instructing a lab section whose content aligned with his research interests, and he occasionally substituted for his supervisor in the classroom. For both Kelly and Andrew, placement into their respective fall research assignments was predetermined, and fall research activities were constrained to projects already underway. Spring semester brought more leeway, with Kelly pursuing an individual research project and Andrew coordinating and delegating the tasks of undergraduate researchers in the lab.

Beneath the surface, however, distinct differences in the borders between Kelly's and Andrew's teaching and research experiences were apparent. For Kelly, this border appeared largely impermeable. Pedagogical guidance was provided by the biology lab coordinator, a source removed from the site of her research activities. While Kelly more closely interacted with this person in the spring to suggest course changes, her suggestions were based entirely on her previous semester's teaching experiences—not research experiences. Perhaps this was to be expected, as early career doctoral students may not be comfortable enough in their identities as researchers to advocate for links between their teaching activities and research discoveries. In both semesters, Kelly reported that about half the material she taught was broadly related to her specific research interests. Curiously, her faculty supervisor reported that little from her teaching assignments related to her developing research agenda. Perhaps he failed to perceive any connection because, while he "didn't have any problems" with Kelly devoting efforts to teaching, these efforts and their outcomes were never a conversation topic between himself and Kelly.

For Andrew, however, the border between teaching and research appeared porous. His supervisor provided both informal and formal pedagogical guidance. In Andrew's first year, teaching was a common topic of discussion with his faculty supervisor, as Andrew often inquired about his teaching approaches. In his second year, Andrew regularly met with his supervisor in preparation to teach a lab section. He appeared unconcerned about sharing career aspirations for teaching with his supervisor. This suggests that Andrew believed that his supervisor was supportive of his teaching aspirations, a relatively rare stance given that "teaching is often viewed as a secondary career in an academic setting" (Luft et al., 2004, p. 214). Additionally, he easily reproduced his teaching in his research lab, carefully guiding undergraduate students through the steps to complete soil tests.

The experiences of Kelly and Andrew reveal the factors influencing these students' perceptions of the teaching-


research relationship. Graduate students are keen observers of faculty life (Austin & McDaniels, 2006). As such, they appear to mimic what their faculty supervisors do (Luft et al., 2004). Thus, it is perhaps not surprising that the faculty supervisors' daily practice of integrating—or not—teaching and research appears evident within their students' perceptions of the relationship between these two core faculty activities. Faculty supervisor and departmental practices around teaching and research assignments also play a role. For example, a teaching assignment that the graduate student perceives as aligned with the student's developing research interests opens the possibility of real dialogue between the teacher and researcher identities, knowledge, and skills sets.

Within the scope of the present study, good teaching and good research may be meaningfully paired for those who will serve as the professoriate of the future. They can also become increasingly conflicted or estranged activities, creating fractured academic identities and practices. Given that faculty responsibilities continue to expand (Austin & McDaniels, 2006), although the amount of time available to accomplish them remains finite, successful future faculty will need to quickly identify and fully utilize the connections between teaching and research in their professional lives. We contend that the ability to do so is honed during doctoral education, and we suggest that the experiences of Kelly and Andrew provide insight into how to avoid an obstacle course of compartmentalized obligations and create a holistic role defined by integrated professional tasks.

Specifically, we suggest that the socialization of doctoral students as integrated professionals is a joint responsibility between programmatic and disciplinary representatives and students. Those charged with determining the direction and structure of doctoral education—such as faculty, graduate program directors, and other administrators—must be cognizant of the need to identify or create connections between student teaching and research content and activities to the fullest extent possible. Doctoral students must be diligent about voicing their need for greater cohesion in their educa-

tional experiences such that teaching is not divorced from research but that the two activities mutually reinforce each other. It is well recognized that doctoral socialization is a bidirectional process (Antony, 2002; Austin & McDaniels, 2006; Tierney, 1997). As such, students are socialized to the norms and values held by their program and discipline and, in turn, restructure these norms and values through their actions and reactions. We suggest that it is time for all involved in doctoral socialization to recognize and act on the need to promote the creation of integrated professionals.

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REFERENCES

- Abramson, P. R. (1992). *A case for case studies*. Thousand Oaks, CA: Sage.
- Antony, J. S. (2002). Reexamining doctoral student socialization and professional development: Moving beyond the congruence and assimilation orientation. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 27, pp. 349-380). New York: Agathon Press.
- Austin, A. E. (2002). Preparing the next generation of faculty. *Journal of Higher Education*, 73(1), 94-122.
- Austin, A. E., Connolly, M. R., & Colbeck, C. L. (2008). Strategies for preparing integrated faculty: The Center for the Integration of Research, Teaching, and Learning. *New Directions for Teaching and Learning*, 113, 69-81.
- Austin, A. E., & McDaniels, M. (2006). Preparing the professoriate of the future: Graduate student socialization for faculty roles. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 21, pp. 397-456). Dordrecht, Netherlands: Springer.

- Bowen, W. G., & Rudenstine, N. L. (1992). *In pursuit of the PhD*. Princeton, NJ: Princeton University Press.
- Branstetter, S. A., & Hendelsman, M. M. (2000). Graduate teaching assistants: Ethical training, beliefs, and practices. *Ethics and Behavior*, 10(1), 27-50.
- Brew, A., & Boud, D. (1995). Teaching and research: Establishing the vital link with research. *Higher Education*, 29, 261-273.
- Calonge, D. S., Chui, P., Thadani, D. R., Mark, K. P., & Pun, C. F. K. (2011). In-service development for graduate teaching assistants: A blended-learning and formative approach. *Journal of University Teaching and Learning Practice*, 8(3). Available at <http://r.o.uow.edu.au/jutlp/vol8/iss3/3>.
- Carnegie Foundation. (2014). *Carnegie classifications institutional profiles*. Retrieved from http://classifications.carnegiefoundation.org/lookup_listings
- Cho, Y. J., Kim, M., Svinicki, M. D., & Decker, M. L. (2011). Exploring teaching concerns and characteristics of graduate teaching assistants. *Teaching in Higher Education*, 16(3), 267-279.
- Colbeck, C. L. (2002, April). *Balancing teaching with other responsibilities: Integrating roles or feeding alligators*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Cumming, J. (2009). The doctoral experience in science: Challenging the current orthodoxy. *British Educational Research Journal*, 35(6), 877-890.
- Deem, R., & Lucas, L. (2006). Learning about research: Exploring the teaching/research relationship amongst educational practitioners studying in higher education. *Teaching in Higher Education*, 11(1), 1-18.
- Ehrenberg, R. G., & Mavros, P. G. (1995). Do doctoral students' financial support patterns affect their times-to-degree and completion probabilities? *Journal of Human Resources*, 30(3), 581-609.
- Feldman, K. (1987). Research productivity and scholarly accomplishments of college teachers as related to their instructional effectiveness. *Research in Higher Education*, 26(3), 227-291.
- Feldon, D. F., Peugh, J., Timmerman, B. E., Maher, M. A., Hurst, M. D., Strickland, D. C., Gilmore, J. A., & Stiegelmeyer, C. (2011). Graduate students' teaching experiences improve their methodological research skills. *Science*, 333(6055), 1037-1039.

- Flora, B. H. (2007). Graduate assistants: Students or staff, policy or practice? *Journal of Higher Education Policy and Management*, 29(3), 315-322.
- Gardner, S. K. (2009). *The development of doctoral students: Phases of challenge and support*. San Francisco: Jossey-Bass.
- Golde, C. M. (1998). Beginning graduate school: Explaining first-year doctoral attrition. *New Directions for Higher Education*, 101, 55-64.
- Golde, C., & Walker, G. (Eds.). (2006). *Envisioning the future of doctoral education: Preparing stewards of the discipline*. San Francisco: Jossey-Bass.
- Goldin, C., & Katz, L. F. (2008). *The race between education and technology*. Cambridge, MA: Belknap Press of Harvard University Press.
- Griffiths, R. (2004). Knowledge production and the research-teaching nexus: The case of the built environment disciplines. *Studies in Higher Education*, 29(6), 709-726.
- Harland, T., & Plangger, G. (2004). The postgraduate chameleon: Changing roles in doctoral education. *Active Learning in Higher Education*, 5(1), 73-86.
- Hattie, J., & Marsh, H. (1996). The relationship between research and teaching: A meta-analysis. *Review of Educational Research*, 66(4), 507-542.
- Hauptman, A. M. (1986). *Studies in graduate and professional education: What we know and what we need to know*. Washington, DC: Association of American Universities.
- Hawley, P. (1993). *Being bright is not enough: The unwritten rules of doctoral studies*. Springfield, IL: Charles C. Thomas.
- Jones, J. L. (1993). TA training: From the TA's point of view. *Innovative Higher Education*, 18(2), 147-161.
- June, A. W. (2009). Grad students think twice about jobs in academe. *Chronicle of Higher Education*, 55(20), A1-A10.
- June, A. W. (2011). Universities turn to graduate instructors to clear course bottlenecks. *Chronicle of Higher Education*, 57(37), A18-A19.
- Luft, J. A., Kurdziel, J. P., Roehrig, G. H., Turner, J., & Wertsch, J. (2004). Growing a garden without water: Graduate teaching assistants in introductory science laboratories at a doctoral/

- research university. *Journal of Research in Science Teaching*, 41(3), 211–233.
- Maher, M.A., Gilmore, J. A., Feldon, D. F., & Davis, T. E. (2013). Cognitive apprenticeship and the supervision of science and engineering research assistants. *Journal of Research Practice*, 9(2), Article M5. Retrieved from <http://jrp.icaap.org/index.php/jrp/article/view/354/311>.
- Marsh, H. W., & Hattie, J. (2002). The relation between research productivity and teaching effectiveness: Complementary, antagonistic, or independent constructs? *Journal of Higher Education*, 73(5), 603–641.
- McAlpine, L., & Amundsen, C. (2011). *Supporting the doctoral process: Research-based strategies for doctoral students, supervisors and administrators*. Amsterdam: Springer.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.
- Miller, J. K., & Stone, D. J. (2011). Voices of family therapy doctoral students of color: Aspirations and factors influencing careers in academia. *Journal of Multicultural Counseling and Development*, 39(2), 101–113.
- Muzaka, V. (2009). The niche of graduate teaching assistants (GTAs): Perceptions and reflections. *Teaching in Higher Education*, 14(1), 1–12.
- Nettles, M. T., & Millett, C. M. (2006). *Three magic letters: Getting to PhD*. Baltimore: Johns Hopkins University Press.
- Parry, S. (2007). *Disciplines and the doctorate*. Dordrecht, Netherlands: Springer.
- Peters, M. A., & Olssen, M. (2005). Useful knowledge: Redefining research and teaching in the learning economy. In R. Barnett (Ed.), *Reshaping the university: New relationships between research, scholarship and teaching* (pp. 37–47). Buckingham, England: Society for Research Into Higher Education/Open University Press.
- Prieto, L. R., & Meyers, S. A. (1999). Effects of training and supervision on the self-efficacy of psychology graduate teaching assistants. *Teaching of Psychology*, 26(4), 264–266.
- Quinn, K. (2011). Graduate and professional students' opinions on work and family balance in academic careers. *Journal of the Professoriate*, 5(1), 99–120.

- Remler, D. K., & Pema, E. (2009). *Why do institutions of higher education reward research while selling education?* (NBER Working Paper No. 14974). Cambridge, MA: National Bureau of Economic Research.
- Robertson, J., & Blackler, G. (2006). Students' experiences of learning in a research environment. *Higher Education Research and Development, 25*(3), 215–229.
- Robertson, J., & Bond, C. (2001). Experiences of the relation between teaching and research: What do academics value? *Higher Education Research and Development, 20*(1), 5–19.
- Schapper, J., & Mayson, S. E. (2010). Research-led teaching: Moving from a fractured engagement to a marriage of convenience. *Higher Education Research and Development, 29*(6), 641–651.
- Seagram, B. C., Gould, J., & Pyke, S. W. (1998). An investigation of gender and other variables on time to completion of doctoral degrees. *Research in Higher Education, 39*(3), 319–335.
- Sears, A. L. W. (2003). Image problems deplete the number of women in academic applicant pools. *Journal of Women and Minorities in Science and Engineering, 9*(2), 169–181.
- Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Thousand Oaks, CA: Sage.
- Tierney, W. G. (1997). Organizational socialization in higher education. *Journal of Higher Education, 68*(1), 1–16.
- Weidman, J. C., Twale, D. J., & Stein, E. L. (2001). *Socialization of graduate and professional students in higher education: A perilous passage?* (ASHE-ERIC Higher Education Report 28, No. 3). Washington, DC: Association for the Study of Higher Education.
- Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.



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