

RESEARCH-BASED LEARNING IN AN ONLINE COURSE–BASED MASTER OF EDUCATION PROGRAM

Barbara Brown,* Michele Jacobsen, Mairi McDermott, Marlon Simmons, Sarah Elaine Eaton, Verena Roberts, & Sandra Becker

Werklund School of Education, University of Calgary, Calgary, Alberta, Canada

*Address all correspondence to: Barbara Brown, Werklund School of Education, University of Calgary, Calgary, Alberta, Canada, E-mail: babrown@ucalgary.ca

In this case study research, we examined graduate student experiences with research-based learning in an online course–based master's degree in education at a Canadian university. Data were gathered during two sequential phases, starting with exit surveys and then interviews with graduates from the master of education program. Findings indicated the way students were grouped and progressed through their courses in cohorts and using a signature pedagogy called collaboratories of practice, where students were provided with opportunities to engage in field-focused inquiry online alongside their peers and with guided support from their instructor, which served to support students with continuity throughout their program and with support for developing and applying research-based learning skills. Participants described the cohort structure and signature pedagogy as key elements that contributed to their research-based learning experiences. These findings are consistent with earlier results from studying two previous cohorts of postgraduate students. Study results serve to inform scholarship and program designs for research-based learning in course-based, online master's degree programs. More broadly, the results will also benefit faculties and institutions developing structural supports and pedagogies for new online courses and program offerings.

KEY WORDS: research-based learning, graduate education, case study, online learning

1. INTRODUCTION

Course-based master's degree programs in education for practicing professionals continue to evolve to effectively support graduate students in developing research competencies (Jacobsen et al., 2018; Willison, 2012). At the same time, stackable and microcredential programs, and digital education offerings in postsecondary institutions are on the rise (Oliver, 2019; Ralston, 2021; Selvaratnam & Sankey, 2021), and course-based programs can offer students with further individualized and flexible pathways to complete master's-level degrees. Professionals seeking to complete a course-based master's degree, who are often working full time, may not consider the value of research skill development (RSD) (Wilmore & Willison, 2016; Willison et al., 2018), which can make a focus on RSD a challenge for

instructors and students. Positive attitudes toward research are an important condition for success, and it can be difficult for graduate students who may undervalue research processes or have limited time for research to change their long-held assumptions of research (Moulding & Hadley, 2010). However, research suggests immersion in the research process can help students develop positive attitudes as critical consumers and informed producers of research in course-based programs (Jacobsen et al., 2018b; Reis-Jorge, 2005). Course-based, professional graduate programs are not yet fully researched. To date, there is a need to study how students experience course-based programs and are supported in research-based learning (Willison, 2014; Willison & O'Regan, 2007; Willison et al., 2018; Wilmore & Willison, 2016). The objective of this case study research was to explore students' research-based learning experiences in an online, professionally oriented, master of education (MEd) program and to understand the necessary program structures and pedagogies that effectively supported students with having a robust research-based learning experience. The following research question guided this study: How are students supported with developing research-based learning skills during an online course-based MEd graduate program?

2. COURSE-BASED MASTER'S DEGREES

In general, master's degrees are described as intermediate degrees that have complexities in their history and a range of purposes (Usher, 2021). Canadian universities offer different types of graduate degrees at the master's level, including a course-based degree and research-based degree. The course-based degree involves completing coursework and has a professional focus (also known as a professional degree) rather than the research-based degree that involves completing a combination of course work and a thesis (also known as an academic degree) with an emphasis on conducting original research. Some master's degree programs are also designed so graduates are eligible for credentialing and accreditation from professional bodies upon degree completion (e.g., University of Calgary's master's degrees in educational leadership qualify graduates for Alberta Education's Leadership Quality Standard certification, a requirement for all school principals in Alberta).

2.1 Credentialed Programs

Macrocredentials (e.g., master's degree, PhD degree, etc.) often refer to credit-bearing or traditional formal learning programs, such as degree programs in postsecondary institutions (UNESCO, 2018). Microcredentials are also becoming a popular pathway as an addition, alternative, or complement to full-degree options (Oliver, 2019; Ralston, 2021; Selvaratnam & Sankey, 2021). Oliver (2019) defines microcredential as “a certification of assessed learning that is additional, alternate, complementary to, or a component part of a formal qualification” (p. 19). In this way, microcredentials can refer to stand-alone short courses that might be non-credit-bearing (e.g., MOOCs, boot camps, digital badges, etc.) or can be stackable and provide pathways toward a credit-bearing and formal degree program. Nano-degrees, micro-

master's credentials, certificates, badges, licences, and endorsements are some of the terms used to describe microcredentials (UNESCO, 2018, p. 11). Proponents argue, "As the future of work unfolds, working citizens are likely to need more and better granular certified learning – micro and macro – to evidence their educational currency amid rapid change" (Oliver, 2019, p. 9). Microcredentialing has also drawn criticism regarding undermining the mission of higher educational institutions to educate the whole person, unbundling traditional degree programs for purposes of efficiency and revenue generation, or as a way to respond to corporate or workplace development needs; there are misperceptions about diminishing the quality of learning experiences and standard of education, replacing instructors with automated courseware, reducing recognition of credentials, and privileging digital technology, to name a few (Ralston, 2021; Selvaratnam & Sankey, 2021).

2.2 Cohort Structure

Credentialed programs with multiple courses can be efficiently organized administratively using a cohort structure by purposefully scheduling a group of students in the same courses together so they can progress at a common pace and can complete the program together rather than making provisions for students to self-enroll in different sections of the same course (Brown et al., 2015; Jacobsen et al., 2018b).

The MEd cohort is an intact group of students who take all of their courses in the program together. Master of education students start and complete their degree program at the same time, engage in sustained academic and professional dialogue, and engage in shared learning experiences as a group. Students in each cohort are supported by instructors and administrators in becoming a community of learners as they progress through the MEd program. (Brown et al., 2015, p. 63)

Results from other studies show that learning with a group provides students with enhanced social presence, improvement in completion rates in online and on-campus environments, and advantages of peer support (Joyce & Brown, 2009). Developing a sense of belonging and connectedness within an online scholarly community is important for student learning (Blankenship & Gibson, 2016; Garrison, 2017) and can also help prevent isolation (Peacock et al., 2020). In a large-scale national study focused on educational leadership programs, researchers found a cohort structure provided benefits for relationships, completion rates, cohesiveness, and professional networking (Barnett et al., 2000). Studies related to cohort structures and instructional implications have also shown that cohorts are complex social structures and can present challenges for students working with peers (Donaldson & Scribner, 2003). A cohort structure in a course-based master's program holds promise; however, scheduling and organization of structures alone will not ensure high-quality learning experiences.

2.3 Signature Pedagogies

Key approaches for teaching and learning can be referred to as signature pedagogies (Shulman, 2005). In educational contexts, inquiry-based, case-based learning, problem-based learning, and technology-enabled learning are common approaches referred to as signature pedagogies in education. Signature pedagogies have positively impacted student and instructor perceptions of learning and have demonstrated gains in student learning in graduate programs (Friesen, 2013a,b; Lee et al., 2016; Lundeberg & Yadav, 2006). Online learning environments in graduate programs can also benefit from signature pedagogies such as collaboratories of practice that provide students with opportunities to engage in field-focused inquiry alongside their peers and with guided support from their instructor (Brown et al., 2017; Eaton et al., 2017; Jacobsen et al., 2018a; Simmons et al., 2021). An online learning collaboratory is considered “a collaborative virtual environment where students, teachers, and experts in the field or domain work together in a variety of ways to support learning” (Dorneich, 2002, p. 201).

With many postsecondary institutions acting to expand and increase online program offerings since the COVID-19 global pandemic, and alternate formats for learning pathways and credentialing, and research experiences, it is important to consider how programs are designed with supportive structures, signature pedagogies, and research-based learning activities (Garrison, 2017; Kebritchi et al., 2017; Smidt & Li, 2019). Arguably, it is not a matter of asking whether an online course-based master's degree program can lead to the development of research-based skills; instead, it is a matter of asking what structures are needed to effectively support students in developing research-based skills.

3. CONTEXT AND THEORETICAL FRAMEWORK

The longstanding MEd course-based degree program in this study included four mandatory, fully online, and semester-long courses (e.g., 12–13 weeks for fall and winter terms and 6 weeks for spring and summer terms) that were mapped to a strongly integrated set of research-teaching activities aimed to promote knowledge creation (Griffiths, 2004). Research-teaching activities can include research-led, research-oriented, research-based, and research-informed teaching (Griffiths, 2004). In research-based teaching, “processes of inquiry are highly integrated into the student learning activities” (p. 722). Willison and O'Regan's (2007) Research Skill Development (RSD) framework provides six facets for research-based teaching that can help students develop their research skills:

- Facet 1 – Embark & Clarify: Embark on inquiry and determine a need for knowledge/ understanding
- Facet 2 – Find & Generate: Find/generate needed information/data using appropriate methodology

- Facet 3 – Evaluate & Reflect: Critically evaluate information/data and the processes to find/generate them
- Facet 4 – Organize & Manage: Organize information collected/generated
- Facet 5 – Analyze & Synthesize: Synthesize/analyze new knowledge
- Facet 6 – Communicate & Apply: Communicate knowledge and understanding and the processes used to generate them

The six facets in the RSD framework also map onto the foundational graduate competencies or standards expected for graduates of the program that were used for the design of the MEd program and for ongoing curriculum mapping and review (Jacobsen et al., 2018a) and for examining graduate student's research-based skills (Jacobsen et al., 2018b). Students in the program learned about research through research-based teaching activities embedded in the four required courses in the program: 1) Program and Practice Evaluation, 2) Research Methodology in Education, 3) Collaboratory of Practice, and 4) Writing Educational Research (see Jacobsen et al., 2018b). The third course (Collaboratory of Practice) is based on the signature pedagogy of students working in an online collaborative-laboratory setting. All courses included graded assessment activities and opportunities for students in the cohort to work in small groups and to work independently. This case study research used the six facets from the RSD framework (Willison, 2012, 2014; Willison et al., 2018; Willison & O'Regan, 2007; Wilmore & Willison, 2016) as a conceptual lens to examine and analyze the data and interpret the results. This framework was used to understand the structures that supported students in developing research-based skills in a master's degree program.

4. METHODOLOGY

Our research team used an explanatory case study approach (Merriam & Tisdell, 2016; Yin, 2018). A case study is characterized by how the case is defined and the unit of analysis (Merriam & Tisdell, 2016). In this study the case was defined as the MEd course-based degree program. Two distinct and sequential phases of data collection (exit surveys followed by interviews) based on studies conducted across two prior cohorts (2017, 2018 cohorts) were used for the present study. The data collected from the prior exit surveys and interviews helped us understand the experiences of students' research-based learning and informed updates to the courses (e.g., assignments, resources), including the sequence of course offerings [see results from previous study (Jacobsen et al., 2018b)].

During the first phase of the present study, exit-survey data were gathered from postgraduate students in an MEd course-based program who had completed the four required research courses in 2019. We surveyed the 2019 cohort to identify what parts of their course-based master's degree program supported their engagement in learning related to the research activities. The exit-survey questions collected data about student perceptions related to three categories: types of pedagogies, types of learning tasks/assessment activities, and the types of structures/processes that supported student engagement in learning. The descriptors for

each of these categories were identified during the curriculum review process (Jacobsen et al., 2018a). The descriptors that formed our exit-survey items were common features and terms used in the four research course outlines established during the curriculum mapping and review process that occurred prior to our study. We used a five-point Likert scale to gauge the extent of agreement (5-strongly agree, 4-somewhat agree, 3-neither agree or disagree, 2-somewhat disagree, or 1-strongly disagree) with the following exit-survey questions:

1. To what extent did each of the following signature pedagogies support your engagement in educational research in your degree? (Inquiry-based learning, problem-based learning, case-based learning, technology-enabled learning, collaboratories of practice)
2. To what extent did each of the following learning tasks/assessment activities support your engagement in educational research? (Synchronous sessions, asynchronous discussions, guest speakers, instructor-created videos, group work, readings, preparing an article critique, CORE (ethics) tutorial, discussion board posts, writing a blog)
3. To what extent did each of the following program structures/processes support your engagement in educational research? (Cohort, capstone, assignments, theory-practice balance, coherent pathway, instructors provided high-quality learning materials, clear ethics application and approval process, formative assessment, online spaces)

The exit-survey invitation was sent to 150 postgraduate students from the 2019 cohort who fulfilled program requirements as of November 2019. Postgraduates were contacted using their university email address and provided with an invitation to participate in the study and a link to complete the exit survey.

We used descriptive statistics for analysis and interpretation of exit-survey data. Exit-survey results from the 2019 postgraduates were also compared to the two previous years of data collection (2017, 2018), and an analysis was conducted and represented by one-way ANOVA comparing between exit-survey results from three years. The exit survey also included open-ended questions for postgraduates to add more detail about signature pedagogies, learning tasks/assessments, and program structures/processes that supported their engagement in educational research. The textual responses to open-ended questions were analyzed using the six facets from the RSD framework (Willison, 2012, 2014; Willison & O'Regan, 2007; Wilmore & Willison, 2016).

During the second phase of the study, follow-up interviews were conducted with participants from the 2019 cohort. Interview data was gathered to complement the information collected through the exit survey. Of the 30 postgraduates who completed the exit survey, nine agreed to participate in an online interview. Four interview questions replicating the exit-survey questions were used to gather information about the students' experiences in developing research skills in the program:

1. Tell us how and whether signature pedagogies (such as inquiry, problem-based, case-based learning, technology-enabled, collaboratories) supported your learning in courses and your overall development as a researcher.
2. What learning/assessment tasks or course-based experiences were most helpful to your learning as a new researcher? In what ways has the research experience informed your professional practice? How have you taken the key learnings from the research into your professional role?
3. In what ways, and to what extent, did your peers in the cohort support your success as a learner?
4. How did you experience the research pathway (from research design, to field-based inquiry, to a final written report) toward your development and goals for carrying out research? What worked well? What did not work well?

Responses from interview participants yielded detailed descriptions and insights about the ways students were supported in developing research skills and engaging in research activities. Using the six facets from the RSD framework (Willison, 2012, 2014; Willison & O'Regan, 2007; Wilmore & Willison, 2016) with two cycles of coding (Miles et al., 2014), the researchers analyzed the interview data and open-ended text responses from the exit survey to learn how practitioner-scholars engaged in the research-informed and research-active MEd program. The first cycle involved a deductive approach with the assignment of researcher-generated codes from the RSD framework to participant responses. An *a priori* coding system, well established in the earlier research conducted with the 2017 and 2018 cohorts, was adopted as well as similar analysis of text responses to the exit-survey questions and interview transcripts. Also, using inductive methods, the researchers assigned descriptive codes to any sections of text that did not fit with one of the provisional codes. In some cases more than one code was assigned to a participant's response. The second cycle involved condensing the descriptive codes and provisional codes into explanatory themes. Following these cycles of analysis, the researchers integrated the qualitative and quantitative data sets and conducted a within-case analysis to interpret the results. The RSD framework was used to interpret and understand students' experiences and how they were supported in developing their research-based skills during a course-based master's degree program.

5. RESULTS

The results are based on the exit-survey responses with a 20% response rate ($n = 30$) and interview transcripts ($n = 9$) involving postgraduate students who completed their MEd degree in 2019. We include an integrated report of quantitative and qualitative data identifying themes that emerged related to the ways in which students were supported with research-based learning. Following the integrated report, we also provide an overall comparison to the data collected with prior cohorts (2017, 2018).

5.1 Signature Pedagogies, Learning Tasks/Assessment Activities

Table 1 provides the signature pedagogies that participants selected as supportive of their research-based learning in the MEd program on a five-point scale (mean close to 5 represents strong agreement and close to 1 represents strong disagreement). Collaboratories of practice is a method of teaching and learning online that provides students with opportunities to engage in field-focused inquiry alongside their peers and with guided support from their instructor (Brown et al., 2017; Eaton et al., 2017; Jacobsen et al., 2018a; Simmons et al., 2021). This approach was selected as the top type of signature pedagogy that supported student engagement in learning.

TABLE 1: Signature pedagogies that supported student engagement in educational research ($n = 30$)

Item	Mean	Standard Deviation
To what extent did the following signature pedagogies support your engagement in educational research in your degree? ($\alpha = 0.82$)	3.99	0.81
1. Collaboratories of practice	4.41	0.91
2. Inquiry-based learning	4.17	1.21
3. Technology-enabled learning	4.10	1.05
4. Problem-based learning	3.83	1.07
5. Case-based teaching	3.31	1.04

Table 2 lists the learning tasks/assessment activities that supported student engagement in educational research on a five-point scale (mean close to 5 represents strong agreement and close to 1 represents strong disagreement).

TABLE 2: Learning tasks/assessment activities that supported student engagement in educational research ($n = 30$)

Item	Mean	Standard Deviation
To what extent did the following learning tasks/assessment activities support your engagement in educational research? ($\alpha = 0.85$)	3.93	0.69
1. Preparing an article critique	4.45	0.91
2. Group work	4.45	1.06
3. Readings (includes media sources)	4.41	0.73
4. Asynchronous discussions/sessions	4.34	1.08
5. Posting and responding to discussion board posts	4.07	1.16
6. The CORE (ethics) tutorial	3.97	0.98
7. Synchronous sessions	3.97	1.24
8. Instructor-created videos/presentations	3.64	1.28
9. Guest speaker(s)	3.14	1.09
10. Writing a blog (or other social media) post	2.86	0.88

As observed from the tables, respondents strongly agreed that the collaboratories of practice (as a signature pedagogy) supported their strong engagement in educational research (4.41 out of 5). Respondents also strongly agreed that engaging in learning tasks/assessment such as group work supported their learning (4.45 out of 5). During the interviews we asked participants, “Building upon the survey, please tell us how and whether signature pedagogies (such as inquiry, problem-based, case-based learning, technology-enabled, collaboratories) supported your learning in courses and your overall development as a researcher” (interview question 1). Students described the collaboratory of practice approach and noted how the design of the four research courses provided graduated support for developing all six research-based skills, from “embark & clarify” to “analyze & synthesize” to “communicate & apply.” In the interviews respondents described collaborative work with peers in small groups and with the larger cohort as a support for their learning and development as a new researcher. One participant stated:

Working with others in our small group and then with the larger cohort group enabled me to refine and articulate my thinking around topics that were being covered. I appreciated the diverse backgrounds of my classmates who brought with them unique points of view that I would not have considered if we had not entered a dialogue. (Olivia)

The following excerpt from one of the participants interviewed captures how collaborating with peers in the courses was an important facet of developing research skills such as “communicating and applying” for refining and renewing others' processes:

The overall climate of collaborative knowledge building was really valuable...we are in this together, we are bouncing ideas off each other, and we are building on one another's ideas in a diplomatic and productive way. This was in each course and shifted the learning from passively absorbing theories to active knowledge building, which made it so much more engaging, particularly in an online context where I feel like engagement is a slippery slope (Liam).

Relationships that developed with peers mattered, and working collaboratively with small groups to provide each other with feedback supported student learning and research skill development. The following excerpt highlights the value of working in small groups (also referred to as studio groups) within the larger cohort during their classes while initiating and conducting independent research projects:

I can't say enough about how important it was to have peers and how the instructor did it was with studio groups. There were three to five people in a group. Any more than that would be unmanageable, and then as a group, we were reviewing other people's work group-to-group, and I think that worked really well. (Emma)

Interview participants recognized the emphasis on collaborative work throughout the program. The following excerpt from the open-ended exit-survey responses provided a common sentiment we also heard during the interviews related to the value of working collaboratively as part of a supportive community when learning to conduct research, "a disposition of inquiry supported by a problem-based approach was necessary to independently chart my way through the research year with the support of my peers in the online community" (Noah). In terms of the learning tasks/assessment activities, we also noted the discrepancy in responses that related to learning tasks/assessments that did not involve working in groups or collaboratively. For example, respondents indicated that writing an article critique supported student engagement in educational research (4.45 out of 5), whereas writing a blog post or other social media post was not as supportive for student engagement in educational research (2.86 out of 5). Both learning tasks (writing an article critique and writing a blog post) are individual learning tasks and did not require working in a group. However, respondents noted that writing an article critique supported student engagement in educational research in comparison to writing a blog post.

5.2 Program Structures/Processes

Table 3 provides a summary of the mean and standard deviation for the structures/processes that supported student engagement in educational research. The majority of participant responses to the items are close to 4 out of 5 (somewhat agree). The item with strongest agreement was the cohort structure (4.48 out of 5). Respondents strongly agreed that the cohort structure in the MEd program enabled student-student relationships to develop in a professional learning and research community.

TABLE 3: Program structures/processes that supported student engagement in educational research ($n = 30$)

Item	Mean	Standard Deviation
To what extent did the following program structures/processes support your engagement in educational research? ($\alpha = 0.93$)	3.93	0.95
1. The cohort structure in the MEd program enabled student-student relationships to develop in a professional learning and research community.	4.48	1.09
2. The online spaces (D2L, Adobe Connect or Zoom, email, other online spaces) were designed to foster thoughtful, reflective dialogue and communications about research issues and topics.	4.38	0.98
3. Formative assessment from instructors and peers during the research courses provides ongoing feedback that helps students to move forward in their learning and research.	4.17	1.23
4. The final research project (capstone) enabled me to be research informed and develop as a research-active scholar of the profession.	4.10	1.29
5. Instructors provided high-quality readings and learning materials to support learning during the research courses.	4.03	1.18
6. The assignments in the research courses were relevant, engaging, and challenging in developing understanding about educational research.	3.93	1.16
7. The balance of theory and practice was well paced within the four research courses (i.e., learning activities and assigned readings; courses addressed issues that are immediately relevant to students' personal context and important to the field).	3.66	1.20
8. The ethics application and approval process were clear for students undertaking research with human participants.	3.62	1.08
9. The four research course structure supports learners in becoming research-active practitioners.	3.48	1.41
10. The research courses provided a coherent pathway from research design, to field-based inquiry, to a final written report.	3.36	1.37

Exit-survey respondents identified the cohort structure as an important aspect of the program design that supported their learning and developing research-based skills in the course-based MEd program. During the interviews, researchers asked participants a question related to the cohort structure, “In what ways, and to what extent, did your peers in the cohort support your success as a learner?” (Interview Question 3). Participants discussed the socioemotional and academic supports provided through the cohort structure. The following excerpt illustrates a common response expressed by the participants when responding to questions about the cohort structure and the link to the research skill “find & generate”:

All of the students in my cohort were extremely welcoming, and all of our professors too. So, I felt very comfortable and very safe right from the beginning, which is wonderful. I

learned a lot from observing and watching how others were delivering their presentations, and speaking, and all of the new terminology. (Amelia)

Interview participants noted the value of the interaction with their cohort members and how this model contributed to their successful progression in the program:

The cohort model was the key to our success. We were lucky that somebody set up a slack.com account, so we kept in touch. We were all a very close cohort and talking every day. So that was just having people that you could ask questions to in a safe place. The cohort model is the way to go. (Elijah)

The item with less agreement was the coherence of the pathway in the program from research design, to field-based inquiry, to a final written report (3.36 out of 5). An open-ended exit-survey response provided one possible reason for this weaker agreement:

For my cohort (ended spring 2019) the evaluation course was the last one. General agreement was that this should have been offered earlier and not be the 4th and final course. Glad to see that the order has now been changed. The evaluation course is very important and should be included. Offering it earlier would allow the student to continue researching the topic in the later research courses, maybe carry out an actual evaluation since there is more time. (Ava)

Exit-survey results from 2019 were similar to the exit-survey results in 2017 and 2018, as shown in Table 4. We conducted an ANOVA to compare three years of data and found no statistically significant differences between participant responses to either of the exit-survey subsets of signature pedagogies, learning tasks/assessment activities, and program structures/processes based on the year of exit-survey completion, $F(2, 63) = 1.50, p < 0.05$; $F(2, 62) = 1.58, p < 0.05$; $F(2, 62) = 0.02, p < 0.05$; respectively.

TABLE 4: Inferential analysis represented by one-way ANOVA comparing between exit-survey results of years 2017, 2018, and 2019

		<i>df</i>	<i>F</i>	<i>Sig.</i>
Signature Pedagogies	Between Groups	2	1.50	0.23
	Within Groups	63	—	—
	Total	65	—	—
Learning Tasks/Assessment Activities	Between Groups	2	1.58	0.21
	Within Groups	62	—	—
	Total	64	—	—
Program Structures/Processes	Between Groups	2	0.02	0.99
	Within Groups	62	—	—
	Total	64	—	—

Findings from the 2019 cohort confirm previous results of earlier research conducted with the 2017 and 2018 cohorts. Our results also provide further insights regarding the type of

supports that helped students develop research-based skills and how their learning experiences were supported by the continuity of a cohort structure and collaboratories of practice.

6. DISCUSSION

Foundational work for this study and our ongoing analysis using Willison and O'Regan's (2007) RSD framework indicates that this research-active, course-based online graduate program supports the development of all six research-based skills (Jacobsen et al., 2018b) and the progression from supervisor-initiated to researcher-instigated to discipline-leading research (Willison & O'Regan, 2007). This finding also aligns with SOTL research of students as researchers (Hill et al., 2019). In our earlier research with two cohorts of postgraduate students who completed the online MEd program (2017, 2018), the participants reported the same two supports that were foundational to their experience and development of research skills: 1) cohort structure and 2) online collaboratories of practice (Jacobsen et al., 2018b).

Despite the development of common course outlines for the four research courses in the program, we also presume that each instructor selected the pedagogical approaches they were more comfortable with, tailored assignments in their own ways, and made provisions for supporting students with research in different ways. Perhaps this could account for higher agreement to some specific exit-survey items (e.g., article critique) and weaker agreement for other items (e.g., blog post). For example, it is possible that blog posts may not have been a format used by all of the instructors for student engagement in educational research and this could be the reason for a lower mean for this item. This could also explain why there was limited discussion about using blogs or other social media during the interviews. As such, we concentrated our interpretations around the items that were strongly rated in the exit survey and were also discussed by the participants during the interviews (e.g., cohort structures and collaboratories of practice). We also recognized that one of the four courses is named after the signature pedagogy called "Collaboratory of Practice," and this similarity with the course name and the signature pedagogy may have also caused the participants some confusion when responding to the exit-survey questions. The course is designed to provide students with time and opportunity to conduct the research in an online collaborative-laboratory setting. However, the consistent results (2017, 2018, 2019 cohorts) also suggest that working with others and teamwork as opposed to working in isolation, is an important aspect of developing research-based skills in online courses that cannot be underestimated. This finding is consistent with scholarship in the learning sciences that demonstrates how collaborative-knowledge-building learning environments are essential for academic growth (Scardamalia & Bereiter, 2014) and need to be considered in online research-based professional graduate programs and during components of programs when students are conducting their research. Using a collaboratories-of-practice approach to teaching online and providing students with synchronous and asynchronous opportunities to engage in field-focused inquiry alongside their peers and with guided support from their instructor is a type of

signature pedagogy that requires further study to help describe the nuances of what this type of pedagogy looks like in online practice.

Another limitation we recognized in our study is that the size of participant group did not permit our research team to account for responses based on the location of the graduate student during the time that they completed their degree program. In the literature, international graduate students in traditional and online programs often report experiencing academic and social isolation in graduate programs (Erichsen & Bollinger, 2011). Some researchers have found that off-campus graduate students can report a greater sense of isolation in comparison to on-campus students (Irani et al., 2014). We noted that the participants in our study reported a sense of connectedness and social interdependence during the time they were developing research-based skills and completing the requirements for their MEd degree with foundational supports that required working closely with their peers. Research components in thesis-based graduate programs (from research design, to field-based inquiry, to a final written report) are generally completed independently with support from a faculty supervisor or committee. In some course-based graduate programs, students do not have an assigned supervisor for their research and may have fewer supports for conducting research activities. The research components of a graduate program can seem largely independent and could be described as an asocial learning experience. However, participants in our study valued working with instructors within the four educational research courses and interacting with a consistent group of peers in a cohort structure for their research-based learning. Within the cohort, graduate students often worked with smaller groups of peers, also referred to as studio groups by the participants in the study. Participants reported that group work and collaborative work supported their learning. Developing relationships and establishing social connectedness has been noted as a supportive structure for developing a strong sense of community (Blankenship & Gibson, 2016; Garrison, 2017). Participants in our study also reported collaboratories of practice as a signature pedagogy that was a supportive approach to learning research-based skills. One of the four courses provided students with an opportunity to develop research-based skills in an online collaborative and laboratory setting. Although the graduate students were engaged in research that related to their professional practice or workplace context, the students in our study reported the value in discussing research ideas with their peers, learning from diverse perspectives, and the opportunity to work alongside peers in groups who were also engaged in research activities. Group work is common in postsecondary classrooms and requires students to share and collaborate (Lee et al., 2016). Attention has been given to group work relative to enhancing content learning and preparing students for professional contexts (Barkley et al., 2014); however, less attention has focused on designing courses or programs with group work to help develop research-based skills with practitioner-scholars. This could be an area to consider for future study.

This study helped deepen our interpretations from our research with earlier cohorts and highlighted the essential components, such as cohort structures and collaboratories of practice, that serve to support students when they are developing research skills in online programs. We recognize the program continues to evolve and there is potential for our

insights to inform continual improvements to this master's program and other online degree programs. The RSD framework was valuable for understanding the structures that supported students when they were developing research-based skills in an online course-based master's degree program. Working alongside peers and engaging in collaborative approaches can support graduate students engaged in practitioner-oriented research while developing research-based skills in the MEd program in this study. From a theoretical perspective, this study contributes to SOTL related to the RSD framework by adding emphasis to the collaborative aspects that cannot be underestimated when describing the six facets of research skill development or designing courses and programs involving research-based learning in graduate programs. Furthermore, online programs are on the rise and are grounded in a body of research that demonstrates the promise and high quality of online programs (Kebritchi et al., 2017; Smidt & Li, 2019). The four research courses in the course-based master's program in this case study research were also structured as the final step of a three-part ladder microcredential program. As networked digital technologies and technological advances continue to impact credit-bearing and non-credit-bearing learning options and multiple modes of delivering courses and microcredentials (UNESCO, 2018), our study can serve to inform the ways to provide continuity for teaching and learning practices and support students' research skill development in established and newly designed programs.

7. CONCLUSION

In this study the research team examined the experience of graduate students engaged in a research-active program and their perceptions of what supported them in developing research-based skills. Data were gathered through exit surveys and interviews with postgraduate students. Participants described program structures, signature pedagogies, and learning activities that helped with their research-based learning experiences with no significant difference from our earlier results from two previous groups of postgraduates from the program. Our interpretations suggest professional graduate programs can serve to strengthen students' research-based skills [e.g., embark & clarify; find & generate; evaluate & reflect; organize & manage; analyze & synthesize; communicate & apply (Willison and O'Regan, 2007)] with a continuity of supports such as a cohort structure and collaboratories of practice. The results contribute to the literature and are significant for improving student learning when conducting research activities in professional graduate programs and increase understanding of how students can be supported with developing research skills in online course-based master's degree programs. With the rise of microcredentialed and stackable degree graduate pathways, the results from this study will be of value to scholars and institutions who are interested in developing research-based learning experiences in online graduate programs with promising structures such as cohorts and collaboratories of practice.

ACKNOWLEDGMENTS

This work was supported by the Taylor Institute for Teaching and Learning at the University of Calgary, SOTL Grant RSO No. 1047408. Thank you to Dr. John Willison for offering feedback on an earlier version of the paper and for the journal reviewers who helped us strengthen the paper. We also acknowledge and are grateful to our participants in the study and for the contributions of our research assistant Maryam Hachem.

REFERENCES

- Barkley, E. F., Cross, K. P., & Major, C. H. (2014). *Collaborative learning techniques: A handbook for college faculty*. John Wiley & Sons.
- Barnett, B. G., Basom, M. R., Yerkes, D. M., & Norris, C. J. (2000). Cohorts in educational leadership programs: Benefits, difficulties, and the potential for developing school leaders. *Educational Administration Quarterly*, 36(2), 255–282. <https://doi.org/10.1177/0013161X00362005>
- Blankenship, J. C., & Gibson, R. (2016). Learning alone, together: Closed-cohort structure in an online journalism and mass communication graduate program. *Journalism & Mass Communication Educator*, 71(4), 425–439. <https://doi.org/10.1177/1077695815622113>
- Brown, B., Dressler, R., Eaton, S. E., & Jacobsen, M. (2015). Practicing what we teach: Using action research to learn about teaching action research. *Canadian Journal of Action Research*, 16(3), 61–78. <https://journals.nipissingu.ca/index.php/cjar/article/view/228>
- Brown, B., Eaton, S. E., Schroeder, M. (2017, May 4–5). *Signature pedagogies in online classes*. In A. P. Preciado Babb, Yeworiew, L., & Sabbaghan, S. (Eds.). *Proceedings of the IDEAS 2017 Conference: Leading Educational Change* (pp. 66–74). Werklund School of Education, University of Calgary. <http://hdl.handle.net/1880/52096>
- Donaldson, J. F., & Scribner, J. P. (2003). Instructional cohorts and learning: Ironic uses of a social system. *Journal of School Leadership*, 13(6), 644–665. <https://doi.org/10.1177/105268460301300603>
- Dorneich, M. C. (2002). A system design framework-driven implementation of a learning collaboratory. *IEEE Transactions on Systems, Man, and Cybernetics – Part A: Systems and Humans*, 32(2), 200–213. <https://doi.org/10.1109/TSMCA.2002.1021108>
- Eaton, S. E., Brown, B., Schroeder, M., Lock, J., & Jacobsen, M. (2017). *Signature pedagogies for e-learning in higher education and beyond*. University of Calgary. <http://hdl.handle.net/1880/51848>
- Erichsen, E. A., & Bolliger, D. U. (2011). Towards understanding international graduate student isolation in traditional and online environments. *Educational Technology Research and Development*, 59(3), 309–326. <https://doi.org/10.1007/s11423-010-9161-6>
- Friesen, S. (2013a). Inquiry-based learning. In R.C. Richey (Ed.) *Encyclopedia of terminology for educational and communications and technology*, (pp. 153–155). Springer.

- Friesen, S. (2013b). Problem-based learning. In R.C. Richey (Ed.) *Encyclopedia of terminology for educational and communications and technology*, (pp. 247–248). Springer.
- Garrison, D. R. (2017). *E-learning in the 21st century: A community of inquiry framework for research and practice* (3rd ed.). Routledge.
- Griffiths, R. (2004). Knowledge production and the research-teaching nexus: The case of the build environment disciplines. *Studies in Higher Education*, 29(6), 709–726.
- Hill, J., Thomas, C., & Brown, B. (2019). Research assistant as partner: Collective leadership to facilitate co-production. *International Journal for Students as Partners*, 3(2), 129–138. <https://doi.org/10.15173/ijpsap.v3i2.3674>
- Irani, T. A., Wilson, S. B., Slough, D. L., & Rieger, M. (2014). Graduate student experiences on- and off-campus: Social connectedness and perceived isolation. *International Journal of E-Learning & Distance Education / Revue Internationale Du e-Learning et La Formation à Distance*, 28(1), Article 1. <http://www.ijede.ca/index.php/jde/article/view/856>
- Jacobsen, M., Eaton, S., Brown, B., Simmons, M., and McDermott, M. (2018a). Action research for graduate program improvements: A response to curriculum mapping and review. *Canadian Journal of Higher Education*, 48(1), 82–98. Online: <http://journals.sfu.ca/cjhe/index.php/cjhe/article/view/188048>
- Jacobsen, M., McDermott, M., Brown, B., Eaton, S. E., & Simmons, M. (2018b). Graduate students' research-based learning experiences in an online master of education program. *Journal of University Teaching and Learning Practice*, 15(4), 1–18. <https://ro.uow.edu.au/jutlp/vol15/iss4/4>
- Joyce, K. & Brown, A. (2009). Enhancing social presence in online learning: Mediation strategies applied to social networking tools. *Online Journal of Distance Learning Administration*, 12(4). <http://www.editlib.org/p/76600>.
- Kebritchi, M., Lipschuetz, A., & Santiago, L. (2017). Issues and challenges for teaching successful online courses in higher education: A literature review. *Journal of Educational Technology Systems*, 46(1), 4–29. <https://doi.org/10.1177/0047239516661713>
- Lee, S. J., Ngampornchai, A., Trail-Constant, T., Abril, A., & Srinivasan, S. (2016). Does a case-based online group project increase students' satisfaction with interaction in online courses? *Active Learning in Higher Education*, 17(3), 249–260. <https://doi.org/10.1177/1469787416654800>
- Lundeberg, M., & Yadav, A. (2006). Assessment of case study teaching: Where do we go from here? Pt. II. *Journal of College Science Teaching* 35(6), 8–13.
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). John Wiley & Sons.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook*. SAGE Publications, Inc.
- Moulding, L. R., & Hadley, K. M. (2010). Graduate students' understanding of educational research in a master of education program. *New Horizons in Education*, 58(1), 43–52.

- Oliver, B. (2019). *Making micro-credentials work for learners, employers and providers*. Deakin University. <https://dteach.deakin.edu.au/wp-content/uploads/sites/103/2019/08/Making-micro-credentials-work-Oliver-Deakin-2019-full-report.pdf>
- Peacock, S., Cowan, J., Irvine, L., & Williams, J. (2020). An exploration into the importance of a sense of belonging for online learners. *The International Review of Research in Open and Distributed Learning*, 21(2), 18–35. <https://doi.org/10.19173/irrodl.v20i5.4539>
- Ralston, S. J. (2021). Higher education's microcredentialing craze: A postdigital-Deweyan critique. *Postdigital Science and Education*, 3(1), 83–101. <https://doi.org/10.1007/s42438-020-00121-8>
- Reis-Jorge, J. M. (2005). Developing teachers' knowledge and skills as researchers: A conceptual framework. *Asia-Pacific Journal of Teacher Education*, 33(3), 303–319. <https://doi.org/10.1080/13598660500286309>
- Scardamalia, M., & Bereiter, C. (2014). Knowledge building and knowledge creation: Theory, pedagogy and technology. In R. K. Sawyer (Ed.). *The Cambridge handbook of the learning sciences* (pp. 397–417). Cambridge University Press.
- Selvaratnam, R. M., & Sankey, M. (2021). An integrative literature review of the implementation of micro-credentials in higher education: Implications for practice in Australasia. *Journal of Teaching and Learning for Graduate Employability*, 12(1), 1–17. <https://doi.org/10.21153/jtlge2021vol12no1art942>
- Shulman, L.S. (2005). Signature pedagogies in the professions. *Daedalus*, 134(3), 52–59. <https://doi.org/10.1162/0011526054622015>
- Simmons, M., McDermott, M., Eaton, S.E., Brown, B., & Jacobsen, M. (2021). Reflection as Pedagogy in Action Research. *Educational Action Research*, 29(2), 245–258. <https://doi.org/10.1080/09650792.2021.1886960>
- Smidt, E., & Li, R. (Eds.). (2019). *Ensuring quality and integrity in online learning programs*: IGI Global. <https://doi.org/10.4018/978-1-5225-7844-4>
- UNESCO. (2018). *Digital credentialing: Implications for the recognition of learning across borders*. <https://unesdoc.unesco.org/ark:/48223/pf0000264428>
- Usher, A. (2021, January 11). The decline of the master's degree. *HESA*. <https://higherstrategy.com/the-decline-of-the-masters-degree/>
- Willison, J. W. (2012). When academics integrate research skill development in the curriculum. *Higher Education Research & Development*, 31(6), 905–919. <https://doi.org/10.1080/07294360.2012.658760>
- Willison, J. (2014). *Outcomes and uptake of explicit research skill development across degree programs: Final Report 2014*. <http://hdl.voced.edu.au/10707/325831>
- Willison, J. & O'Regan, K. (2007). Commonly known, commonly not known, totally unknown: A framework for students becoming researchers. *Higher Education Research and Development*, 26(4), 393–409. <https://doi.org/10.1080/07294360701658609>
- Willison, J., O'Regan, K., & Kuhn, S. (2018). Researcher skill development framework (US English ed.). *Open Educational Resources*. <https://commons.und.edu/oers/6>

Wilmore, M., & Willison, J. (2016). Graduates' attitudes to research skill development in undergraduate media education. *Asia Pacific Media Educator*, 26(1), 113–128.

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications, Inc.