

## Transdisciplinary or Pedagogically Distinct? Disciplinary Considerations for Teaching Certificates in Higher Education

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This research provides an analysis of disciplines and disciplinary differences regarding the pedagogical value and content of post-graduate teaching certificates in higher education. Findings and recommendations are based upon a survey (N = 450) of department heads and doctoral students at Canadian research-focused universities. Participants were surveyed regarding their perceptions of the value of a credentialed teaching certificate for new academics seeking employment, as well as whether they believe the pedagogical knowledge and skills that typically comprise teaching certificates are valuable. Examining whether a strongly held disciplinary identity in more senior academics contributes to these differences, the survey results demonstrate significant differences between disciplines for the overall value and, in some areas, the content of teaching certificates, especially in department head responses. Relatedly, the open-ended survey comments show a deeply ingrained disciplinary identity, particularly for those holding the department head roles, which in turn reflected several participants' perceptions of disciplinary teaching and learning knowledge and skills as holding superior value to generic, transdisciplinary programs. Recommendations include a renewed focus in educational development initiatives on linking transdisciplinary approaches to specific disciplinary contexts, further connecting overarching pedagogical theories to pedagogical content knowledge as it is translated in practice.

With a few notable exceptions, centralized centers for teaching and learning within institutions of higher education provide teaching development activities in a transdisciplinary format, often using generic teaching development approaches. The term *transdisciplinary* signifies an approach pertaining to multiple fields and branches of knowledge, and in higher education it can be associated with centralized, coordinated pedagogical programming using an overarching or generic understanding of teaching and learning. Transdisciplinary approaches have been criticized as processes “in which educational developers parachute into disciplines with their generic canon about student learning, emphasizing the deep and surface binary, and about reflective practice” (Manathunga, 2006, p. 24). Generic approaches have also been identified as problematic because academics have perceived differences in their focus on teaching and learning across the disciplines (Gurung, Chick, & Haynie, 2009). Nevertheless, the justification for transdisciplinary approaches is warranted on the basis that they provide institutional economies of scale (Jenkins & Burkill, 2004; Kanuka, Heller, & Jugdev, 2008). Research has shown that academics can identify over 140 distinct disciplines (National Forum, 2015). Rowland (2002) asserts further that as disciplines are increasingly fragmented into “highly specialized sub-disciplines, so the very idea of the discipline itself becomes redundant” (p. 61; see also Brew, 2003). Alternatively, it has been argued that there are opportunities for metadisciplinary awareness through teaching programs when they are offered in a transdisciplinary format, which can be achieved through collegial conversations and collaborations across disciplines (Chick, Haynie, & Gurung, 2009). Finding a balance between discipline-specific versus

transdisciplinary teaching knowledge and skills has been hotly debated in the literature, leaving those who offer teaching development with few clear ways forward. This conundrum is further complicated by the fact that providing comprehensive but individualized teaching services and programs for more than 140 unique disciplinary areas would be unfeasible for most, if not all, institutions of higher education.

While acknowledging the impracticality of providing pedagogically unique teaching programs exponentially, it is also widely recognized that academics have a strong preference for engaging in teaching development activities in their own discipline. This preference arises from academics' tendency to relate to their own pedagogical content knowledge alongside a distinct disciplinary culture and discourse, often learned early in a career through associations in home departments or units, professional associations, and scholarly fora (National Forum, 2015; Wareing, 2009). Healy (2005) argues further that, given the perceived importance of a discipline within academics' identity, it is reasonable to assume the nature of the teaching varies between disciplines. Even though it is acknowledged in the literature that faculty members strongly believe they have a distinct disciplinary identity and reflect a clear sense of disciplinary attributes and boundaries, the existence of such disciplinary boundaries has also been challenged in the literature. Barnett (1994), for example, argues that “disciplines are not the harmonious enterprises sometimes assumed but are, rather, the territories of warring factions, often leaving a bloody mess in their internecine struggles” (p. 61). Relatedly, Gibbs (2000) notes that various teaching activities described as being discipline-specific are, in fact, applied widely across disciplines – while also acknowledging that transdisciplinary (or, generic) principles

of teaching and learning apply with varying significance in different disciplines. These varying pedagogical differences are often witnessed within each discipline's signature pedagogies (Gurung et al., 2009; Shulman, 2005), which form a relationship between pedagogical content knowledge (PCK) and disciplinary ways of thinking in practice.

Given the strong disciplinary identities that exist, as well as the enduring perceptions amongst academics that there are important differences between disciplines, this study aims to gain further insights into disciplinary considerations within the umbrella of transdisciplinary teaching programs. In this study, we explore these disciplinary differences regarding the perceived value of a transdisciplinary credentialed teaching program for new academics, such as those typically offered through an institution's centralized certificate in teaching. Specific research objectives include (a) gaining insights into the perceived value of transdisciplinary teaching certificates for new academics and (b) perceptions of transdisciplinary pedagogical knowledge and skills within different disciplines.

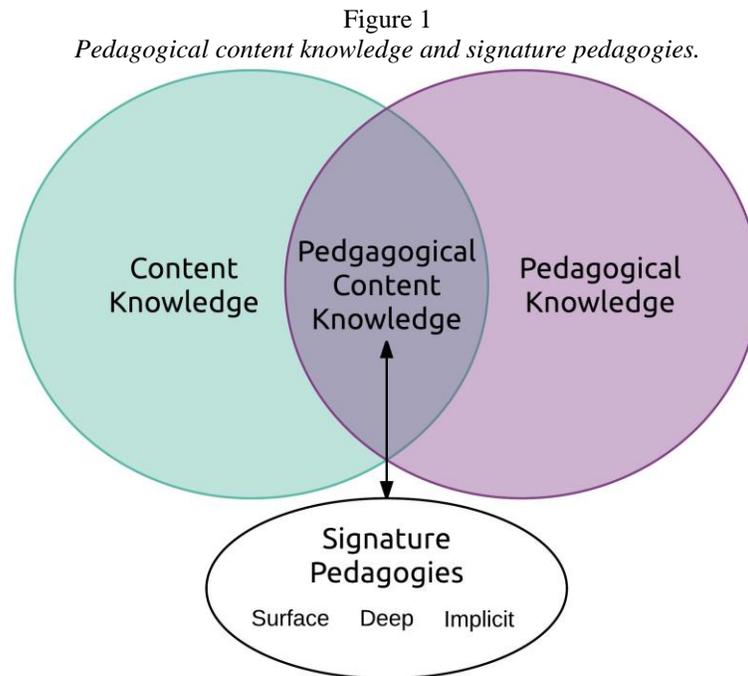
### Literature Review

Issues related to disciplinary considerations for centrally supported institutional activities, including teaching development programs and initiatives, have tended to trigger binary positions in the literature. Research and discourse on this topic vary widely. There are views, for example, that teaching development is "best not seen as a generic and practical activity ... If it does, it will inevitably be sucked into the reductive discourse of culture compliance" (Rowland, 2002, p. 62). Alternatively, Jenkins and Burkill (2004) assert that most teaching issues that new and early academics encounter are generic in nature, though they do acknowledge that a disciplinary focus can help to head off common criticisms. Other discourse in the literature expresses similar sentiments, emphasizing that disciplinary relevance may address academic preferences to engage in teaching development within their own disciplinary context. For example, a recent study by the National Forum (2015) confirms perceptions of specific pedagogical approaches as being uniquely connected to the disciplines, but also highlights the importance of transdisciplinary skill development, such as critical reasoning and independent thinking, concluding that "teaching approaches cited by disciplinary groups as central to their pedagogy are not exclusive to any discipline – in other words, people may prefer to talk with disciplinary colleagues about teaching, even though colleagues in other disciplines have similar issues" (p. 16). Wareing states that disciplinary division "offers a partial explanation for challenges made to the validity of cross-university activities, such as postgraduate certificates in learning and teaching," explaining that

academics working on "transdisciplinary activities encounter unfamiliar social networks and customs, and need to develop new skills and bodies of knowledge before feeling confident and comfortable outside their original discipline" (2009, pp. 917-918). Such views demonstrate the need to gain further understanding of disciplinary perspectives and contexts that could be integrated into generic educational development initiatives, such as teaching certificates.

An analysis of current literature on transdisciplinary approaches to teaching programs suggests that while there is strong evidence of academics' preference for distinct disciplinary approaches within teaching programs, the pedagogical evidence supporting such disciplinary divides in teaching is rather thin. For example, it has been suggested that there is little evidence in the literature on disciplinary differences with respect to how students learn in specific disciplines, including the research on curriculum and learning theories (Gibbs, 2000; Manathunga, 2006). Wareing (2009) also provides an overview of the literature, suggesting there is little evidence to support disciplinary differences. Rather, academics perceive their discipline to be "methodologically, pedagogically and conceptually better than other disciplines ... [and] academics construct 'stories' to explain the superiority of their own disciplines over others" (pp. 921-922). These stories, according to Wareing, construct and maintain disciplinary distinctiveness and superiority, ultimately resulting in lower perceived relevance for transdisciplinary teaching programs.

Much of the literature reviewed argues that academics *perceive* there to be differences in the way teachers teach and learners learn based on the discipline. For example, Yeo and Boman's (2017) recent work calls attention to disciplinary differences in faculty conceptions of assessment, stating that "a universal approach to assessment practice is not realistic...significant variance between disciplinary approaches should be expected" (p. 3). However, much of the literature reviewed also argues that because there is scant evidence of actual (versus perceived) disciplinary differences, there is, in fact, justification for transdisciplinary teaching programs. While far less research on this topic has been conducted with students, some literature illustrates that students hold similar disciplinary perspectives. Goldschmidt (2014), for example, reveals that students appear to have similar perspectives with respect to their identity and the value of disciplinary practices. Research by Prior (1998) also substantiates this perspective, with findings that show working with students in their own disciplines creates a sense of belongingness or membership, highlighting the importance of such disciplinary identities. This disciplinary identity has also been confirmed in other recent higher education research (see, for example,



*Note.* This figure illustrates the intersection of disciplinary content and pedagogical knowledge, relating to the elements of signature pedagogies, as outlined in Shulman (1986; 2005).

Smith, 2016) on undergraduate meaning making processes in disciplinary contexts.

Our review of the research is consistent with Lueddeke (2003) in that much of the literature in this area is normative and descriptive, with fewer studies than might be expected on academics' values and beliefs with respect to teaching practices within disciplinary contexts. While an extensive review is beyond the scope of this study, Donald's (2002) 25 years of research provides noteworthy evidence that not only shows disciplinary differences in the ways students and academics think, but also illustrates that certain teaching and learning practices can hinder or help student learning within the disciplines. It is also worth noting that absent in much of the literature advocating for a transdisciplinary approach to teaching programs is important seminal research over several decades conducted by scholars including Biglan (1973), Kolb (1981), Becher (1989), Healey (2000), and Donald (2002).

### Conceptual Framework

Transdisciplinary teaching programs that reflect an underpinning assumption that teaching and learning activities are, *carte blanche*, generic are at odds with research showing embedded disciplinary dictums about the nature of learning, which can ultimately guide pedagogical approaches. Shulman (1986) has referred

to the intersection of disciplinary content and pedagogy knowledge as pedagogical content knowledge. The dichotomy between transdisciplinary and disciplinary knowledge of pedagogy has been questioned due, largely, to the work of Shulman (see also Grossman, 1989; Gudmundsdottir, 1988; Wilson, Shulman, & Richert, 1987). Recognizing the importance of both pedagogical knowledge and disciplinary (content) knowledge, Shulman developed a framework for teacher development by introducing the notion of pedagogical content knowledge, illustrated in Figure 1.

Extending this work on content knowledge and disciplinary context for teaching and learning, Shulman (2005) articulated the idea of signature pedagogies in the professions (or, disciplines), which involve three dimensions: a surface structure, reflecting concrete or operational components of any particular field; a deep structure that reflects a set of assumptions about the best way to impart a particular body of knowledge and skills; and, an implicit structure involving the beliefs, values, and dispositions of the profession or discipline (pp. 54-55). Together, pedagogical content knowledge and signature pedagogies provide a foundation for investigating implicit and explicit perceptions of transdisciplinary and discipline-specific considerations for educational development via programs such as teaching certificates.

Shulman (1986) has argued that a distinct form of pedagogical content knowledge (PCK) exists and that

this knowledge builds upon, but is different from, subject matter knowledge. Shulman defines PCK as going “beyond knowledge of subject matter per se to the dimension of subject matter knowledge *for teaching*” (emphasis in original, p. 6). In this way, rather than viewing teaching development from the perspective of pedagogical knowledge versus content knowledge, Shulman argues for the integration of these two knowledge bases. Warning that the contemporary trend to solely prioritize pedagogy over content has created a missing paradigm, Shulman’s (1986) foundational work continues to ring true today in highlighting a “sharp distinction between knowledge and pedagogy...[t]he missing paradigm refers to a blind spot with respect to content” (p. 5) within teaching research and practice as a gap that must be addressed.

Shulman’s conceptualization of PCK has relevant and direct implications for teaching programs in higher education. According to Shulman (1986), those who are involved in the design, development, and facilitation of teaching and learning activities need to acquire knowledge about content, as well as overall program development. Hence, to facilitate effective classroom teaching, academics need to understand not only the pedagogical strategies unique to their disciplines (e.g., the subject matter being taught and the culture of their discipline), but also learning theories, which are transdisciplinary and relevant to understanding students’ intellectual development. For example, the seminal research by Perry (1970) and more recent research by Baxter Magolda (2004) on students’ intellectual development are applicable across and within the disciplines. This kind of understanding provides a foundation for PCK that enables academics to make ideas more accessible to the students they teach.

If teaching in higher education is to be effective, academics must struggle with issues of both their disciplinary ways of knowing and overarching bodies of pedagogical knowledge. This means that academics need to develop a repertoire of teaching methods that reflect the uniqueness of their disciplinary culture, as well as the broader constructs of the cognitive sciences and educational research on students’ intellectual development. This presents an intersection between learning how to facilitate the students’ intellectual development and understanding the unique ways of constructing knowledge within and between the disciplines. It is here that PCK connects to signature pedagogies that implicitly and/or explicitly build disciplinary habits of mind by “educating students to practice the intellectual moves and values of experts in the field” (Chick et al., 2009, p. 2), therefore creating discipline-specific strengths while also building metadisciplinary awareness by fostering linkages and connections within and between the disciplines.

Related prior research has also revealed some important insights on the intersection of disciplinary

content and transdisciplinary pedagogical knowledge. An overview of this literature reveals both support and change in instructors as a result of developing pedagogical content knowledge. Noteworthy in the empirical research reviewed by Van Driel, Verloop, and De Vos (1998) is that there might be value to having disciplinary experts study subject matter from a transdisciplinary pedagogical perspective. As such, the constructs put forward by Shulman (1986) and the related research on PCK and signature pedagogies were used to frame the research in this study.

### Research Design and Methodology

The purpose of this research was to gain further insights on (a) the perceived value of transdisciplinary teaching certificates and (b) participants’ perspectives on transdisciplinary pedagogical knowledge as compared to discipline-specific content knowledge. The study utilized a survey methodology via a cross-sectional design (Cohen, Manion, & Morrison, 2011) for collecting and analyzing participants’ perceptions and views of teaching development program content within post-graduate teaching certificates. Following an analysis of the literature on teaching development programs within higher education, the survey was designed according to five recurring areas of focus for teaching development of academics across disciplines: 1) varied teaching methods; 2) diverse assessment strategies; 3) undergraduate class size; 4) philosophies of teaching and theories of learning; and 5) course management and instructional design, such as learning outcomes and syllabi (Arreola, 2007; Hunt, Wright, & Gordon, 2008; Kenny, Watson, & Watton, 2014; Smith, Heubel, & Hansen, 2016). The survey was designed to explore these five areas broadly, with eight specific questions focused on teaching program content, each of which was followed by a textual comment box, therefore capturing participant views through both closed and open-ended data. A specific survey question related to discipline was also included, and two survey questions explored the perceived value of a credentialed teaching certificate for primarily teaching-focused (instructional) versus primarily research-focused (tenure track) academic positions. The survey concluded with an open-ended comment box to capture additional unstructured perspectives.

### Sample

This study used a convenience sample of two groups of participants: doctoral students ( $N = 128$ ), who are the target audience for taking post-graduate teaching certificates, and department heads ( $N = 322$ ), who are responsible for leading academic hiring in Canada. Department heads from six of Canada’s U15 universities (research-focused with

medical faculties) were identified via information listed on publically available websites. Six hundred participants meeting the inclusion criteria were emailed invitations to participate in the online survey for a response rate of 54% ( $N = 322$ ). For doctoral students, to ensure participation was voluntary, institutional research ethics approval required that survey invitations were provided by a member of the Graduate Students' Association (GSA), not a faculty member. Therefore, a GSA member at Canadian research-intensive university distributed the invitation for doctoral participants via an email listserv, resulting in 128 usable doctoral survey responses. To enable current and recently completed doctoral students to participate, those who held or were transitioning to post-doctoral fellow positions were included in the target sample (for clarity, doctoral student is the term used for this group). Disciplinary sub-groups were determined according to the Canadian Tri-Agency framework, which includes the Health Sciences (doctoral students  $n = 33$ , department heads  $n = 63$ ), Natural Sciences & Engineering (doctoral students  $n = 56$ , department heads  $n = 90$ ), and Humanities & Social Sciences (doctoral students  $n = 20$ , department heads  $n = 133$ ). In a few instances, responses related to these disciplinary categories were not provided and therefore could not be quantitatively analyzed; however, since all of the survey questions described below contained both a quantitative and descriptive field (open-ended comment boxes), adjustments were made by analyzing all open-ended comments.

### Data Analysis

To analyze and compare responses of department head and doctoral student groups according to discipline, data analysis centered on demonstrable relationships, differences, patterns, or themes between groups regarding both the value and content of teaching development within post-graduate teaching certificates in higher education. For the open-ended text-based survey items, responses were analyzed using generic qualitative coding techniques (Merriam, 2009) inclusive of descriptive, process, in vivo, pattern, and simultaneous coding, then organized into theoretical units that emerged from the saturated categories and themes. For the quantitative survey items, responses were analyzed using descriptive and inferential statistical procedures via SPSS software. Likert-type scales ranging from 1 (*strongly agree*) to 4 (*strongly disagree*) were used to measure participant perceptions. Because there is a debate in the literature about treatment of Likert-type scales (e.g., Jamieson, 2004), where the outcome variables included Likert-type items that are ordinal in nature, both a parametric (i.e., t-test for comparing doctoral student and department head groups, and a one-way ANOVA for comparing across three disciplinary groups) and corresponding non-parametric test (i.e., Mann-Whitney and Kruskal-Wallis respectively) were conducted, with the most conservative results selected (López, Valenzuela,

Nussbaum, & Tsai, 2015; Polit, 2009). Post-hoc tests were conducted to determine whether the mean difference for items between disciplines was significant, with Tamhane's T2 selected for post-hoc tests because it is robust to homogeneity of variances (i.e., it does not assume equal variances) (Efrosini, Kokaliari, & Roy, 2012, p. 574).

### Limitations

Since this research focuses on participants from research-intensive universities, it is limited by the nature of the methods and sample utilized. There is a need for further research on these issues, including additional quantitative, qualitative, and mixed methods studies using other sample types and sizes across different higher education contexts.

### Results

Survey findings illustrate several significant differences according to discipline and role (department head or doctoral student), not only for the content comprising post-graduate teaching certificates, but also for the overall perceived value of such certificates (for further information on overall perceived value for academic employment, please see Kanuka & Smith, 2018). As the following results show, the quantitative results demonstrate where significant differences between doctoral student and department head groups occur according to discipline, with the open-ended comments providing insights into why these disciplinary differences exist.

### Quantitative Results

To determine whether there were differences between the three disciplinary categories of Health Sciences, Humanities & Social Sciences, and Natural Sciences & Engineering, analysis of doctoral students' and department heads' combined and isolated quantitative responses were completed as follows.

**Disciplinary differences for academic hiring.** Significant differences between disciplines for combined department head and doctoral student responses can be explained by examining the isolated responses of each of these roles. For department heads, a one-way ANOVA showed significant differences ( $p < 0.001$ ) between disciplines (see Q1 in Table 1), with Health Sciences department heads placing significantly higher value on a post-graduate teaching certificate as positively influencing interview selection for tenure or tenure-track positions. Tamhane post-hoc tests confirmed significant differences occurred between department heads, with those in Health Sciences placing significantly higher value on Q1 than those in Humanities & Social Sciences ( $p < 0.001$ ) and in Natural Sciences &

Table 1  
Perceived Value of Teaching Certificates for Academic Hiring by Discipline

	Discipline <i>n</i> (%) <sup>†</sup> , Mean (SD, total <i>n</i> )		
	Health Sciences	Natural Sciences & Engineering	Humanities & Social Sciences
Q1. If an applicant for a <i>tenure or tenure track</i> faculty position in your department has a ‘for credit’ (formal, externally recognized) Certificate in Teaching and Learning in Higher Education from a respected university, it would positively influence selection for an interview.			
Dept. heads	52 (83.9%), 1.81** (0.74, 62)	66 (74.1%), 2.21** (0.73, 89)	84 (64.2%), 2.35** (0.76, 131)
Doctoral students	28 (87.5%) 1.72 (0.85, 32)	43 (79.6%) 1.85 <sup>††</sup> (0.74, 54)	17 (85.0%) 1.85 <sup>††</sup> (0.67, 20)
Dept. heads and doctoral students combined	80 (85.1%) 1.78*** (0.78, 94)	109 (76.2%) 2.07*** (0.75, 143)	101 (66.9%) 2.29*** (0.77, 151)
Q2. If an applicant for an <i>instructional position</i> (e.g., non-tenure/non-tenure track lecturer, sessional) in your department has a ‘for credit’ (formal, externally recognized) Certificate in Teaching and Learning in Higher Education from a respected university, it would positively influence selection for an interview.			
	Health Sciences	Natural Sciences & Engineering	Humanities & Social Sciences
Dept. heads	54 (87.1%), 1.57* (0.72, 62)	77 (88.5%), 1.71 (0.73, 87)	111 (85.4%), 1.89* (0.74, 130)
Doctoral students	28 (90.3%) 1.48 (0.68, 31)	48 (90.5%) 1.55 (0.67, 53)	19 (95.0%) 1.60 (0.60, 20)
Dept. heads and doctoral students combined	82 (88.2%) 1.54 <sup>†††</sup> (0.70, 93)	125 (89.2%) 1.65 (0.71, 140)	130 (86.7%) 1.85 <sup>†††</sup> (0.72, 150)

<sup>†</sup> Number and percentage of (2) agree and (1) strongly agree survey responses by discipline.

\* $p < 0.05$  and \*\* $p < 0.001$ , one-way ANOVA shows significant differences in department head responses between disciplinary categories.

<sup>††</sup> $p < 0.01$ , t-test shows significant differences between doctoral students and dept. heads in Natural Sciences & Engineering and Humanities & Social Sciences.

\*\*\* $p < 0.001$ , one-way ANOVA shows significant differences, with Tamhane confirming significant differences between all three disciplines for combined responses.

<sup>†††</sup> $p = 0.003$ , one-way ANOVA shows significant differences, with Tamhane confirming significant differences between Health Sciences and Humanities & Social Sciences disciplines for combined responses.

Engineering ( $p = 0.003$ ) disciplinary groups. Regarding interview selection for non-tenure track instructional positions (see Q2 in Table 1), the one-way ANOVA and Tamhane post-hoc tests both showed significant differences ( $p < 0.05$ ), with department heads in the Health Sciences placing significantly higher agreement on post-graduate certificates than department heads in the Humanities & Social Sciences. For doctoral students, responses for Q1 and Q2 showed no significant differences between disciplines.

To further analyze whether differences exist between doctoral students and department heads in each disciplinary category, a t-test was used to compare

means between these two groups. Regarding hiring for a tenure or tenure-track position (see Q1 in Table 1), a t-test comparing roles demonstrated that, as compared to department heads in those disciplines, doctoral students in the Natural Sciences & Engineering ( $t(141) = 2.86$ ,  $p = 0.005$ ) and Humanities & Social Sciences ( $t(149) = 2.77$ ,  $p = 0.006$ ) disciplines placed significantly higher value on a post-graduate teaching certificate as positively influencing interview selection. However, regarding non-tenure track instructional hiring (see Q2 in Table 1), a t-test demonstrated no significant differences between doctoral students and department heads according to discipline for the

perceived value of a teaching certificate as positively influencing interview selection.

**Disciplinary consistency for teaching development.** Analysis showed few significant disciplinary differences for department head and doctoral student responses regarding the value of developing teaching knowledge and skills via a post-graduate certificate. To analyze department head perceptions of the value of content that comprises teaching certificates (for more information, see Table 1A in Appendix A), a one-way ANOVA demonstrated significant differences for department heads between disciplines ( $p \leq 0.005$ ) for teaching development of learning outcomes. Tamhane post-hoc tests further illustrated that department heads in the Health Sciences placed significantly higher value on teaching development for writing learning outcomes than those in Natural Sciences & Engineering ( $p = 0.025$ ) and Humanities & Social Sciences ( $p = 0.004$ ) groups. Regarding teaching development focused on knowing how students learn based on learning theories in higher education, a one-way ANOVA demonstrated significant differences for department heads between disciplines ( $p < 0.05$ ), with Tamhane post-hoc tests showing that those in the Health Sciences again placed higher value on this than those in the Natural Sciences & Engineering ( $p = 0.025$ ) disciplinary group. For doctoral student responses, a one-way ANOVA showed significant differences ( $p < 0.05$ ) between disciplinary groups for only one item: knowing how to develop a syllabus/course outline (for more information, see Table 2A in Appendix A). A one-way ANOVA showed significant differences ( $p < 0.05$ ) between disciplinary groups, with the more conservative Kruskal-Wallis test confirming significant differences between mean ranks ( $p = 0.040$ ). Here, Tamhane post-hoc tests demonstrated slightly significant differences ( $p = 0.057$ ) between two disciplines, illustrating that doctoral students in the Health Sciences placed somewhat higher value on teaching development for syllabi/course outlines as compared to those in the Natural Sciences & Engineering.

Overall, those in the Health Sciences perceived teaching certificates to be of greater value for academic hiring, with doctoral students and department heads alike in the Health Sciences providing significantly higher mean values for Q1 and Q2, ultimately illustrating agreement that teaching certificates would positively influence interview selection, particularly for non-tenure track instructional positions. In contrast to doctoral student responses, department heads in the Natural Sciences & Engineering and the Humanities & Social Sciences provided the lowest mean values for these questions, indicating lower agreement with teaching certificates as positively influencing interview selection, especially for tenure-track positions.

However, unlike the diverging responses apparent for academic hiring, responses regarding development of teaching knowledge and skills (see Tables 1A and 2A) via a post-graduate certificate were more consistent, with very few significant differences in doctoral student and department head survey responses according to discipline. In the few areas where differences did exist, results reflected similarities to the academic hiring findings, with those disciplines outside of the Health Sciences providing lower mean values.

### Open-Ended Survey Results

Analysis of the open-ended responses focused on core themes and patterns emerging from the textual comment items. Specifically, analysis centered on participant descriptions of the value and content typically comprising teaching certificates, as related to the questions posed, as well as overall participant explanations reflecting disciplinary context and considerations.

**The importance of discipline.** Participant comments lend further insights by describing the reasons why there are significant disciplinary differences regarding the overall value of a teaching certificate, especially for department heads and, in particular, for academic hiring. As compared to the doctoral students, department heads provided a larger range of open-ended comments, with several of their descriptions revealing deeply ingrained disciplinary perspectives and values. For instance, one department head noted that the “credibility of the instructor is also important to the value of such a certificate. As is knowledge of how to teach in specific disciplines.” In regard to Engineering courses, one department head also described the importance of disciplinary knowledge:

It is most important that the candidate, especially a sessional, have knowledge of the subject at hand. The weakness in the universities is that Faculty do not know how the real world operates....It is not the lack of ability to design a course - it is the lack of understanding what the subject matter is.

Echoing this comment, a Humanities and Social Sciences department head noted that disciplinary expertise takes priority: “for us there exist credentials already on the teaching of particular languages. These credentials would have more relevance than a Cert in Teaching and Learning.” Even though Health Sciences department heads provided higher overall quantitative values in several areas, similar disciplinary qualifications were still identified as important within the open-ended results, with one participant stating that “A Masters in Education is a good option as well, but I don't find it is well regarded in nursing education.” Placing priority on experience with and knowledge of disciplinary ways of knowing and being was a recurring theme in

department head comments, in several cases setting up a binary between disciplinary versus transdisciplinary teaching abilities and qualifications.

The theme of prioritizing disciplinary experience and expertise continued in department head descriptions of the importance of research in developing disciplinary skills and knowledge within universities. As one department head stated, “What we teach is grounded in our research. If teaching training and pedagogical theory helps, fine, but that is second to experience and actual content.” Another department head also emphasized the importance of both disciplinary competence and research contributions:

I strongly agree that all those [teaching] competences are important, but they do not override a candidate's competence in his/her own discipline and his/her ability to conduct original research and publish it in scholarly venues. This is the reason I did not "strongly" agree in the first two questions.

In all of these examples, what comes to the fore is the persisting priority of disciplinary and research expertise, as well as experience with disciplinary knowledge systems and methods, even if transdisciplinary teaching knowledge and skills are also viewed as somewhat valuable.

#### **Disciplinary perspectives on teaching development.**

Qualitative results also shed insights into why there are significant disciplinary differences for department head responses regarding certain topics that typically inform the knowledge and skills developed in teaching certificates. With respect to developing abilities to write a syllabus, one doctoral student emphasized institutional context and subject area, as follows: “Support for this kind of training and teaching certification really depends in part on where you earned your PhD and gained post-doctoral training in the first place (+/- subject area).” Likewise, a department head also emphasized disciplinary context and content, noting that “it doesn't take long to learn how to develop a syllabus. I[t]'s the discipline that takes the time to learn, the content: the form is easily acquired.” This perspective was also reinforced in other department heads' comments about learning outcomes, with one participant noting that “[a]fter all, a big part of identifying learning objectives has to do with content, not just ‘form.’” Such perspectives were echoed by another department head, who said that “Learning outcomes may be defined in a variety of ways and may be discipline specific, so learning about these in the type of course/certificate imp[li]e[d] by this survey, may not have a major impact for some disciplines.” These participant descriptions continue to illustrate the ways in which several participants, particularly department heads, placed high value on discipline-specific knowledge and skills.

Another area where the open-ended comments help to explain the reasons why significant disciplinary differences occur for department heads is in regard to

developing an understanding of how students learn based on learning theories. One department head described his or her discipline as a “specialist field with its own literature on best practices, rather different from more general theory on learning in [post-secondary education] PSE settings.” Another agreed:

Whilst this is valuable, I have found it critical that the teaching imparts knowledge at the cutting edge of the discipline, preferably by a Faculty member who is an international expert in the discipline being taught. There is nothing that substitutes for this in engaging the attention and motivation of the students in class.

The importance of discipline was reiterated by several department heads, as illustrated in comments such as “the discipline matters more to us” and “Again this may be quite discipline specific, and so learning theories may not equally apply to all students in all disciplines.” In this way, discipline-specific knowledge and skills were often given priority over the development of teaching knowledge and skills.

Emphasis on disciplinary ways of knowing and being, as well as discipline-specific teaching approaches, continued in the department head comments with respect to developing diverse instructional and assessment methods, in some cases contrasting doctoral student responses. For example, one doctoral student “absolutely” agreed with development of diverse teaching methods, noting that “Although some methods work better than others in specific fields, the goal of all university-level teaching should be to engage students in the learning process.” In contrast, several department heads agreed but provided disciplinary caveats:

Agree, provided the facilitator is an expert in the discipline taught. Problem based learning by “non experts” is, in my opinion, futile and an unproven theory. It is also not supported by recent student feedback in disciplines such as medicine, where students are looking to be taught by practicing physicians and reject non-physicians.

Several other department heads emphasized the importance of disciplinary teaching and learning knowledge and skills, demonstrated in comments such as, “Again, this is very diverse and specific to the course material/topics to be taught,” and, “Some of these methods may be irrelevant to certain disciplines.” Crystalizing many of these recurring sentiments, one department head put it this way: “One of the great weaknesses of current workshop and training methods is that these do not translate into various disciplinary contexts or into discussions of curriculum.” Providing

several insights into the reasons why several participants, particularly department heads, demonstrated differing views on both the value and content of teaching certificates, the open-ended results illustrate deeply held values of and emphasis upon discipline-specific teaching and learning knowledge and skills.

### Results Summary

Results from the survey data demonstrate differences between participant responses according to discipline and according to their roles as either a department head or doctoral student. Quantitative survey data showed significant differences between these groups for academic hiring, with department heads in the Natural Sciences & Engineering and Humanities & Social Sciences groups indicating lower agreement with teaching certificates as positively influencing interview selection, especially for tenure-track hiring. In terms of teaching certificate content that informs what knowledge and skills are developed, while few differences appeared, there were notable differences between disciplines regarding participants' perceptions of the value of knowing how to write learning outcomes and how students learn based on learning theories (department heads), as well as for knowing how to create a syllabus/course outline (doctoral students). Here again, differences occurred between disciplines outside of the Health Sciences, as these disciplines provided lower mean values. The open-ended comment results further illuminate the reasons why participants, specifically department heads, showed these differences. Open-ended comments illustrated thematic perceptions (largely of department heads) that reflect deeply held disciplinary values related to teaching and learning knowledge and skills, ultimately reinforcing the primacy of disciplinary ways of knowing and being over the transdisciplinary pedagogical focus of teaching certificates.

### Discussion and Recommendations

Given teaching development programs are typically offered in a transdisciplinary format in institutions of higher education, many, if not most, disciplinary narratives, cultures, and pedagogies are only tangentially situated in the program content. Much of the literature on transdisciplinary teaching programs provides a compelling rationale for this practice, specifically, creating economies of scale with programs that address many needs across disciplines in higher education. Perhaps as importantly, research on the intellectual development of students who enter programs in higher education is relevant across disciplines. For example, Baxter Magolda and Terenzini's (1999) analysis of trends and implications for learning in the twenty-first

century revealed that critical and reflective thinking, complex cognitive thinking, application of knowledge to practical problems, and self-directed/self-regulated learning are essential skills for all undergraduates. All such metacognitive knowledge and skills are necessarily transdisciplinary. These kinds of metacognitive knowledge and skills, also referred to as higher-ordered learning that necessitates meaning construction (Donald, 2002), are premised on learning theories that span the disciplines. These approaches are empirically and theoretically informed, though as the results in this study show, theories tend not to be considered as important as other content typically provided in teaching programs, as department heads' responses across disciplines (especially in Natural Sciences & Engineering, as shown in Table 1A) demonstrated. On this front, the findings indicate that teaching development programs likely need to provide greater focus on, and explanation of, *why* knowledge of learning theories and teaching philosophies are important, explaining specifically how these theories apply to practice. For example, learning theories help us to deeply understand, articulate, and perhaps shift our teaching and learning paradigms (Barr & Tagg, 1995). Such findings illustrate a continued need for connecting theoretical and empirical foundations to our contemporary disciplinary contexts, not only within the scholarship of teaching and learning (Kanuka, 2011), but also within teaching and learning practices.

Recognizing the importance of both PCK and transdisciplinary knowledge, a key focus for teaching development programs would be to work closely and collaboratively with all faculties in a manner that recognizes the distinctive form of teacher-practitioners' PCK. In doing so, disciplinary ways of knowing can be used by faculty to guide their actions in highly contextualized classroom settings. At the same time, it is important for those in faculty development roles to remain cognizant that many, if not most, issues facing new academics occur across the disciplines. Wareing (2009) presents compelling literature illustrating that there exists as many differences *within* disciplines as there are *across* disciplines, with discourses that not only reinforce boundaries between disciplines, but also "mythologize the superiority of one's own discipline over others" (p. 926). Supporting this assertion, the findings in this study indicate that pedagogic issues included in cross-university teaching programs that apply across all disciplines can be dismissed by some academics because the constructs and content terminology are inconsistent with the perceived importance of disciplinary ways of knowing.

Prior research has shown that while efforts to connect the disciplines have been initiated, results reveal that these activities have "had limited effectiveness as a sole strategy" (Quinnell, Russell, Thompson, Marshall, & Cowley, 2010, p. 22). Quinnell et al. also assert that

individual academics need to make meaning of the transdisciplinary information, arguing “academic staff are first and foremost disciplinary experts, they are best placed to comment on which models and practice of scholarship describe the scholarship of learning and teaching within the context of their own disciplines” (2010, p. 21). At the same time, internationally, broader initiatives aimed at helping to foster teaching and research discussions between and across disciplines and institutions, such as the Quality Assurance Agency for Higher Education’s recent *Focus On: The Post-Graduate Research (PGR) Student Experience* (n.d.) report and resources for the United Kingdom, point to evidence of these continued conversations.

Mindful of the benefits of transdisciplinary approaches, the results from this study indicate that academics may fail to translate transdisciplinary knowledge and skills to their own disciplinary contexts and everyday classroom practices. Indeed, rather than make meaningful connections with transdisciplinary theories and constructs of teaching and learning, more established academics (such as department heads) may dismiss this information as irrelevant. Based on our findings, it is misguided to place the sole responsibility of translating transdisciplinary theory to practice on academics within their own specific disciplines. In order to address this issue with current teaching certificates that, as one department head affirmed, “do not translate to various disciplinary contexts, or into discussions of curriculum,” those in centralized centers for teaching and learning and in specific departments have an opportunity to work collaboratively to strike a better balance between transdisciplinary and discipline-specific teaching development.

The data in this study also support Healey’s (2000) assertion that there are differing levels of engagement between the disciplines, recommending that links between the scholarly literature on learning and teaching are essential, and concluding that our understanding of how academics view interfacing with transdisciplinary programs on teaching and learning is worthy of further exploration. Quinnell et al. (2010) describes this as “interfacing with SoTL [scholarship of teaching and learning] theory and practice” (p. 24). On this front, findings from this study do support Quinnell et al.’s advocacy for the development of epistemological frameworks establishing ways of knowing for PCK, with results from this study also underscoring the importance of developing further such ontological frameworks, to articulate ways of knowing and being in the disciplines. Specifically, the data from our study of research-focused universities indicates that several academics, particularly those in more established roles, do not view transdisciplinary pedagogical theories as easily translating to their own disciplines; as such, linking transdisciplinary content to

specific disciplines needs to be further built into teaching development programs up front. Data from this study indicate that failure to do so can result in a lack of understanding for how pedagogical theories apply to practice. In particular, despite the fact that much has been written on the relationship between theory and practice in education, the data from this study indicate that several academics across disciplines continue to view educational theories as irrelevant jargon that is disconnected from their everyday teaching practices. These results indicate that more work needs to be done to interface between disciplinarity and transdisciplinarity in teaching development activities.

### Conclusion

The purpose of this research was to provide an analysis of disciplines and disciplinary differences in perceptions regarding the value and content of post-graduate teaching certificates in higher education. Findings from this study provide additional insights on disciplinary differences for the perceived value of transdisciplinary teaching development for new academics, as well as differences between disciplines and roles (department heads and doctoral students) regarding the perceived value of various knowledge and skills typically targeted through content within transdisciplinary teaching certificates. Examining whether a strongly held disciplinary identity in more senior academics contributes to these differences, the quantitative survey research results demonstrate significant differences between disciplines for the overall value and, in some areas, the content of teaching certificates, especially in department head responses. Relatedly, the open-ended data show a deeply ingrained disciplinary identity, particularly for those holding department head roles, which in turn reflect several participants’ perceptions of disciplinary teaching and learning knowledge and skills as holding superior value to generic, transdisciplinary programs. To address these issues, educational development initiatives must expand the capacity to link transdisciplinary content to specific disciplines, further connecting overarching pedagogical theories to pedagogical content knowledge as it is translated into practice.

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Appendix A  
Additional Survey Data

Table 1A  
*Department Heads' Perceived Value of Teaching Knowledge and Skills*

	Discipline <i>n</i> (%) <sup>†</sup> , Mean (SD, total <i>n</i> )		
	Health Sciences	Natural Sciences & Engineering	Humanities & Social Sciences
Knowing how to develop a syllabus and/or course outline.	50 (90.9%), 1.55 (0.77, 55)	76 (96.2%) 1.44 (0.57, 79)	107 (98.1%) 1.31 (0.50, 109)
Knowing how to write learning outcomes.	48 (88.9%) 1.52*(0.69, 54)	65 (83.3%) 1.86* (0.75, 78)	86 (80.3%) 1.92* (0.76, 107)
Knowing how students learn (based on learning theories) in higher education.	50 (89.2%) 1.66** (0.67, 56)	62 (79.5%) 1.99** (0.73, 78)	85 (79.4%) 1.94 (0.77, 107)
Knowing how to design a course (e.g., design, develop, deliver, evaluate).	48 (87.2%) 1.60 (0.71, 55)	77 (97.4%) 1.48 (0.55, 79)	104 (96.3%) 1.43 (0.63, 108)
Knowing how to write a teaching philosophy for a dossier/portfolio.	44 (80.0%) 1.86 <sup>††</sup> (0.78, 55)	56 (71.8%) 2.17 <sup>††</sup> (0.73, 78)	81 (75.7%) 2.06 (0.71, 107)
Knowing how to successfully facilitate large classes.	44 (80.0%) 1.78 (0.81, 55)	70 (91.0%) 1.65 (0.64, 77)	99 (91.7%) 1.69 (0.65, 108)
Knowing how to use diverse teaching methods.	51 (92.7%) 1.53 (0.63, 55)	69 (76.4%) 1.77 (0.66, 79)	98 (90.7%) 1.71 (0.68, 108)
Knowing how to use diverse assessment/evaluation methods.	47 (87.0%) 1.54 (0.77, 54)	76 (96.2%) 1.72 (0.53, 79)	(91.7%) 1.68 (0.68, 108)

<sup>†</sup>Number and percentage of (2) agree and (1) strongly agree survey responses by discipline.

\*significant at  $p \leq 0.005$  and \*\*significant at  $p < 0.05$ .

<sup>††</sup>Differences between Health Sciences and Natural Sciences & Engineering were shown to be slightly significant ( $p = 0.055$  for one-way ANOVA, and  $p = 0.051$  for Kruskal-Wallis), though not shown to be significant in Tamhane post-hoc tests ( $p = 0.063$ ).

Table 2A  
*Doctoral Students' Perceived Value of Teaching Knowledge and Skills*

	Discipline <i>n</i> (%) <sup>†</sup> , Mean (SD, total <i>n</i> )		
	Health Sciences	Natural Sciences & Engineering	Humanities & Social Sciences
Knowing how to develop a syllabus and/or course outline.	29 (100.0%), 1.24* (0.44, 29)	42 (98.3%), 1.53* (0.62, 47)	17 (100.0%) 1.24 (0.44, 17)
Knowing how to write learning outcomes.	27 (93.1%) 1.45 (0.63, 29)	45 (95.7%) 1.75 (0.61, 47)	16 (94.1%) 1.53, (0.62, 17)
Knowing how students learn (based on learning theories) in higher education.	28 (96.6%) 1.69 (0.54, 29)	43 (93.5%) 1.76 (0.64, 46)	15 (88.2%) 1.77 (0.66, 17)
Knowing how to design a course (e.g., design, develop, deliver, evaluate).	26 (100.0%) 1.21 (0.41, 29)	45 (97.8%) 1.35 (0.53, 46)	17 (100.0%) 1.24 (0.44, 17)
Knowing how to write a teaching philosophy for a dossier/portfolio.	26 (89.7%) 1.83 (0.81, 29)	41 (87.2%) 1.85 (0.69, 47)	16 (94.1%) 1.77 (0.75, 17)
Knowing how to successfully facilitate large classes.	27 (93.1%) 1.52 (0.63, 29)	45 (95.8%) 1.68 (0.56, 47)	16 (94.2%) 1.65 (0.79, 17)
Knowing how to use diverse teaching methods.	29 (100.0%) 1.38 (0.49, 29)	45 (95.7%) 1.49 (0.59, 47)	16 (94.1%) 1.35 (0.79, 17)
Knowing how to use diverse assessment/evaluation methods.	29 (100.0%) 1.48 (0.51, 29)	43 (91.1%) 1.70 (0.69, 47)	15 (88.2%) 1.65 (0.86, 17)

<sup>†</sup>Number and percentage of (2) agree and (1) strongly agree survey responses by discipline.

\*significant at  $p < 0.05$ .