

Postdoctoral scholars' perceptions of a university teaching certificate program

Postdoctoral
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perceptions

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Received 17 December 2019
Revised 7 April 2020
14 May 2020
Accepted 1 June 2020

Abstract

Purpose – This study aims to explore postdoctoral scholars' experiences and perceptions of a teaching certificate program and identify how they use the knowledge and skills developed through the certificate program to improve their teaching practices.

Design/methodology/approach – In this case study, the authors explored postdoctoral scholars' experiences and perceptions of a teaching certificate using a multiple methods and data sources including documents, course evaluations, interviews and surveys.

Findings – The teaching certificate program helped postdocs learn the language and theory of teaching and learning in post-secondary education; practice specific strategies and develop confidence in how to teach; network with colleagues about teaching and learning; develop a reflective teaching practice; and contribute to the scholarship of teaching and learning.

Practical implications – The findings from this study will inform efforts to develop new or refine existing approaches to promote teaching and learning professional development opportunities for postdoctoral scholars.

Originality/value – This paper fulfills an identified need to study teaching and learning development for postdoctoral scholars.

Keywords Higher education, Case study, Academic development, Teaching and learning, Postdoctoral scholars

Paper type Case study



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This study was funded by a University of Calgary Teaching and Learning Grant.

Introduction

Many postdoctoral scholars aim to obtain faculty positions and are, therefore, integral to future advances in teaching practices in higher education (Jadavji *et al.*, 2016; Vitae, 2009). However, the training postdoctoral scholars receive is often designed to prepare them for research careers and rarely includes the development of teaching and learning skills (Jadavji *et al.*, 2016). In local and international studies, postdoctoral scholars recognized the need to develop teaching skills to enhance the learning of their current and/or future students (Åkerlind, 2005; Jadavji *et al.*, 2016; Lee *et al.*, 2010; Rybarczyk *et al.*, 2011). Yet, teaching and learning programs are often targeted toward faculty and graduate students, with far fewer programs offered to postdoctoral scholars (Kenny *et al.*, 2014; Rose, 2012; Rybarczyk *et al.*, 2011; Scaffidi and Berman, 2011).

While the preparation of graduate students as scholarly post-secondary teachers is widely recognized as important (Britnell *et al.*, 2010; Schonwetter and Ellis, 2011), research pertaining specifically to postdoctoral scholars is limited. As teaching and learning are significant components of the faculty positions, which postdoctoral scholars pursue, it is critical that postdoctoral scholars develop skills that support their future teaching practices in higher education (Jadavji *et al.*, 2016). The development of transferable skills such as interpersonal communication, presentation, leadership, management, networking and teaching skills are imperative for success in many careers both inside and outside of academia (Åkerlind, 2005; Smith *et al.*, 2002). The development of scholarly teaching and learning skills and confidence through a certificate program can provide a more well-rounded postdoc experience (Taylor *et al.*, 2008). A recently conducted systematic review explored the impact of professional learning and development for postdoctoral scholars and found that engaging in such opportunities had a positive impact on their teaching and learning skills, general career skills and the development of community amongst them (Nowell *et al.*, 2018). Several other studies have identified that teaching development programs have positive impacts, with participants reporting positive changes to their teaching practices, classroom approaches, course designs and assignment strategies (Austin *et al.*, 2008; Fishman *et al.*, 2003; Garet *et al.*, 2001; Gibbs and Coffey, 2004).

In 2013, our institution invested in a large postdoctoral scholar program, which resulted in a substantial increase in the number of national and international postdoctoral scholars. The postdoctoral scholar cohort has grown to over 500 of which 42% are female and 50% are international. A local needs assessment, conducted in partnership with the postdoctoral scholar program, highlighted developing teaching expertise as a key priority for postdoctoral scholars.

An environmental scan of teaching development programs in Canada highlighted that most Canadian post-secondary institutions offer some form of graduate student teaching development and these offerings are often open to postdoctoral scholars as well. There is an increasing trend toward offering non-credit certificates in this area to recognize participants' achievements and skills and toward targeting programs specifically at graduate participants and postdoctoral scholars rather than simply allowing access to existing programs designed for faculty members, who have very different needs and goals. However, while some of these programs include both graduate participants and postdoctoral scholars, few, if any, universities in Canada offer a certificate specific to postdoctoral scholars.

Research indicates that providing customization options of teaching certificate programs has a positive impact (Rust, 2000). It is important to consider that postdoctoral scholars have diverse backgrounds and needs and successful certificate programs are able to provide participants the opportunity to focus their professional learning according to their teaching background, interests and desired outcomes (Hubball and Poole, 2003). This approach is

effective for a diverse cohort of participants as it requires participants to take an active role in their own development through independent, collaborative and experiential learning opportunities.

Professional development in teaching is often perceived on a spectrum – from empowering pedagogical identity and authority, to unnecessary and time-consuming (Onsman, 2011). However, Onsman (2011) suggested, when done well, professional learning can promote teaching effectiveness and have a significant impact on student learning and the instructors' teaching approaches through measurable outcomes. Fraser *et al.* (2017) argued early career teachers benefit by learning foundational teaching concepts and approaches in higher education first and can then transition more effectively into activities involving the development of teaching conceptualization and practice.

Hubball and Burt (2006) recommended continuous reflection on strategies for planning, assessment, programming and appropriate learning context. These include providing a diverse selection of active learning activities to allow participants to learn and apply their new skills and knowledge and using frequent formative and summative program evaluations that focus on participants' perceptions of the program, the processes within the program and the short and long-term impacts of the program. Hubball and Poole (2008) also recommended considering the flexibility, quality and quantity of the program's learning outcomes. Additionally, it is important to align the program's timeline, learning context, programming and assessment processes and educational leadership with the program's overall learning outcomes and to re-evaluate these outcomes regularly (Hubball and Poole, 2008).

In response, our university recently established an innovative postdoctoral scholar certificate program in university teaching and learning that includes five individual courses that piece together to complete a certificate. The current certificate program was designed with this literature and recommendations in mind, along with an institutional environmental scan, needs assessment and multi-stage institutional level feedback process. A detailed description of the certificate program is published elsewhere (Nowell *et al.*, 2020). This certificate is unique to our institution and offers our postdoctoral scholars an opportunity to develop their teaching and learning skills and earn individual course badges and a completion certificate not available to their peers at other institutions. To date postdoctoral scholars' experiences with university certificate programs in teaching and learning have not been empirically investigated. We leveraged the opportunity of the new certificate program to explore postdoctoral scholars' experiences and perceptions of a certificate program in university teaching and learning and sought to identify how postdoctoral scholars use the knowledge and skills developed through the certificate program to improve their own teaching practices.

Methods

We used a multi-methods case study approach, which included collecting, analyzing and integrating quantitative and qualitative data to understand postdoctoral scholars' perceptions of the certificate program more completely (Creswell, 2014; Tashakkori and Teddlie, 2010; Yin, 2003). Data collection and analysis was conducted simultaneously and iteratively through course evaluations, surveys and interviews. This research was approved by the Conjoint Faculties Research Ethics Board at the University of Calgary.

Certificate program

We developed a certificate program, designed to be completed over two or more years, that consisted of five semester-long courses that each focused on different aspects of teaching

and learning practice and scholarship. The five courses purposely included blended components and multiple points of entry to support participation, retention and completion in individual courses or the entire certificate program. Participants self-enroll and there is no official application or selection process required. This continuous enrolment program allows participants to start any course at any time and at any point in their postdoctoral appointments. Participants are invited to take a class, complete a course and/or finish all five courses to earn the certificate, choosing only the classes and courses that work best for them.

The individual classes within a course and the courses themselves were standalone and could be taken in any order. They were also complimentary and together provided a comprehensive overview of teaching and learning skills and theory. Participants complete the following five courses to earn the certificate as follows:

- (1) Emerging Teachers' Development;
- (2) Scholarship of Teaching and Learning (SoTL) Foundations;
- (3) Theories and Issues in Postsecondary Teaching and Learning;
- (4) Learning Spaces and Digital Pedagogy; and
- (5) Developing Your Teaching Dossier.

While each course has a unique focus, the following certificate-level learning outcomes guide the design and assessment of all courses:

- Engage in collaborative, critically reflective conversations with colleagues to explore current issues, theories and research in postsecondary education;
- Identify and implement research-informed teaching methods that enhance participant learning;
- Practice peer teaching and collect and respond to feedback from colleagues;
- Articulate a research question and develop a plan to conduct a SoTL project;
- Evaluate, select and integrate effective learning technologies and maximize spaces to enhance participant learning; and
- Develop a teaching philosophy/dossier that aligns key beliefs about teaching and learning to sources of evidence drawn from participation in the certificate program.

Individuals apply for course completion and/or certificates after they have completed all requirements. For a detailed description of the certificate program please see [Nowell *et al.* \(2020\)](#).

Data collection

To explore postdoctoral scholars' experiences and perceptions the certificate program a variety of quantitative and qualitative data were sought. Our study drew upon several sets of data including curriculum documents, course evaluations, surveys and qualitative interviews. We collected data including participants' satisfaction and reaction to their engagement in the individual classes, as well as changes in participant beliefs and practices ([Hines, 2009](#); [Kneale *et al.*, 2016](#)). A survey, to examine the perceived usefulness of the certificate program, was developed and contained demographic items, questions about perceptions of the certificate program, learning gained through engaging in the certificate program and how knowledge and skills developed through these opportunities was used. Measurement related validity (e.g. face, content, criterion and construct) ([Creswell, 2014](#)) was addressed prior to distribution. The surveys were offered online via a secure website and voluntary participation was sought from all postdoctoral scholars who participated in the

certificate program. Semi-structured interview guides were developed and informed by literature (Nowell *et al.*, 2018; Nowell *et al.*, 2019), document review and survey responses. The focus of interviews was to understand perceptions of the certificate program, learning gained through engaging in these opportunities and how knowledge and skills developed through these opportunities were used. All willing participants were interviewed.

Data analysis

All documents and interview transcripts were assigned a unique identifier and imported into NVivo 10 for qualitative data management, indexing and theorizing. Data were thematically analyzed to transform data from individual sources to common, interactive themes (Braun and Clarke, 2006; Nowell *et al.*, 2017). Written memos were used to provide a record of the analytic process. Class evaluations and survey data were downloaded and imported into SPSS (version 22) statistical software package. The characteristics of the study population were analyzed using descriptive statistics. Kruskal–Wallis tests were conducted to examine differences between participants.

Results

Certificate program

A curriculum map was developed following analysis of strategic documents. Table 1 presents an overview of how each individual course aligns with the certificate learning outcomes. In addition, the table indicates the number of contact hours for each course, the experiential learning tasks that learners complete and reveals how all five courses make a substantive contribution to participants' learning.

Course evaluations

A total of 134 unique postdoctoral scholars engaged in individual classes during the pilot year of the certificate program. Of these 134 participants, 75 completed individual courses and 8 completed the entire certificate program in the period of the study. Of the 75 postdoctoral scholars who completed individual courses, 33 completed the course level evaluations. Table 2 highlights the collated evaluation data from both the individual courses and the certificate program. A strong majority (91%) of participants indicated they feel more prepared for future teaching, 88% specified they will be able to apply what they learned to their teaching and 87% designated the courses met or exceeded their expectations.

Characteristics of survey and interview participants

Of the 134 postdoctoral scholars who completed individual classes during the pilot year of the certificate program, there were 100 respondents and 94 completed surveys for a response rate of 74% and a completion rate of 94%. A total of 65% of postdoctoral scholars who completed the survey were between 25–34 years old and 42% were from the faculty of medicine, which is representative of the high proportion of postdoctoral scholars from this faculty at our institution. In total, 34 survey participants provided their email addresses to indicate their willingness to participate in interviews and 21 participated in a semi-structured interview. The characteristics for survey and interview participants are displayed in Table 3.

Survey results

Survey respondents were asked to identify postdoctoral professional learning and development opportunities they attended and to rate how useful these opportunities were on

Table 1.
Postdoctoral scholar
certificate in
university teaching
and learning
curriculum map

Course name	Hours in length	Emerging teachers development	SOTL Foundations	Learning spaces and digital pedagogy	Theories and issues in postsecondary teaching and learning	Developing your teaching dossier
Number of classes	10	5	12	10	12	8
Experiential learning task	Engage in collaborative, critically reflective conversations with colleagues to explore current issues, theories and research in postsecondary education	Write a reflective statement ✓	Outline a SoTL research plan ✓	Integrate learning technology and spaces	Design a lesson plan and feedback instrument	Create a draft teaching dossier
Certificate learning outcomes	Identify and implement research-informed teaching methods that enhance student learning	Practice peer teaching and collecting and responding to feedback from colleagues	Articulate a research question and develop a plan to conduct a SoTL (scholarship of teaching and learning) project	✓	✓	✓
	Evaluate and select effective learning technologies and maximize spaces to enhance student learning	Develop a teaching philosophy/dossier that aligns key beliefs about teaching and learning to sources of evidence drawn from participation in the Certificate program				✓

Table 2.
Collated evaluation
data

Evaluation items	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
I feel more prepared for my current and/or future teaching, learning and research experience because of my participation in the program classes	<i>n</i> = 0(0)	<i>n</i> = 1(3)	<i>n</i> = 2(6)	<i>n</i> = 11(33)	<i>n</i> = 19(58)
I will be able to apply the material presented and discussions in the program classes to my future teaching, learning and research experiences	<i>n</i> = 0(0)	<i>n</i> = 1(3)	<i>n</i> = 3(9)	<i>n</i> = 10(30)	<i>n</i> = 19(58)
Overall, the program classes met (or exceeded) my expectations	<i>n</i> = 3(9)	<i>n</i> = 0(0)	<i>n</i> = 1(3)	<i>n</i> = 15(45)	<i>n</i> = 14(42)

Characteristics	Surveys (<i>n</i> = 94)		Interviews (<i>n</i> = 21)	
	<i>n</i>	(%)	<i>n</i>	(%)
<i>Gender</i>				
Male	64	68.1	15	71.4
Female				
<i>Age</i>				
Less than 25 years	0	0	0	0
25–34 years	60	65.2	13	61.9
35–44 years	28	30.4	7	33.3
45–54 years	3	3.3	1	4.8
55 years plus	1	1.1	0	0
<i>Faculty</i>				
Arts	8	8.7	0	0
Business	1	1.1	1	4.8
Engineering	14	15.2	3	14.3
Environmental design	1	1.1	0	0
Kinesiology	4	4.3	2	9.5
Medicine	39	42.4	6	28.6
Nursing	5	5.4	2	9.5
Science	16	17.4	4	19.0
	4	4.4	3	14.3
<i>Veterinary medicine</i>				
Year of postdoctoral fellowship				
Year 1	22	23.9	4	19.0
Year 2	35	38	8	38.1
Year 3	19	20.7	2	9.5
Year 4	9	9.8	4	19.0
Year 5	5	5.4	1	4.8
Completed fellowship	1	2.2	2	9.5

Table 3.
Characteristics of
survey and interview
participants

Note: Missing value for some items therefore totals may not add to 94

a scale of 1–10 (10 being the most useful). Figure 1 depicts the participants' rating of the usefulness of these opportunities. Teaching and learning classes were rated as the most useful of all professional learning and development opportunities with a mean rating of 7.94, a median of 8 and a range being from 4–10. There were no significant differences in average rank score between women and men ($p = 0.162$, Kruskal–Wallis test), age groups ($p = 0.367$, Kruskal–Wallis test) or years of postdoctoral fellowship ($p = 0.781$, Kruskal–Wallis test). Although more women than men attended teaching and learning classes, there were no significant differences in attendance between genders ($p = 0.772$, Kruskal–Wallis test). There were also no statistically significant differences in attendance among age groups ($p = 0.280$, Kruskal–Wallis test).

Interview findings

Participants provided examples of how they have used the knowledge and skills developed through the certificate program to improve their teaching practices. Themes elicited from postdoc responses were categorized into three interrelated and broad themes (Table 4), namely, desire to develop teaching practice, benefits of engaging in the certificate program and potential impact on future teaching practice. No differences were found between participants of different age, faculty and years of postdoc experience.

Desire to develop teaching practice

Lack of teaching opportunities. Although many postdoctoral scholars indicated they would like to teach, there were limited opportunities to gain hands-on teaching experience during their postdoc appointments. This was often related to funding being contingent on research productivity and their supervisor's involvement with teaching: "So, my supervisor, she's a researcher and clinician and does not do any teaching at all [...] I was not getting that kind of training" (P8):

From my experience, teaching at the postdoc level is also not in the culture of some of the fields. For instance, in Chemistry, and possibly in natural sciences, teaching at the postdoc level is not valued. Postdocs are seen as a time to focus on research, however, teaching helps to improve research skills (P20).

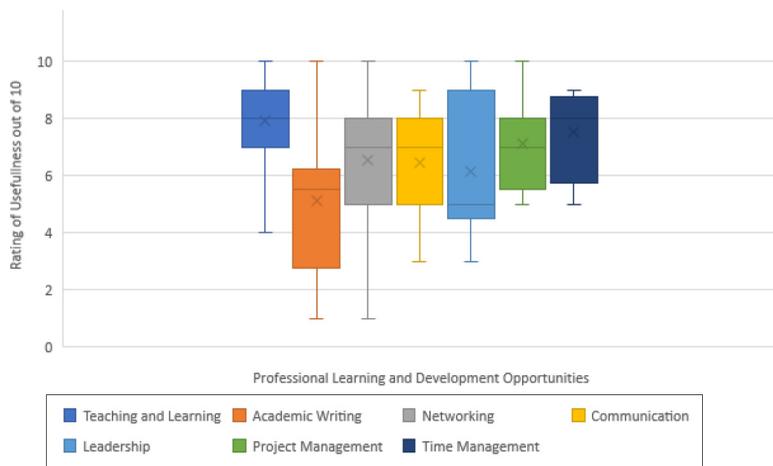


Figure 1. Participants ratings of postdoctoral professional learning and development opportunities on a scale of 1–10 (10 being the most useful)

Theme	Subtheme	Exemplar quotes
Desire to develop teaching practice	Lack of teaching opportunities	"I have not found many teaching opportunities available as a post-doc, mostly because my funding is contingent on me doing research and as much as I love teaching, I do not think I have the time right now to invest in it" (P5)
	Interest in developing teaching practice	"I'm very interested in teaching and I'm looking into it as a possible career after I finish my post doc" (P2)
Benefits of engaging in the teaching certificate program	Learning the language of teaching and learning	"Words like formative vs summative feedback, I never would have got other than doing these workshops" (P8)
	Engaging in experiential learning opportunities	"So, its not just theoretical, you actually do the exercise in the class, so then you remember" (P19)
	Networking around a common interest	"Having the opportunity to meet other post docs, not only in your area but also seeing some in humanities and how they think and that was quite interesting" (P20)
Impact on future teaching practice	Developing a reflective practice	"Thinking about being a reflective teacher. I'm not a reflective person in general, but I really appreciate the importance of that now in [...] becoming a better teacher" (P8)
	Building a teaching and learning toolkit	"I'm planning to use the knowledge I have collected to design a class" (P4)
	Incorporating key learnings into teaching practice	"Hopefully, I'm going to do some teaching, some lectures so I can use all the skills that I learned" (P12)
	Engaging and contributing to the scholarship of teaching and learning	"I would like to assess how can we make pre-lab for an experiment-based class? How can we make them more effective from the point of view of students because a lot of time they would not do it and probably there is a reason they do not do their pre-labs, maybe they do not have time but also if you are not finding something useful, probably you would not do it?" (P20)

Table 4.
Themes and
subthemes

Although opportunities to teach appeared limited, some participants chose "to focus on learning the theory behind it" (P12) and noted "it has been really helpful to learn about things that I could do when I'm teaching in post-secondary" (P19).

Interest in developing teaching practice. For postdoctoral scholars already interested in teaching, there was tangible excitement regarding teaching development opportunities. One participant said, "I was really excited to see a whole institute for teaching because teaching has been my passion. That was my start" (P14). For others, it was not until they were well into their postdoctoral fellowship that they began to see the value of teaching development. One participant noted, "for a long time, I did not realize after I got my PhD, I still need to learn some professional skills" (P4). Others initially viewed teaching development opportunities as a way to build their CV but developed an enthusiasm for teaching and learning over time:

I needed to improve my technical skills for the job market and some portion of it was just wanting to become better as an instructor. I think going into it I definitely felt more about the need to build my CV [...] but then as it went it sort of totally morphed and it became much more about excitedly learning about teaching as opposed to filling out a CV (P21).

Benefits of engaging in the certificate program

Learning the language of teaching and learning. For many postdoctoral scholars, the language of teaching and learning was not familiar. The certificate program “was useful for using the vocabulary that [. . .] we did not know before” (P20). For international postdoctoral scholars it was also useful to learn about cultural differences in the way teaching and learning is articulated: “I think there is for me an opportunity to know-how in North America you talk about teaching because I’m coming from another country” (P2). As many of the postdoctoral scholars in this study were actively looking for permanent academic employment, the certificate program helped them to speak about teaching and learning during the interview process. One postdoc stated, “even if I do not have that much practical experience, I know the theory and I can talk about it” (P12). Another highlighted, “learning the expert language in the field was really helpful when it came to interviews” (P8).

Engaging in experiential learning opportunities. Opportunities are included throughout the certificate program to provide postdoctoral scholars with experiential learning, including writing reflective statements, drafting a plan to conduct research on topics related to teaching and learning, developing teaching resources using cutting-edge technology and crafting a teaching dossier. As one postdoc conveyed, these experiential learning opportunities were “quite useful for the interview process because I was asked some question about how will you teach or mentor your students? I could use that” (P20). Another postdoc described increased confidence: “I feel like I have a much better idea of how to teach and I have been able to put together an actual teaching dossier” (P17).

Networking around a common interest. Throughout the certificate program postdoctoral scholars had opportunities to meet and work with postdoctoral scholars from other disciplines. This networking around teaching and learning provided ample opportunities for interesting discussions. One postdoc described these opportunities to be “quite helpful [. . .] it allows you to brainstorm and chat about certain issues with other postdoctoral scholars” (P5).

Developing a reflective practice. As postdoctoral scholars moved through the certificate program they were encouraged to become reflective teachers to support their growth and development:

It has been helpful to think about my teachers in the past and [. . .] reflect on the stuff that they did well, and also the stuff that they could have done better, and kind of think of what I want my teaching to look like” (P19).

The development of reflective practice was modeled and required, which led to more long term buy-in for the importance of reflection “I think that I will kind of from now remember how to reflect on how I teach as another piece of adjustment” (P20).

Building a teaching and learning toolkit. To complete the certificate program, postdoctoral scholars engage in a number of classes with various facilitators to help build their individualized teaching and learning toolkits. One postdoc stated the various classes “allowed me to create [. . .] a portfolio of SoTL tips, tricks and literature” (P8). Another postdoc reflected on how participating in various teaching and learning approaches allowed them to see how it could be used in their own classroom: “its not just theoretical, you actually do the exercise in the class, so then you remember when you go and do a lecture you think maybe I will do the think-pair-share” (P19). Notably, postdoctoral scholars frequently mentioned creating clear learning objectives, using small group discussions, integrating anonymous polls, incorporating videos, aligning assessments with outcomes, formative and summative feedback and using rubrics as key tools in their growing toolkits.

Potential impact on future teaching practice

Incorporating key learnings into teaching practice. Participants expressed a genuine desire to put the skills they learned into practice. One participant expressed how helpful the certificate program had been for their current teaching practice: “I think the [certificate program] has been really, really helpful and its definitely absorbed into my teaching practice, absolutely” (P8). Those who were looking for more teaching opportunities noted the certificate program helped them to learn about things they will incorporate into their teaching practice in the future.

Engaging and contributing to the scholarship of teaching and learning. As part of the certificate program, postdoctoral scholars were introduced to the SoTL and explored how teaching and learning research could be conducted in their classrooms. Participants identified a number of areas of potential research including testing different teaching approaches and the impact on “the academic achievements in students” (P4), “ways of optimizing group work” (P8) and “how much feedback to give [. . .] what types of students are using it and not using it, how does the amount of grades play into that” (P8). One postdoc was interested in exploring how best to develop pre-lab activities for chemistry students:

I would like to implement and assess [. . .] how can we make pre-lab for an experiment-based class? How can we make them more effective from the point of view of students, because a lot of time they won't do it and probably there is a reason they don't do their pre-labs, maybe they don't have time but also if you're not finding something useful, probably you wouldn't do it (P20).

Discussion

In this study, we explored postdocs' experiences and perceptions of a teaching and learning certificate program and identified how they are using or will use the knowledge and skills developed through the certificate program to improve their own teaching practices. Generally, postdoctoral scholars found the certificate program helped them feel more prepared for current and/or future teaching experiences. The vast majority felt they could apply what they learned to their future teaching, learning and research practices. The findings further confirmed that this intentionally-designed flexible and complementary teaching development program helped them learn the language and theory of teaching and learning in postsecondary education; practice specific strategies and develop confidence in how to teach; network with colleagues about teaching and learning; develop a reflective teaching practice; and contribute to the SoTL.

Similar to other research that explored postdoctoral scholars' desire for opportunities to develop skills in teaching and learning (Åkerlind, 2005; Matyas *et al.*, 2011; Mitchell *et al.*, 2013), the participants in this study indicated a strong desire to develop their teaching skills. Other researchers have reported that participating in teaching and learning development has a number of positive outcomes including increased awareness and interest in different teaching approaches (Ash *et al.*, 2009), increased self-confidence in applying active learning opportunities in their classrooms (Bauer *et al.*, 2013; Brancaccio-Taras *et al.*, 2016; Derting *et al.*, 2016), enhanced abilities to integrate innovative and collaborative teaching methods into their teaching practice, increased awareness of the SoTL (Bauer *et al.*, 2013; Gibbs and Coffey, 2004; Rybarczyk *et al.*, 2011) and a stronger focus on student learning (Bauer *et al.*, 2013; Derting *et al.*, 2016; Ebert-May *et al.*, 2015). Similar to other studies, our findings also support the importance of integrating systematic opportunities for developing a critically reflective teaching practice, through informal and formal cross-disciplinary dialogue and written activities that encourage both experience-based and research-based reflection (Kreber and Castleden, 2009). Developing capacities in reflection is a critical component of

developing and strengthening teaching expertise over time (Hendry and Dean, 2002; Kreber and Castleden, 2009) and the present findings confirm the benefits of ensuring reflective activities are meaningfully incorporated into postdoc teaching development programs. The findings also support previous research related to the benefits and positive outcomes of integrating the SoTL as a core component of postdoc teaching development programs (Brew and Ginns, 2008; Trigwell, 2013).

Researchers found that postdoctoral scholars who transition into academic positions indicate pedagogical skills and teaching experience are key components that helped prepare them for academic roles (Rybarczyk *et al.*, 2016). Importantly, a study that compared postdoctoral scholars who engaged in teaching as part of their postdoctoral fellowships to those who did not, found no significant differences in the number of scholars publishing, publication rates or length of time in postdoc positions (Rybarczyk *et al.*, 2011). The findings in the present study suggest that when postdoctoral scholars participate in professional learning opportunities to strengthen their teaching practices during their appointments it enhances their confidence and success as they move forward to pursuing academic positions.

Networking opportunities were one of the identified benefits of the certificate program. Postdoctoral scholars reported on the importance of being provided opportunities for cross-disciplinary conversations with colleagues with similar interests in teaching and learning. Similarly, Baiduc *et al.* (2016) identified that postdoctoral scholars who engaged in professional development programs found one of the most useful benefits to be the interactions with their peers. In a recent case study conducted on a postdoc fellowship program, participants identified that they appreciated the power and importance of postdoctoral scholar cohorts and community (Eisen and Eaton, 2017). Other studies identified developing peer networks and social interaction as unexpected benefits of engagement in professional learning and development opportunities for postdoctoral scholars (Holtzclaw *et al.*, 2005). Chen *et al.* (2015) found those who engaged in developing a peer network during their postdoctoral fellowship had smoother postdoctoral phases and positive experiences of preparing for their desired careers. Further, postdoctoral scholars who participated in professional development also gained skills and competencies in developing teams and peer networking (Kuhn and Castano, 2016; Lee *et al.*, 2010). Our findings support these studies and those that suggest the importance of developing significant networks with colleagues, to have trusted conversations to advance teaching and learning practices (Roxå and Mårtensson, 2009).

Strengths and limitations

This study is strengthened by the inclusion of postdoctoral scholars from a diverse range of disciplines and years of training. The multi-methods case design was especially useful as the quantitative data was used to speak to the larger population while providing the depth of a qualitative study (Creswell, 2014; Tashakkori and Teddlie, 2010). The inclusion of a variety of data allowed us to explore postdoctoral scholars' perceptions of the certificate program more completely. This study is limited by only focusing on one university's certificate program and may not be generalizable to other locations, where the context may vary. This study is further limited by studying postdoctoral scholars who, by their voluntary certificate program enrollment, already see the importance of professional development related to teaching and learning. Furthermore, participants were self-selected, which may limit the generalizability of our study findings. A comprehensive evaluation of the impact of a postdoctoral teaching certificate including job market performance is an important area for future research.

Conclusion

The career pathways of postdoctoral scholars' are wide-ranging, with most seeking academic employment in which teaching will be a significant component. Postdoctoral scholars recognize the value of teaching and learning training, despite the traditional focus and expectation on disciplinary research. Teaching development programs provide important professional learning and development opportunities for postdoctoral scholars across all disciplines and should be integrated into all postdoctoral training. In this paper we explored postdoctoral scholars' experiences and perceptions of a certificate program in university teaching and learning and sought to identify how postdoctoral scholars use the knowledge and skills developed through the certificate program to improve their own teaching practices. The findings reaffirm the benefits of intentionally-designed postdoctoral scholar teaching development programs. As postsecondary institutions work to meet the evolving needs of postdoctoral scholars, it is critical that universities develop professional learning programs that are research-informed to best serve their participants. We encourage other institutions to learn from our case study findings to develop or adapt their teaching development programs for postdoctoral scholars within their local context.

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