

# Research-Enriched Curricula Final Report

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**University  
of Victoria**  
Learning and  
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## Executive Summary

Research-enriched teaching and creative activity<sup>1</sup> has made its way into higher education curricula across the world and has been deemed a necessary component of universities today (Kenny et al., 1998). This report was undertaken to build on what the University of Victoria (UVic) is already doing in research-enriched teaching so that it can become a leader in this area in Canada. To do so, a scan of the literature and interviews were conducted with experts in the field (six) and with UVic instructors (25) utilizing research-enriched teaching in their courses. All of this information is brought together in this report to determine next steps UVic can take to create a plan to best support departments and instructors implement research-enriched teaching. UVic's Strategic Framework posits: "The University of Victoria will be Canada's leader in research-enriched and experiential learning" (p. 5).

This study found that the literature focused on three areas: the research/teaching nexus, skill development and their significance, and misconceptions about research-enriched teaching. In general, the literature supports that instructors and students do not always see the connections or links between research and teaching, which can lead to misconceptions about what students know, how students will respond, and what general strategies to utilize for supporting students with enhancing their research skills (e.g., independent thought, communication, critical thinking, and data analysis).

Interviews with the six experts resulted in the following key characteristics – customizable framework: adaptable across disciplines; holistic approach: integrated throughout the curriculum; scaffolded learning: connecting research and teaching; and validating narratives: articulating research from year one to four. The approach taken to the development of research-enriched curricula needs to be customizable and adaptable due to instructor, departmental, and disciplinary differences. To ensure that students are sufficiently supported in a research-enriched curriculum, a holistic rather than atomistic approach needs to be developed that is integrated throughout the curriculum. To help students make relevant connections, instructors need to ensure that they are explicit with all aspects of their course,

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<sup>1</sup> The inclusion of research and creative activity as both critical forms for undergraduate engagement recognizes the full breadth of scholarship and inquiry that is represented by the University of Victoria and is consistent with the recommendations from the Boyer Commission (Kenny et al., 1998). Therefore, in this document, when referring to research, it is understood to include all forms of research represented in different disciplines. This includes scholarly analysis of texts or images, the creation of new artistic pieces, critically engaging in tasks related to a specific discipline, lab work, empirical research, and inquiry-based projects, to name a few examples.

from intended learning outcomes, to assessment, and instructional strategies, so that student learning is appropriately sequenced and scaffolded. Relevancy of each aspect of the course and the connection to research needs to be transparent. Lastly, it is important that research is articulated and validated within disciplines and departments for instructors and students. Part of that articulation and validation is to spark student curiosity to investigate further a specific project, topic, or discipline.

Taking the literature review and key findings together provides the necessary foundation to develop resources and supports for instructors and departments at UVic. For example, the development of a dedicated website, a symposium devoted to research-enriched teaching, workshops, and curriculum retreats.

Finally, we are grateful to all who contributed their time and thoughts to this study.

## Introduction

The University of Victoria will be Canada's leader in research-enriched and experiential learning. Our focus on teaching excellence and an exceptional student experience will ensure that UVic students are transformed by their time at UVic, and are equipped for personal success and to contribute effectively as alumni and global citizens. (University of Victoria's Strategic Framework, p. 5)

This report outlines a study undertaken for the President's Strategic Framework Impact Fund, *Research-Enriched Curricula* conducted through the [Division of Learning and Teaching Support and Innovation](#) (LTSI) at the University of Victoria (UVic).

The mandate of the LTSI is to support and work collaboratively with instructors and students to promote excellence in teaching and learning. One aspect of the LTSI's current mandate is to foster the development of research-enriched curriculum and promote teaching that is informed and enriched by research most notably through the highly [successful Jamie Cassels Undergraduate Research Award](#) (JCURA) initiative. This study includes an environmental scan of current research-enriched initiatives at other universities and conversations with instructors at UVic, brought together with the latest research, best practices, and case study examples. As a result, the aim is to ensure that students at UVic are engaged in the latest research activities and develop enhanced research capabilities throughout their degree (from first- to fourth-year courses).

This work is in addition to the already established research-enriched initiatives at UVic, such as the *President's Fellowship in Research-Enriched Teaching*, [Research-Enriched Teaching](#) grants, [Award for Excellence in Undergraduate Research-Enriched Teaching](#), and the JCURA initiative mentioned above.

Research-enriched teaching has made its way into higher education curricula across the world. Generally, it is defined as the incorporation of authentic research experiences into courses (Brew, 2006; Fung, 2017). Essentially, "research-based learning curricula are taken to include all the opportunities provided for students to gain experience in planning and carrying out research, learn research skills appropriate to the discipline, and pursue and present research that they encounter during their degree" (Brew, 2013, p. 605). Synonyms for research-enriched teaching include "researched-informed teaching," "teaching-research relationship," "teaching-research nexus," "inquiry-based learning," and "research-based teaching" (Gresty et al., 2013). UVic's definition of research-enriched teaching is:

Research-enriched teaching is defined as the inclusion of hands-on research experiences whereby students actively engage in the research process within their discipline or field. This includes opportunities for students to gain experience in planning and undertaking research or creative activity, from question identification and proposal development, through engagement in the research process or creative activity, to knowledge translation activities. The intent is for students to see themselves as developing researchers furthering their opportunities and skill development in inquiry-based learning.

No matter what nomenclature is used, the connection between teaching and research has been the subject of long-standing debates in higher education. Therefore, Zupanc (2012) and Brew (2013) suggest the need for a revitalization of Humboldtian<sup>2</sup> ideals by promoting more research and general inquiry-based learning for students. The purpose of this report is not to relay that long history but rather to explore how to effectively integrate research-enriched teaching into curriculum.

Nonetheless, there are some considerations to keep in mind when switching to a research-enriched curriculum, both from the student and instructor's perspective. In particular, there is evidence that instructors are divided regarding the importance of incorporating more research into curricula (Brennan et al., 2016; Brew, 2006). Additionally, there are still clear distinctions in place in many institutions between teaching and research, and as such, instructors generally identify as one or the other. For the few instructors who recognize that both teaching and research play a role in their everyday lives, because of institutional dichotomy, they often find themselves being forced to select and focus more on one over the other (Brennan et al., 2016). In terms of students, it is important to be aware that if research-enriched curriculum is something being implemented in already developed curricula, there may be pushback from students. In particular, they may grapple with feelings of grief, shock, denial, and fear when shifting to a new format (Gresty et al., 2013). Therefore, instructors need to explain the benefits of research-enriched teaching and methodologies, and provide time for students to adapt (Gresty et al., 2013).

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<sup>2</sup> Humboldtian ideals for higher education refer to the holistic integration and interconnectedness between teaching and research (Zupanc, 2012; Brew, 2013; Macheridis, Paulsson, & Pihl, 2020).



## Methodology

For this project, several components were undertaken. First, a literature review about research-enriched teaching was conducted. Keywords, such as “research-enriched teaching,” “inquiry-based learning,” or “teaching-research nexus,” were utilized to identify initial articles for review from the databases ERIC/Academic Search Premier (EBSCOHost) and JSTOR. From there, articles specific to post-secondary education or higher education were selected. Part of the literature review included an environmental scan of universities around the world where research-enriched teaching was occurring. Using keywords (similar to those above) or specific institutions identified from the literature (e.g., Adelaide University, Macquarie University) were also searched. For Canadian-specific institutions, a qualifier was used, such as “Canada” or “Canadian.”

After a thorough review of the literature, several identified experts in research-enriched teaching were contacted and those who agreed were interviewed from February 2020 to May 2020. Interviews were conducted with the following experts:

- Dr. Dilly Fung, Vice Chancellor at the London School of Economics in the UK;
- Dr. Lyn Torres, Librarian at Monash University in Australia;
- Dr. John Willison, an instructor at Adelaide University in Australia;
- Dr. Katherine Howell, an instructor at University College Dublin in Ireland;
- Dr. Corrine Laverty, an educator and librarian at Queen’s University; and
- Dr. Michelle Yeo, Director of the Institute for Scholarship of Teaching and Learning at Mount Royal University.

Throughout this document, these contributors will be referred to by their last name. Interviews ranged from 60 to 200 minutes. The following questions provided the basis for the semi-structured interviews:

1. What has your institution done to engage instructors in implementing research-enriched teaching (RET) into their courses? Was there instructor resistance for implementation? Did you find key interest for research-enriched teaching in a specific department or field?
2. Do you maintain a discipline-based approach to RET? Why or why not?
3. Do you connect RET to experiential learning? If so, how?
4. Do you provide RET resources for instructors and/or students?
5. How have you supported research-enriched teaching in first and second-year courses?

6. What are the successes of research-enriched teaching? Do you evaluate the outcomes and impacts of research-enriched teaching? If so, how? And, what have been the results of that evaluation?
7. In these recent times, what has been done around supporting online research-enriched teaching? (added in April 2020 in response to COVID-19)

Following the interviews, notes were coded, and characteristics developed using thematic analysis. Once confirmed and determined to be mutually exclusive, notes were re-coded accordingly.

Subsequent to the international interviews, instructors at UVic, identified on the [Co-op and Career Services experiential learning maps](#), were interviewed from May 2020 to June 2020. The Co-op and Career Services experiential learning map was an efficient way to identify which courses might provide examples of research-enriched teaching. This resulted in the identification of 85 courses. Due to one of our specific goals being to investigate first- and second-year courses, those courses were selected, as well as a few third- and fourth-year courses, aiming for an even distribution among all faculties. This led to selecting 30 courses and due to instructors' availabilities and willingness to participate in a 30-minute interview resulted in interviewing 25 instructors.

After conducting interviews with the 25 instructors selected, 18 were chosen as case studies with 16 completed (see *Appendix 1: Research-enriched teaching case-study booklet*). To be included as a case study, the course had to actively engage students in research opportunities where students had ownership over a portion or entirety of a project; be representative of diverse years, departments, and disciplines; and generally take a scaffolded approach in supporting students through their research and learning journey. The general structure for each one-page case study was built from the following questions:

1. Can you give me some background on the course, and what motivated you to introduce research components?
2. In your course, what specific research components were students provided? How were those presented to the students? How were they scaffolded?
3. What were the intended learning outcomes for your course that the student research components met?
4. How did students synthesize their learning through engaging in research? What assessment linked to the research components?

5. What would you recommend to colleagues wanting to enrich their course with research components?

The 30-minute interviews began with a brief introduction of the project and the Co-op and Career Experiential map. Responses were recorded as notes. To augment their case study, it was decided to ask instructors for student contact information to seek comments from students regarding their research-enriched experience in the course. Key aspects of the course were then synthesized into a condensed form with keywords, the name of the course and instructor, student data, how the research was shaped in that course, the general experience of students, intended learning outcomes, and finally recommendations or findings to share with colleagues interested in pursuing research-enriched teaching. Each instructor was asked to approve the one-page case study (see *Appendix 1: Research-enriched teaching case-study booklet* for all case studies).

Data collected from the UVic case studies was not used in our analysis but rather was used to compare to our findings and literature reviewed.

### *Limitations of this study*

Although striving for balanced representation of all faculties and levels of research-enriched teaching at UVic, due to numerous factors, including the impact of the pandemic and overall fit within the project, not all faculties or disciplines are represented.

Additionally, our breadth of international interviews does not include some regions of the world and we recognize that research-enriched teaching is likely taking place in institutions across the globe.

This report begins with a review of the literature, followed by key findings, discussion, and finally next steps.

## **Literature Review**

Three areas of focus were found in the literature: the teaching-research nexus, skills learned and their significance, and general misconceptions about research-enriched teaching. General topics woven throughout discussion of these three areas of focus include the process of inquiry, student autonomy, instructional strategies, and student and instructor opinions. The teaching-research nexus discussion focuses on different models and frameworks developed to support embedding research-enriched teaching in curriculum. However, new models and frameworks can provoke concerns from students and instructors and potentially hinders implementation.

Skills and their significance highlight the importance of scaffolding and the positive impact on student learning and overall curiosity. Lastly, the focus on misconceptions addresses aspects of time, student interest, instructors' views about the general effectiveness of research-enriched teaching, and students' concerns.

### **The teaching-research nexus**

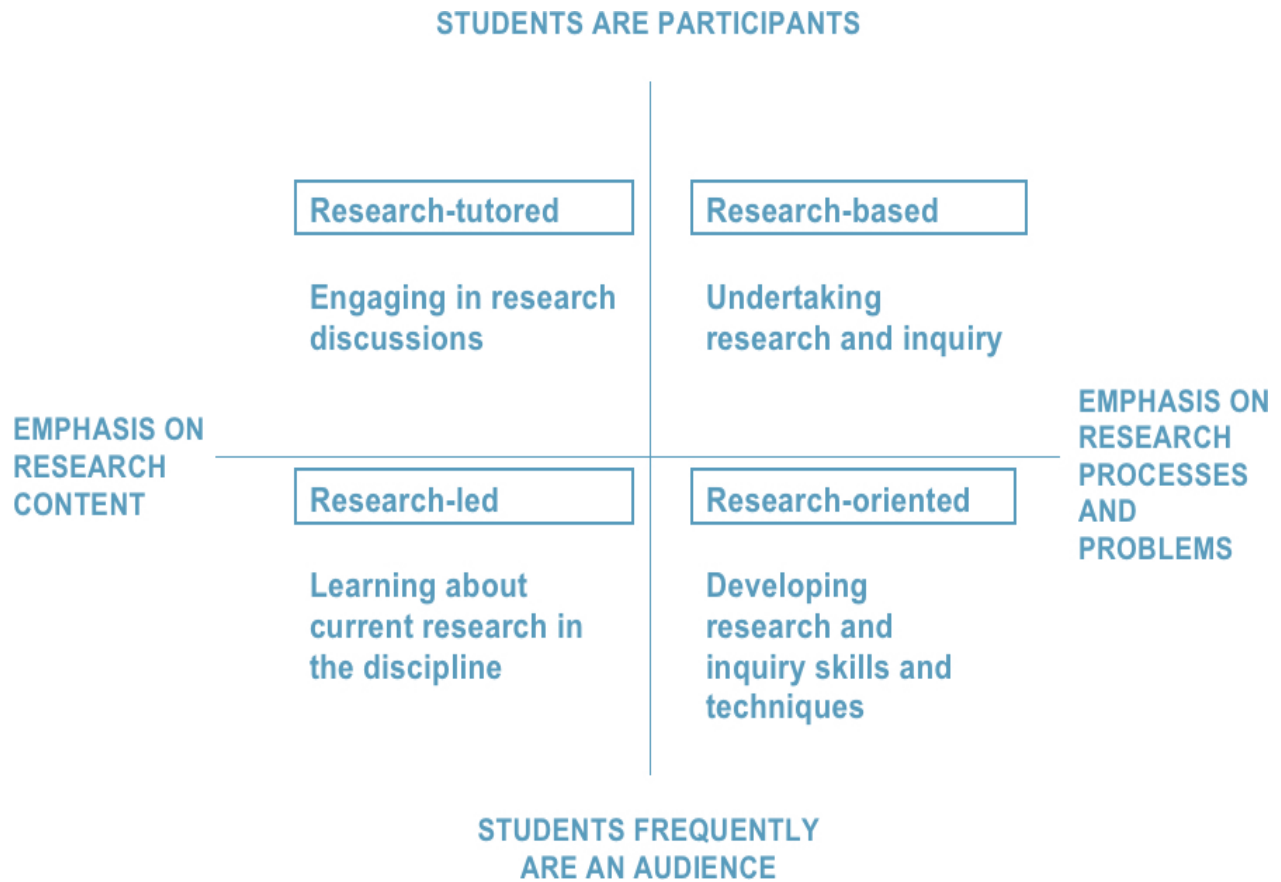
In 1998, the Boyer Commission published a report arguing that American research universities were not preparing their students well enough for professional life or graduate study (Kenny et al., 1998). This report became the catalyst for a greater emphasis and better connection between teaching and research (Kenny et al., 1998; Levy & Petrulis, 2007). Additionally, other researchers argue that higher education must overcome the divide between teaching and research (Brew, 2006; Malcolm, 2014), and focus more on how they intersect and design supports that help students see the interconnection (Brew & Boud, 1995).

To cope with the influx of research and interest in this area, there have been several different models or frameworks developed in response to the push for more research-enriched teaching with each trying to build on what has been previously reported. Five prominent models are discussed below.

To begin, a framework proposed by Healey and Jenkins (2009) divided inquiry and research into four main categories: pursuing (information-active), authoring (discovery-active), identifying (information-responsive), and producing (discovery-responsive). This allows instructors to work through which aspects of their curriculum could be more student-led, and which would perhaps be more instructor-led. Additionally, they expand to propose four key mechanisms for engaging students in research:

- Research-led: learning about current research in the discipline;
- Research-based: undertaking research and inquiry;
- Research-tutored: engaging in research discussions
- Research-oriented: developing research skills and techniques (see Figure 1).

Figure 1: The nature of undergraduate research and inquiry (Healey & Jenkins, 2009, p. 6).



This first attempt at developing a framework resulted in gaps being identified. First, who initiates the inquiry is not specified, and secondly, concerns around the balance between the quadrants and how they interact with intended learning outcomes and assessment of courses or course material is not clear (Brew, 2013).

A framework focused more on inquiry-based learning used extensively in pedagogical research and design was developed by Levy and Petrulis (2012). In particular, this framework is designed as a matrix with three considerations: the status of student inquiry, with whom responsibility lies for developing the inquiry questions, and the level of process support, guidance, or structure provided to students (Levy & Petrulis, 2012; see Figure 2). The authors identified four modes of inquiry-based learning present within the matrix: identifying, authoring, producing, and pursuing (Levy & Petrulis, 2012). The authors argued for a required shift from a learning paradigm to a discovery paradigm in undergraduate education (Levy & Petrulis, 2012).

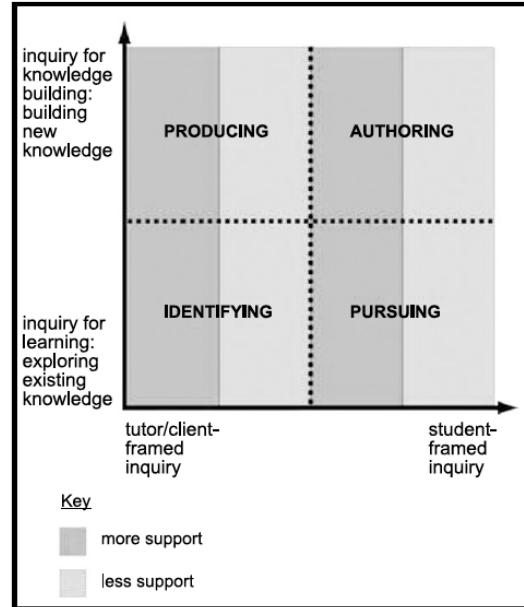
Figure 2: Modes of inquiry-based learning (Levy & Petrulis, 2012).

**Authoring:** Inquiry tasks are designed to encourage students to explore their own open questions, problems, scenarios or lines of inquiry, in interaction with a knowledge base ('how can I answer my open question?').

**Producing:** Inquiry tasks are designed to encourage students to explore open questions, problems, scenarios or lines of inquiry, framed by teachers, or others such as an external 'client', in interaction with a knowledge base ('how can I answer this open question?').

**Pursuing:** Inquiry tasks are designed to encourage students to explore a knowledge base actively by pursuing their own questions, problems, scenarios or lines of inquiry ('what is the existing answer/response to my question?').

**Identifying:** Inquiry tasks are designed to encourage students to explore a knowledge base actively in response to questions, problems, scenarios or lines of inquiry framed by teachers ('what is the existing answer/response to this question?').

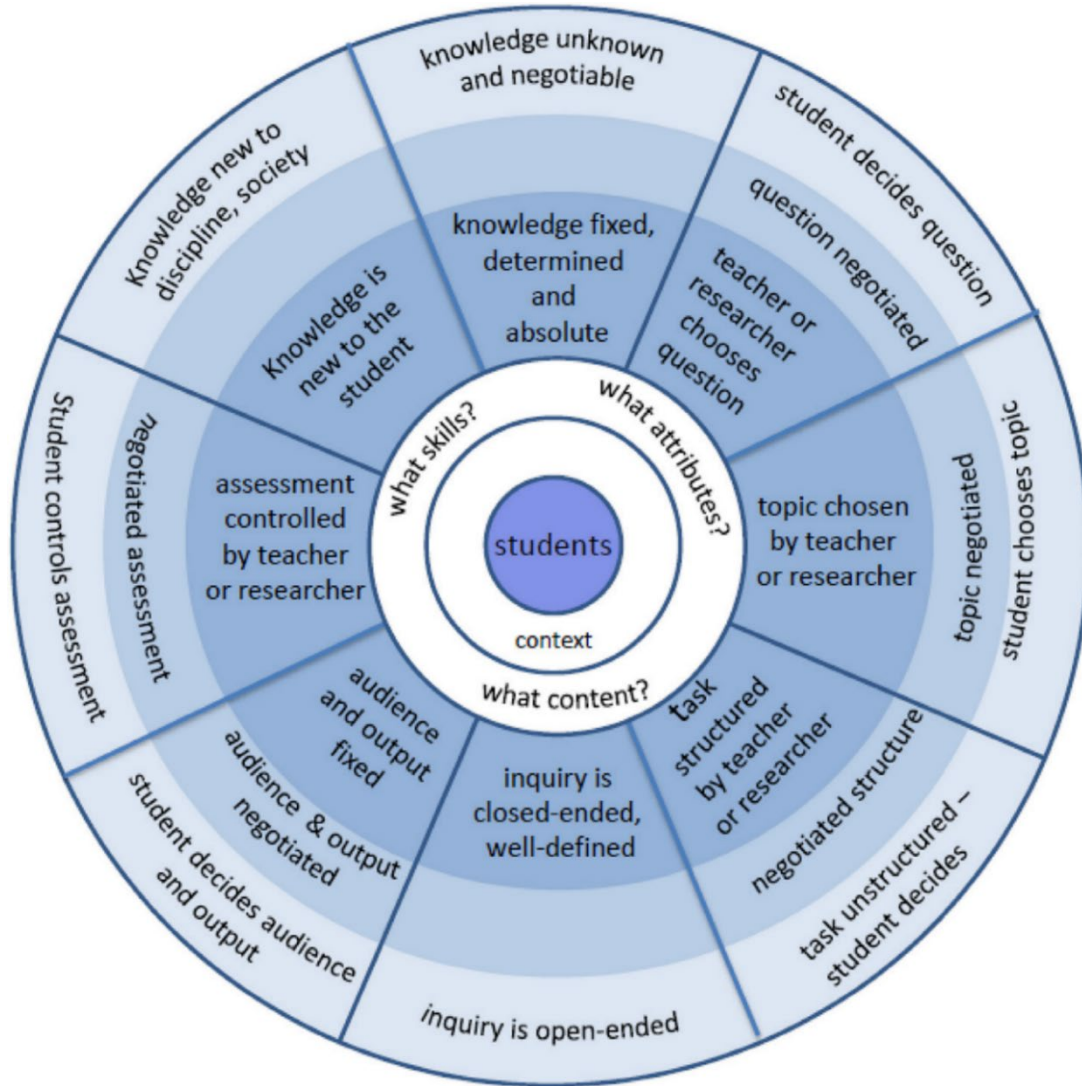


Despite addressing gaps from the first model, Brew (2013) found the framework lacked specification and recognition of where students acquire existing knowledge to effectively author or create new information or knowledge.

As such, this led to the development of a third model, the *Wheel Model* (see Figure 3), which assists in decision-making associated with implementing research-based experiences for students (Brew, 2013). The *Wheel Model* is unique in that it places students at the centre of the wheel positioning instructors to decide which route or method they wish to use to support students in engaging in research-enriched curricula. It also provides different options and streams depending on the instructor's goals and student level (e.g., first-year versus fourth-year).



Figure 3: The Wheel Model (Brew, 2013, p. 613).



Through its use in multiple courses across Macquarie University, the *Wheel Model* has been found to do the following:

This circular or 'wheel' model integrates decisions about the curriculum context including the nature, number and type of students, learning outcomes including disciplinary knowledge acquisition and attributes, capabilities and skills to be developed as well as, the nature of knowledge and the nature of the tasks to be completed and how they are to be assessed. (Brew, 2013, pp. 612–613)

The design of the wheel allows for stronger development of research-enriched teaching in courses and an increase in student autonomy as one moves out from the centre. Therefore, this model can be used at different levels and in different courses (Brew, 2013), providing a tool for instructors and universities working on redesigning or developing curriculum to have a greater research-enriched focus.

Another framework developed to assist in tracking students' skills in research development (Willison & O'Regan, 2007; Willison & O'Regan, 2019) is *Research Skills Development (RSD)* (see Table 1). Since its creation, it has been applied to several universities and campuses across the world, particularly in Australia. For example, the University of Adelaide has developed a comprehensive handbook that can be used by instructors interested in implementing research-enriched teaching in their courses (Willison et al., 2009). The handbook provides numerous examples and tools for both designing curriculum based on research-enriched pedagogy and how to redesign existing curricula.

*Table 1: Simplified framework for Research Skills Development (RSD)*

(Willison & O'Regan, 2007, 2009, 2019)

INCREASING LEVELS OF AUTONOMY					
FACETS OF INQUIRY	Level 1	Level 2	Level 3	Level 4	Level 5
Embark & determine a need for inquiry	closed inquiry high degree of structure/ guidance	closed inquiry some structure/ guidance	closed inquiry working independently	open inquiry within structured guidelines	open inquiry within self-determined guidelines
Find/collect information/data					
Critically evaluate					
Organize information					
Synthesise, analyse and apply					
Communicate					

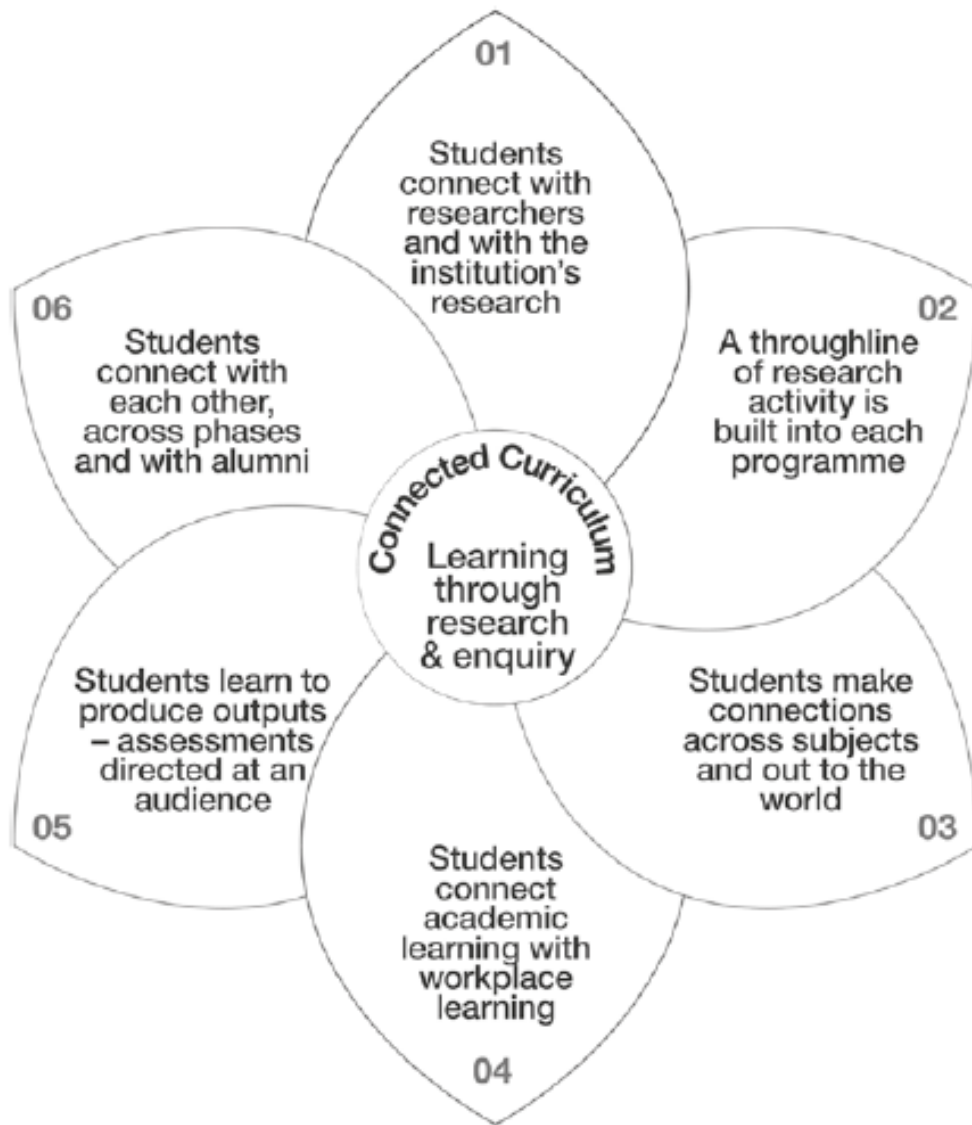




Lastly, Fung (2017) developed a *Connected Curriculum* divided into six distinct dimensions with a greater emphasis on values-based components (see Figure 4). Specifically, the *Connected Curriculum* framework promotes sharing excellent practices and stimulating new ideas (Fung, 2017). “At its core it is about shining a light on knowledge itself, and the goals and values underpinning the interconnected missions of education and research” (Fung, 2017, p. 2). This framework focuses specifically on opening lines of communication between students, instructors, staff, and others to engage in conversations around teaching and learning practices that support the interconnectedness of research and teaching. This framework helps institutions think about what their purpose is in the here-and-now, and how best they can support students for the future. Its focus is also on aiding students in connecting what they are learning to multiple facets within their educational and professional lives.

The *Connected Curriculum* framework has been widely incorporated at University College London since 2014 and has led to increased actions, such as a Connected Curriculum Steering Committee, select Working Groups, seconding academics and professional staff for roughly one day per week to work on the initiative, funding projects for the development and enhancement of more connected curriculum, and annual conferences where developments and research are presented related to the *Connected Curriculum* (Fung, 2017).

Figure 4: The Connected Curriculum model (Fung, 2017, p. 5).



These models provide several ways to approach integrating research-enriched teaching into curricula. Each has distinct features appropriate for different instructors, departments, or disciplines to incorporate research or creative activity for undergraduate students. No matter which model is used, students gain significant skills through engagement with research-enriched opportunities.

## Skills learned and their significance

Positive outcomes associated with utilizing research-enriched teaching within curricula was evident in the literature (Griffiths, 2004; Zupanc, 2012). For example, students confirm that they have a more authentic and meaningful learning experience and recognize improvement in their research skills through research-enriched projects (Casey et al., 2016). Students are also more likely to engage in the material and be excited if there is a clear and explicit focus on enhancing their research skills through projects, assignments, and assessment that are aligned with research-enriched pedagogies (Willison et al., 2009).

In general, students appreciated having more time for independent thought and for developing strong skills that they could effectively transfer between courses, school, and their professional work. “Transferable skills including communication skills, data analysis, critical thinking, problem solving, independent learning, and use of appropriate reliable resources, were identified by students across all disciplines as being important” (Casey et al., 2016, p. 25). Additionally, others have found that students will gain skills and experience in:

six facets of the research process: namely, that students embark on inquiry and so determine a need for knowledge/understanding, find/generate needed information/data using appropriate methodology, critically evaluate information/data and the process to find/generate them, organise information they have collected/generated, synthesise and analyse new knowledge, and communicate knowledge and understanding and the processes used to generate them. (Willison et al., 2009, p. 5)

However, of utmost importance, is that these skills are developed in the right sequence.

Therefore, as in all curriculum development, scaffolding is important. “The timing of some modules can present a barrier to student learning and engagement. If sequencing is poor, skills may not be taught in time to meet the demands of the programme, or students may not understand the significance of what they are being asked to learn” (Casey et al., 2016, p. 17). This can also affect students attaining greater autonomy. With proper scaffolding and allowing students to engage in open-ended research, opportunities are provided for students to engage in the material and information they desire, while allowing them to craft questions to fit their research, thus increasing their autonomy with the material (Willison & O’Regan, 2007). “Developing student autonomy is integral to an emancipatory curriculum such as research-based learning can provide” (Brew & Saunders, 2020, p. 2). This is also highlighted by the

increased shift towards a more discovery-based paradigm that fosters student curiosity as proposed by Levy and Petrulis (2012).

In addition, the use of research-enriched teaching and providing students with opportunities to engage in different research activities was echoed throughout this study, leading to an increase in student confidence and overall feelings of being better prepared (Casey et al., 2016; Fung, 2017). In general, if students had an opportunity to engage in a research project, they felt they were given a real opportunity to “practice” for graduate school and to see if they enjoyed research. It also allowed students to form a better community and stronger relationships not only with their teaching assistants (TAs), but also among staff and instructors—helping students feel they belonged somewhere and were part of something (Casey et al., 2016; Whitlock & Stierer, 2009).

There is distinct variance among definitions for what institutes undergraduate research or creative activity (Beckman & Hensel, 2009) but what is clear is that when students have an opportunity to engage authentically in whatever form research or creative activities take in their discipline the overall student experience is enhanced (Healey & Jenkins, 2018). These changes and impacts include critical thinking skills (Wayment & Dickson, 2008), logic and independent learning (Ishiyama, 2002), and general interpersonal and cognitive skills (Landrum & Nelsen, 2002). Programs that also included scaffolded inquiry-based learning opportunities generally promote student skills in researching literature or relevant sources, collaborating with others, and formulating their own research or creative activity question (Perrella et al., 2020; Zimbardi & Myatt, 2014). Another impact of students’ engagement in research or creative activity projects includes an increased awareness and sense of belonging through communities of practice or cohorts within their research groups (Hunter et al., 2007; Spronken-Smith & Walker, 2010). The impact of the research and creative activity-enriched opportunities have benefits that extend beyond the realm of academics, including into professional and career-based initiatives (Hunter et al., 2007). Further work by our unit has found evidence to support that the incorporation of undergraduate students into research projects, classified as a high impact practice, leads to greater general student success and increased rates of retention with first-year students (Ishiyama, 2002; Pitton, 2021; Walkington, 2015).

Instructors and faculty members are aware of the benefits associated with engaging students in research or creative activities, but the relevance or importance of such opportunities are not often made explicit to students (Wayment & Dickson, 2008). In the end, the primary group of people for whom this impacts are the students themselves (Walkington, 2015), including general increases in resilience (Perrella et al., 2020). Apart from the skills associated with

engaging in research or creative activity, a critical aspect that students appreciate when undertaking such tasks is the mentorship and support with a faculty member, graduate student, post-doctoral student, or tutor (Walkington, 2015).

The multitude of skills that students gain from research-enriched teaching leads to a greater ability to transfer knowledge and skills to other contexts, excites students to engage further in the discipline, extends students curiosity around research and uncovering unknowns (Landrum & Nelsen, 2002), and builds student confidence in doing research, whatever career path they take. Despite these positive outcomes, issues can also impact the implementation of research-enriched teaching.

### **General misconceptions about research-enriched teaching**

When instructors are tasked with increasing the autonomy of their students or allowing them more space for independent thought, often concerns are voiced. In particular:

Spronken-Smith et al. (2011) carried out a meta-analysis of 10 cases of inquiry-based learning, identifying factors that enabled and constrained its use. They found that **teacher responses to the introduction of inquiry-mode teaching included fear and anxiety, primarily due to the relinquishing of control.** Such responses need to be carefully anticipated and managed, to ensure good staff morale and an enhanced student experience. (Gresty et al., 2013, p. 572)

Implementing new instructional strategies into a course or redesigning a program, comes with apprehension. Change does not mean that the new strategy will work well and most likely it will require further adjustment. Especially with instructors used to taking a teacher-centred approach to teaching, whereby they are in control of all aspects of a course, relinquishing some of that control to students goes against their philosophy of teaching.

Not just instructors come with misconceptions but also students. In particular, students can come with inaccurate or misconstrued ideas about what research is and what it means to undertake research (Earley, 2014). Many students have not been previously introduced to research or do not necessarily know what it means to be a researcher, which may lead to students shying away from engaging in research-enriched learning or participating in research (Casey et al., 2016). How instructors specifically translate research into learning experiences for students will be affected by how each individual instructor defines research and what they perceive as being research-based learning (Brew & Saunders, 2020). Due to the hierarchy in place in institutions as well as the differences among methods and formats of teaching among

instructors, there could be misconceptions among students' beliefs about research and its undertaking (Brew & Saunders, 2020).

Additionally, there are the concerns associated with students' previous experiences of research, such as little usable data after weeks of sampling, which could cause students to be more hesitant to participate in research due to fear of failure (Casey et al., 2016). If required, the struggles and challenges associated with obtaining people for focus groups and other studies would become evident. An instructor may want to provide students with an authentic research experience but needs to ensure students are not defeated by difficulties related to pursuing certain research topics. Poor experiences in other contexts can lead to negative thoughts about research that can affect the overall class (Earley, 2014).

Students reported both positive and negative research experiences. The very positive reaction of students to instances of lecturers bringing their own research into their teaching was described in the previous section on awareness. The numerous positive comments relating to opportunities for hands-on learning, independent learning, skills development, and opportunities to link teaching to the workplace [were identified as strong positive perspectives to research]. ... student perceptions of the factors that contributed to positive, or negative, research experiences ... the provision of adequate preparation, the importance of teaching research skills in appropriate contexts, and the need for good support by postgraduates and staff, came across very strongly, as well as a number of other factors relating to module design. (Casey et al., 2016, p. 16)

As this describes, several factors contribute to students' experiences with research-enriched teaching. All of these factors are important to take into consideration when designing a program to support departments and instructors.

Finally, instructors have the misconception that students will not engage in research, due to various factors, such as not knowing how to do research, not interested in research, or previous experiences (Earley, 2014). Nevertheless, it is argued that this should not be a concern if the research-enriched course is properly scaffolded with clear intended learning outcomes and valuable assessment throughout (Fung, 2017; Healey & Jenkins, 2009).

These three main areas of focus related to research-enriched curriculum, namely, the research and teaching nexus, skills learned and their significance, and misconceptions about research-enriched teaching, provide a foundational understanding of the necessary components to take into consideration when designing research-enriched curriculum. Before moving to the

investigation conducted for this report, it is important to review what other universities are doing in this regard.

### **Who is doing what in the world with research-enriched teaching?**

In Canada, there are universities that recognize the significance of including students in the research experience. For example, Queen's has recently undertaken a strategic review of inquiry-based learning occurring across their institution (Lavery, 2019). Queen's also has an award similar to UVic's *Award for Excellence in Undergraduate Research-Enriched Teaching*, called *Promoting Student Inquiry Teaching Award*. Mount Royal University (MRU) produced a well-organized document that outlines how they are instituting research-enriched teaching practices and promoting change in the curricula. Within this document and commonly echoed throughout research-enriched literature were phrases such as, "bridge the gap," or "bring students in," and "provide authentic opportunities." Additionally, there were specific sections designed for Indigenous research, creative research (or projects outside of the 'norm'), and the importance of communicating research. The University of British Columbia (UBC) has an *Institute for the Scholarship of Teaching and Learning (ISoTL)* program where they include and incorporate undergraduate students on projects to provide them with an opportunity for research. The University of Toronto (UofT) has student-instructor interaction benchmarks for including students in research but it is not clear how students are engaged in research opportunities. However, there is a lack of information presented on institutional websites and few documents outlining how each is incorporating or fostering a stronger link to research-enriched teaching. For many, it seems to have stemmed from a strategic plan initiative with some dating back to 2011 (Queen's) and others more recent (2018 at MRU).

Internationally, the push for research-enriched teaching has a longer history. In Germany, research-enriched teaching was mandated in the 1970s through government policies requiring a greater emphasis on student involvement in research. In Australia, the University of Adelaide (Willison & O'Regan, 2007) and Macquarie University (Brew, 2013) are leaders in frameworks, examples, and execution of research-enriched teaching and opportunities for students. In Dublin, the University College Dublin conducted focus groups to identify gaps in the curricula for engaging students with research opportunities (Casey et al., 2016). In the UK, the University of Gloucestershire is where Healey and Jenkins (2009) developed a framework for research-enriched teaching and provided examples and support for instructors wanting to engage more closely with research-enriched teaching and pedagogy. Additionally, the work done by Healey and Jenkins (2009) provides descriptions of specific universities and colleges utilizing aspects of research-enriched teaching such as, students engaging in inquiry study in their first-year, later



in their academic careers, and specific programs that have a greater emphasis on research-enriched teaching.

Due to this longer history, international counterparts have more evidence, more information, and more engagement for curricula that are research-enriched for students. Overall, there is significant work taking place throughout parts of the world to ensure a greater educational experience for students and better preparation for their professional and graduate careers through the inclusion of curricula with a strong focus on research-enriched teaching.

For our work, in order to augment the evidence from the literature and environmental scan, six interviews were conducted with international leaders in research-enriched teaching. The key question<sup>3</sup> from the interviews was surrounding the factors around implementing research-enriched teaching at their respective institutions. From those interviews, we performed a thematic analysis of the data and identified four key characteristics which we used as our lens for further analysis and interpretation of the data and the literature.

## Key Findings

The following four key characteristics resulted from the international interviews:

- Customizable framework: adaptable across disciplines
- Holistic approach: integrated throughout the curriculum
- Scaffolded learning: connecting research and teaching
- Validating narratives: articulating research from year one to four

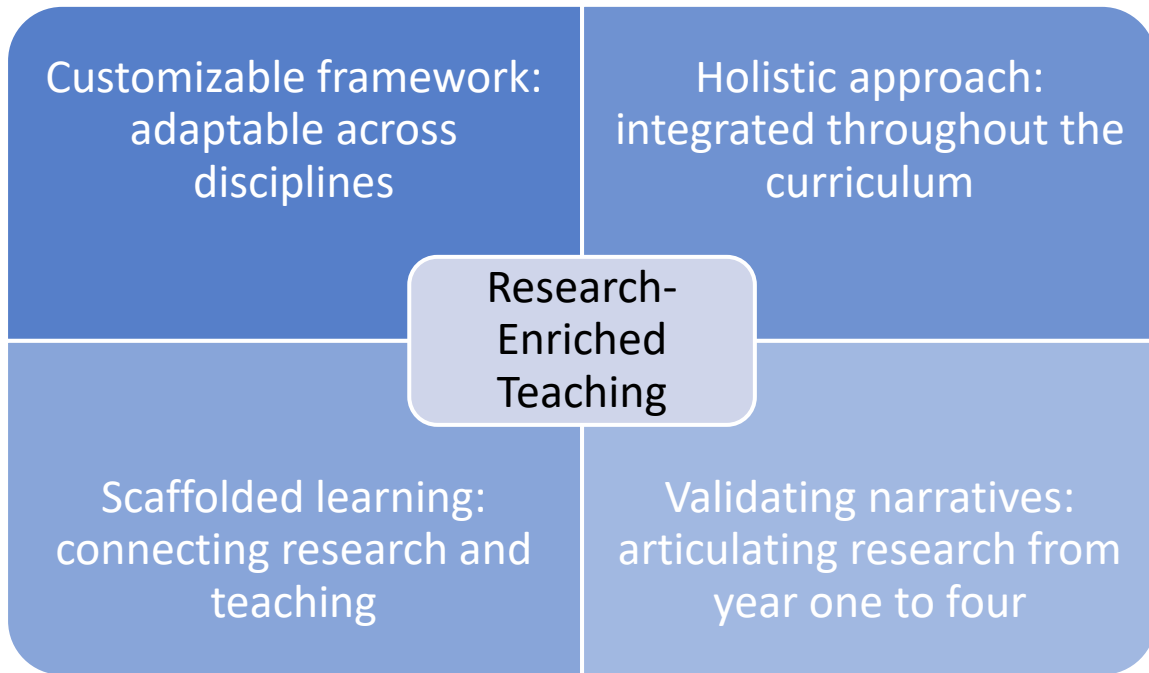
Each characteristic is discussed below with the following graphic, indicating that each of the characteristics are required for successful implementation of research-enriched curricula (see Figure 5).

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<sup>3</sup> Specific questions asked during the interviews can be found in the *Methodology* section, pages 5-7 above.



Figure 5: Research-enriched teaching key characteristics.



**Customizable framework: adaptable across disciplines**

The successful incorporation of research-enriched teaching into curricula requires the ability to customize curriculum to allow variety, openness, and the integration of research aspects important to each unit, program, discipline, or department.

For something to be customizable, it needs to be flexible and open-ended enough to be modified for a specific instructor, course, department, discipline<sup>4</sup>. Yeo noted that the disciplinary aspect of research is substantial and that it is difficult to have a generalized set of research definitions, language, terminology, or outcomes. Differences within and among departments need to be recognized and flexibility built-in throughout curriculum development for research-enriched opportunities (Fung, 2017). Adaptability allows different forms of research and application of research opportunities, within universities, countries, and fields. This ensures a program that is adaptable to the needs of its students within that context (Brew,

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<sup>4</sup> For examples, see EPHE142, ANTH398, and LAW339 in the case study booklet in Appendix 1: Research-enriched teaching case-study booklet.

2013). Lavery confirmed that adaptable frameworks allow their use to be widespread and unrestricted, promoting research-enriched curricula and initiatives to be driven by the discipline and department, due to the different approaches to the research process.

Taking a customizable approach recognizes that every department has their own definition of what constitutes research. Fung confirmed that even within disciplines, there are academic microclimates and small sub-groups with different definitions of research. In addition, Willison noted that there is also the technical piece to consider—that ‘analysis’ means very different things to different disciplines or fields. Incorporating research-enriched teaching needs to be modifiable to fit many different definitions and formats so that it is authentic to the context in which the course is being taught. This includes respecting unique language or terminology in different units, as well as attitudes and beliefs about what research means. Fung acknowledges that instructors will problematize what research means and position their discipline within the larger definition of research and knowledge. Furthermore, by ensuring that instructors have autonomy and can contribute to what research means for their specific unit, this can lead to shifts in the overall culture and inclusion of research-enriched opportunities (Willison). Having flexibility built into research-enriched opportunities ensures that instructors’ identities are represented and that instructors have autonomy in designing research-enriched curriculum. Therefore, Fung noted, this allows for frameworks and research-enriched initiatives to be exploratory, ensuring instructors have agency within their teaching. Further, Torres noted that this built-in flexibility allows instructors to take research-enriched opportunities outside of traditional learning environments.

Curricula integrating research-enriched opportunities needs to be adaptable and customizable for each unit, discipline, and for instructors in their particular context. When introduced in an expansive way, those interested can then develop research-enriched programs with the components discussed in the next key characteristics.

### **Holistic approach: integrated throughout the curriculum**

Taking a holistic rather than atomistic approach to research-enriched teaching encourages deeply integrated learning due to courses being connected and seen as a whole rather than separate. The result is a connected curriculum (Fung, 2017) whereby all courses are research-enriched within a degree program. Taking a holistic approach means taking all factors related to a program into consideration. It can be described as a relational web (Hager, 2008), where students, instructors, and staff understand how all courses are connected. Fung confirmed that success occurs when the design of the whole degree program is integrated with research-enriched opportunities leading to an overall narrative coherence. In opposition is an atomistic

approach that provokes a surface approach to learning where students have to find the threads of connection throughout their degree. This approach has a long history in post-secondary education when a professor's expertise in one area took precedence (Lee et al., 2010).

Working from a disciplinary definition of research (with departmental agreement), each degree is designed so that research opportunities are embedded from first to fourth year. When a holistic approach is taken, research or creative activity is fully integrated and appropriately sequenced into the curriculum at all levels with students recognizing how teaching and research are intrinsically linked. Appropriate sequencing or scaffolding and the development of students' knowledge begins with foundational concepts with high support and progressively gives students more responsibilities and opportunities to apply knowledge and skills on their own. Taking a holistic approach ensures that students' learning about research is scaffolded and supported in a way that ensures previous years' learning continuously builds in subsequent years and that it continues to foster students' curiosity. Scaffolding promotes breaking down component knowledge and skills about research into a sequence that supports students in learning all aspects related to research—literature reviews, undertaking, and sharing. It is not just about integrating throughout the curriculum; it is about ensuring that all aspects are appropriately sequenced with sufficient support. Willison specifically highlighted that often missing within a curriculum is how research-enriched learning moves between second- and third-year, specifically addressing the need for a holistic curriculum, confirmed by Fung and Howell.

Howell proposed a general structure for research-enriched teaching as having:

- An exploratory general research class,
- A second class that introduces students to the general skills within the discipline for research,
- A third class that is more hands-on for students to practice techniques in that field, and
- A culminating final class that encompasses an independent research project<sup>5</sup>.

As Howell's structure suggests, proper scaffolding helps students recognize the importance and general purpose of research. As well, Willison noted that students recognize when their

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<sup>5</sup> See Appendix 1 for an example from THEA338, which addresses scaffolding by going deeper with less. Rather than trying to address numerous concepts, students have the opportunity to focus in on a few key examples and use those exemplars to inform their own independent commercial theatre project (*Experience through the Lens of a Broadway Producer*).

learning was supported with research-enriched teaching. However, Lavery cautions that change needs to be planned sequentially so that students are not expected to complete a research project without prior support. Students engaged in a holistic research-enriched curriculum develop deeper connections to the discipline, improve critical thinking skills, have higher engagement, and are better prepared for graduate research. Yeo highlighted that if a program sees itself preparing students for graduate school, there is often more research-enriched teaching embedded within the program.

Yeo confirmed that the curriculum process is where instructors require the most support. In addition, Torres recommended helping instructors engage with resources like librarians and embedding teams of librarians within the curriculum. However, Torres warned about taking a top-down approach and that it is not only about curriculum and design, but that teaching is also important for success. Therefore, Willison suggested recognizing key champions within departments, disciplines, or units to help develop a holistic approach to curriculum design.

### **Scaffolded learning: connecting research and teaching**

A large proponent of research-enriched teaching is providing relevant opportunities for students to engage in hands-on research or creative experiences that aids in connecting them to the unknown in research, other courses, employment, and their future. For instructors, this means connecting research and teaching in authentic ways. For students, Torres highlighted that it is important to make clear that the skills required for research are relevant in everyday life. Further, Howell stated that research-teaching linkages be explicit in class, while Torres noted that those linkages be contextualized within the academic setting<sup>6</sup>. Students could also be asked to prepare a culminating portfolio to help them recognize how their experience of a research-enriched curriculum was integrated throughout their degree and continued to bolster their curiosity and discovery-attitudes towards research.

When undertaking research-enriched opportunities throughout their degree, students need to be active rather than passive learners and subsequently see themselves as being researchers (acting like a [insert discipline here]; for example, as a biologist, anthropologist, etc.) as links and connections are made. Active learning authentically engages students in their own learning and helps foster students' curiosity in the subject. Research-enriched teaching requires

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<sup>6</sup> For example, see Appendix 1 and BIOL362 (*Research Experience for Biology Students with an Exploratory Project*) where students are tasked with undertaking unknown research that is connected to an independent project.

students to be actively talking about what they are learning, writing about it<sup>7</sup>, relating it to other courses and previous material, and synthesizing their learning by application and engagement (Chickering & Gamson, 1987). Active learning can also increase motivation because students feel invested in their education and overall learning experience (Svinicki & McKeachie, 2014).

Fung noted how students could not truly grasp the nuance of research until they had to participate in a research related activity. Students want to identify themselves in research-enriched opportunities. A sub-category within this characteristic was the significance of instructional strategies. Many different strategies can be used to engage students in research-enriched opportunities within the classroom. These can include but are not limited to community-engaged learning (CEL), team-based learning (TBL), inquiry-based learning (IBL), and problem-based learning (PBL). Laverty confirmed that it is through experiential learning that students make stronger connections with research.

Scaffolding combined with research-enriched instructional strategies results in initiatives of bringing research into the classroom that supports students. For example, Yeo suggested that students in first- or second-year<sup>8</sup> could be tasked with creating a research proposal and submit an ethics application. Another example from Yeo, is that students look at the underlying principles in research for that field or discipline and consequently obtain a basic understanding of qualitative and quantitative research (e.g., research literacy and credible/not credible sources). Alternatively, Willison related how general discovery experience or inquiry-based learning has been used regularly in first-year courses helping students begin to navigate research within that discipline. An example from the UVic case studies, EPHE142, requires students to embark on a discovery or inquiry-journey by having them select a lifestyle change project related specifically to a lifestyle aspect they wish to change. From there, they delve into the literature, identify key resources, plan an experiment to test a change, and document and reflect throughout the journey (see *Investigating the Impact of Lifestyle Changes One Project at a Time* in Appendix 1). Torres suggested that utilizing pathway units, or small units that emphasize study skills and provide context of those skills are very useful throughout their undergraduate years and provides students with foundational skills for learning and research.

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<sup>7</sup> See Appendix 2: Research journals students can submit to through UVic for undergraduate research journals that accept student submissions.

<sup>8</sup> See EPHE245 in the case study booklet in Appendix 1: Research-enriched teaching case-study booklet.

To have an authentic research experience, students must actively participate and have relevant and connected research-enriched opportunities. Capstone projects<sup>9</sup> help students make those connections and see the relevance of research for themselves currently and in their future (Howell). If students are not actively involved or connected in research-enriched experiences, then they are not truly engaging in research experiences within their discipline.

### **Validating narratives: articulating research from year one to four**

The final characteristic highlights the importance of validating students and instructors' narratives through the articulation of research. Validation and sharing by colleagues and students establishes the significance of embedding curriculum with research-enriched literature and strategies. Validation of narratives occurs through relationships and supports, and clearly articulating the research opportunities embedded throughout a course. The interactions and bonds formed with others through a specific task, activity, event, class, or other commonly shared interest are integral to authentic research-enriched teaching. However, Howell warned that student awareness and perception of research is often different and disconnected from instructors' perceptions, and it is important that research-enriched initiatives cater to both parties to ensure success and relevance.

Research-enriched opportunities generally do not happen individually but instead include numerous interested parties. Willison highly recommended taking a ground-up approach requiring peers to share with peers, even across disciplines. Therefore, an underlying aspect of successful research-enriched opportunities includes bolstering those relationships through events and supports that showcase and encourage collegial sharing between instructors, students, intersections between the two, and cross-disciplinary collaborations.

For instructors, Torres claimed that agency and identity are respected when narratives are validated. Willison concurred by asserting that engaging in relationships with colleagues validates other's judgement and perceptions, which in turn respects individual identities and gives ownership of overall implementation and design to instructors. Providing spaces for instructors to interact with one another is beneficial for brainstorming, synthesizing, and identifying research-enriched initiatives within disciplines that are scaffolded, holistic, and relevant to students. Fung noted that offering high-level exploratory research-based forums for specific groups of instructors allows the generation of ideas, sharing of interest, and

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<sup>9</sup> See CIVE400, IS320, or SJS400A in the case study booklet in Appendix 1: Research-enriched teaching case-study booklet.

connections between classes, years, groups, and other disciplines. Torres expanded this notion by extending the significance of including staff in events. For example, Torres noted that librarians were keen to be involved and excited to share exemplars. By creating that initial link and bond, narratives begin to take shape around how to support students in research-enriched teaching, which promotes enhanced engagement between instructors and staff, as well (Torres).

For students, Fung highlighted how their narratives are validated by engaging them in conversations about research in the discipline. Willison suggests utilizing strategies like students as partners (SaPs), which takes research-enriched teaching broader and provides additional avenues to spark students' curiosity in research. Lavery emphasized how students want to see value in what they are learning for their future<sup>10</sup>. Howell explained this can be accomplished by providing a final year independent in-class research opportunities (that has been properly scaffolded and supported throughout their degree). In GEOG476 at UVic (*Getting Your Hands Dirty in Geomorphology Research Projects*), a previous student stated:

I found that learning through researching a topic that I could choose enabled both my creative freedom, as well as the knowledge I have accumulated over my years at UVic in this subject, which allowed me to focus all my energy into something I found interesting and enjoyed learning about. (*Appendix 1: Research-enriched teaching case-study booklet*)

This quote confirms what Howell stated; when students feel they have their own agency and take ownership of a project, there is a clear shift in attitude as students develop as researchers in the field.

Various other supports suggested for instructors and students included papers, guides, and specific people through communities of practice (CoPs), instructors' communities, students as partners (SaPs), and staff, such as librarians and teaching centre personnel.

Willison found the use of CoPs to be very helpful in disseminating information and having a peer group to brainstorm, talk initiatives through, and a place to bounce ideas. Other interviewees noted that specific course-design workshops for instructors with a focus on

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<sup>10</sup> See SENG421 in the case study booklet in Appendix 1: Research-enriched teaching case-study booklet.

inquiry or research-enriched teaching were helpful (Lavery) and having specific events for students to showcase and talk about their work, such as research and scholarship days (Yeo)<sup>11</sup>.

Identified numerous times in this study was the integral role that librarians and library staff play in the execution of research-enriched opportunities. Torres found that librarians are often already engaged in research-enriched practices or keen to be involved. Additionally, librarians often provide library and course guides dedicated to disciplinary research accessible to students that instructors can incorporate into their course learning management system (Torres). Yeo suggested that undergraduate research assistants in the library could be trained through practices like students as partners to offer support to instructors or in co-facilitating workshops about literature searches, inquiry and discovery learning, or other research-enriched strategies.

Creating synergy between relationships curated and created among individual groups and across groups and the supports available in many forms is where positive research-enriched teaching occurs.

These four characteristics represent what these experts consider to be of utmost importance when integrating research-enriched teaching curricula at the departmental, disciplinary, and individual level.

## Discussion

Institutions have been making numerous advances to better support their students with research opportunities since the Boyer Commission report of 1998 (Kenny et al., 1998). To develop a successful research-enriched program, it is recommended that institutions reflect on the purpose of the research and teaching outcomes and work towards a “curriculum that is informed by research that provides understanding of the research process and methods and its application to economic, social, health, and global contexts” (Whitlock & Stierer, 2009, p. 10).

In this study, we identified four emerging characteristics: (a) customizable framework: adaptable across disciplines, (b) holistic approach: integrated throughout the curriculum, (c) scaffolded learning: connecting research and teaching, and (d) validating narratives: articulating research from year one to four. In this section, these findings are brought together with the literature. Research-enriched teaching goes by many different names including “inquiry-based learning,” “research-based teaching,” and others (Gresty et al., 2013). As such, an integral part

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<sup>11</sup> Similar to UVic’s Jamie Cassels Undergraduate Research Awards (JCURA) Fair.



of having a curriculum that is enriched with research is to have inquiry and discovery for students with underlying aspects of teaching-research linkages.

One of the key findings from this study was that research-enriched teaching initiatives need to be customizable and adaptable. Willison asserts that all aspects, such as language used and frameworks, need to be open-ended and allow disciplines to adapt the material. Brew and Saunders (2020) confirm that instructors will translate research-enriched opportunities based on how they and their department define research and research-enriched learning. For example, Howell highlighted that something done as research in a lab setting will be different from what law students experience; therefore, a customizable framework that is adaptable across disciplines is critical.

Due to these differences, there are concerns from administrators and instructors that students might come with misconceptions about what constitutes research (Brew & Saunders, 2020; Earley, 2014). As addressed earlier, implementing scaffolding alleviates this concern (Fung, 2017; Healey & Jenkins, 2009). Torres claimed that when research-enriched opportunities are disciplinary-specific, support can be provided to help individual instructors or units to approach development of a framework systematically. In order to do this, Torres suggested to first understand the context to better support a unit and instructors unpack research-enriched teaching in their discipline through statements and questions.

By ensuring frameworks, documentation, and general language around research-enriched teaching is customizable and adaptable confirms respect of instructors' agency and autonomy, as well as disciplinary specifics, such as language, techniques or strategies for research, and opportunities that are dependent within that specific field. Customization and adaptability, coupled with ensuring a holistic curriculum can be achieved by using models such as the *Wheel Model* (Brew, 2013), *RSD* framework (Willison & O'Regan, 2007; Willison & O'Regan, 2019), and *Connected Curriculum* (Fung, 2017). These models and frameworks include open-endedness and inclusive language that allows customization to each individual department and instructor. They are also broad enough to support building and embedding research-enriched opportunities throughout an entire curriculum. Creating spaces for instructors within a discipline to have a meaningful conversation around what research is in their field, is an important step in embedding the research-enriched teaching throughout the curricula and therefore working towards a connected curriculum (Fung, 2017). The *Connected Curriculum* framework has a large focus on helping students make relevant connections within their classes, their academic and/or workplace setting, institution research (including researchers), and their peers (Fung, 2017).

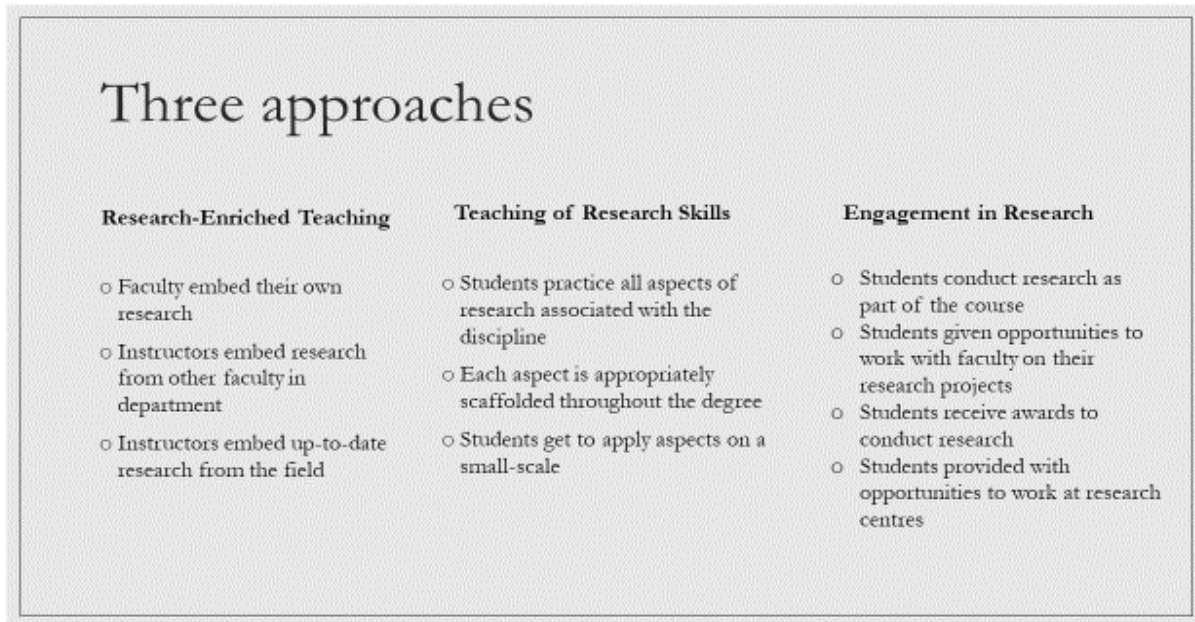
Having curricula customizable and adaptable ensures that departments can take a holistic approach to designing curriculum from first- to fourth-year. It is recommended that careful conversations around the importance of both teaching and research and allowances for instructors to specifically highlight how both research and teaching play a role in their daily lives is required (Brennan et al., 2016). Once those conversations take place, the aim is to have agreement on how research can be appropriately sequenced throughout the degree, which provides guidance for instructors on how different strategies can be implemented into their courses.

Many different strategies can be used to embed research-enriched teaching in the curriculum. For example, Fung and Willison suggested providing transcript distinctions or embed a degree portfolio as a part of students' final year where students showcase what they have accomplished over the four years and how they themselves have created their own teaching-research linkages. This does not mean that students would only do it in their final year, but they would work on throughout their undergraduate degree and culminate in a distinction or recognition at the end of their final year.

In general, embedding research into curriculum can be divided into three approaches: research-enriched teaching, teaching of research skills, and engagement in research (see Figure 6).



Figure 6: Three approaches to research-enriched curriculum.



These approaches are not mutually exclusive but do represent how research-enriched teaching can be scaffolded into curriculum.

Despite multiple ways to integrate into curriculum, Earley (2014) and Gresty et al. (2013) highlight that both students and instructors can come into research experiences with anxiety and fear, or even misconceptions of what works well to support students or engage in research. This is one reason why scaffolding is so important for authentic research-enriched experiences. In particular:

Spronken-Smith and Walker (2010, 723–738) draw on work by Jerome Bruner and Lev Vygotsky to address the importance of ‘scaffolding’ students’ learning, by providing structured support for them to build up their levels of independence as they investigate. They distinguish between three levels of enquiry:

- Structured inquiry – where teachers provide an issue or problem and an outline for addressing it;
- Guided inquiry – where teachers provide questions to stimulate inquiry but students are self-directed in terms of exploring these questions;



- Open inquiry – where students formulate the questions themselves as well as going through the full inquiry cycle (Fung, 2017, p. 36).

Scaffolding and sequencing within a holistic curriculum are key recommendations from the literature and this study. Inquiry or discovery (initiating curiosity) is also a large component of successful research-enriched teaching (Bateman, 1990; Lee, 2012). Healey and Jenkins (2009) divided inquiry and research into their four quadrants for a framework that includes both student-led and instructor-led categories. Levy and Petrusis (2012) built on the previous framework and specifically expanded into more inquiry-based learning. Their model showcased the level of the task and the amount of support required, leading towards a more scaffolded and holistic approach for incorporating research-enriched opportunities. They also note the importance of transitioning from a learning framework to a more discovery-based framework wherein students can explore and discover as part of the properly supported and scaffolded curriculum. The *Wheel Model* (Brew, 2013) is highly customizable and puts students at the centre for overall support throughout their research-enriched learning experiences. Both the *RSD* (Willison & O'Regan, 2007, 2019) and the *Connected Curriculum* (Fung, 2017) frameworks are more open-ended with high levels of scaffolding built directly into the frameworks and corresponding customization available. The *RSD* framework has five to seven levels and curricula can be mapped in such a way that students move throughout each level within a single course, across courses, and throughout their entire program.

Further recommendations to ensure scaffolding, include the following:

- Recognize the importance of providing opportunities for students to embark and clarify (Willison; Torres),
- Incorporate a more literature-based structure in first-year and build on that (Howell; Yeo),
- Ensure the change between years in research skills is made sequentially (Lavery), and
- Connect exploratory and investigative strategies as students move through levels (Fung).

The aim is to ensure that timing and scaffolding supports students and is devoid of barriers to their continuous growth in research skills (Casey et al., 2016).

A well-developed holistic curriculum will help ensure instructors and departments are making relevant connections. New experiences can be daunting and oftentimes student's express anxiety, fear, or uncertainty with new formats and classroom exercises (Gresty et al., 2013). Typically, this is due to the specific connection between the current topic and its corresponding exercise not being clear. Fung shared that the point of research is that there is so much that is

unknown, and students need to become comfortable with the unknown and that through investigation, they will learn. As already discussed, active learning strategies, such as team-based learning, inquiry-based learning, community engaged learning were echoed clearly throughout the literature and in interviews as effective strategies to use in research-enriched curriculum.

Creating active and engaging experiences for students will create discovery opportunities for students to engage more carefully with research in their field and to make those relevant connections for themselves currently and for their future. Laverty recommended providing opportunities for students to articulate what they are learning. Incorporating research-enriched opportunities that are more literature-oriented in approach, such as utilizing primary sources to uncover an answer and dig into a question, will help begin students on a trajectory for discipline-specific research (Willison). Willison noted that oftentimes, general inquiry or clarification are missing in first- or second-year. Fung strongly stated that students learn best by doing and nothing is truly taught until it is learned. Therefore, a great way for students to learn is to investigate the question themselves. Willison also noted that it is important to ensure that research-enriched learning opportunities are accessible and developed with equal opportunity in mind. In addition, students are often thinking about their future employment options, which requires instructors making explicit connections about how research-enriched opportunities will support their future and will help students make those relevant connections. Instructors also need help making connections, as they are often unsure about the teaching-research nexus with not every instructor necessarily believing that teaching and research should be linked (Brennan et al., 2016; Brew, 2006). Therefore, supporting instructors to help see the interconnectedness between research and teaching will ensure that instructors can make those relevant connections themselves so that they can best support their students.

One way to help make connections is by validating narratives. Fung claimed that stronger connections are formed through dynamic dialogue. Through narrative validation by articulation of research, students can identify and see themselves using their skills in other placements and formats and this allows students to make relevant connections (Willison et al., 2007, 2009). The positive effects of students engaging in authentic experiences are impactful not only for their current course but for their future, as well (Griffiths, 2004; Zupanc, 2012). “Transferable skills including communication skills, data analysis, critical thinking, problem solving, independent learning, and use of appropriate reliable resources, were identified by students across all disciplines as being important” (Casey et al., 2016, p. 25).

In supporting the validation of narratives, communities of practice or specific awards related to research-enriched initiatives help validate instructors' narratives. For example, Fung recommended instructors engage in dialogue about their disciplinary research and translate that into learning opportunities for students. One specific support that was discussed at length in many of the interviews was the use of university librarians as instrumental supports to both instructors and students for bridging the gap between research and teaching. Additionally, frameworks such as the *RSD* (Willison & O'Regan, 2007, 2019) or the *Wheel Model* (Brew, 2013) can be used as starting points for conversations about what embark and clarify means for an instructor (Willison).

Despite a lack of attention in the literature, an opportunity for both instructors and students to share what they have accomplished was emphasized in this study. Events, such as conferences and symposiums<sup>12</sup> (like UVic's JCURA), were highly recommended. In departments or courses, students could showcase their research-enriched learning via a culminating event. Torres stated that providing opportunities for both instructors and students to engage in showcasing and dialoguing about research within their disciplines, promotes continuous development of skills and connections between research and teaching.

### **Next steps and future considerations**

In this study, key characteristics were identified and gaps discovered to help determine next steps to UVic becoming Canada's institutional leader in research-enriched curricula.

To begin with, the development of resources, guides, and an accompanying website will take into consideration recommendations from this study. For example, Fung noted that resources created need to use accessible terminology and be useful to instructors (customizable characteristic). As well, recommendations need to be streamlined to include the most important information related to research-enriched curricula. Resources developed will aim to be open and adaptable, while providing discipline-specific examples (such as the case studies in *Appendix 1*) so that departments and instructors have relevant exemplars.

Additionally, awards signify the importance of embedding research into curriculum. Therefore, UVic's *Award for Excellence in Undergraduate Research-Enriched Teaching*, *President's Fellowship in Research-Enriched Teaching*, and *JCURA* award will continue to figure prominently

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<sup>12</sup> For an analysis of other programs that recognize undergraduate research across Canada, see Appendix 3: Undergraduate research programs across Canada.

in resources. Gathering participants' stories of how their teaching and learning have been impacted by receiving these awards would be an initiative to explore (validating characteristic). Further, the annual *Let's Talk about Teaching* event will feature research-enriched teaching prominently. More importantly, LTSI will develop a symposium dedicated to research-enriched teaching, which will showcase some of the case studies in this report.

Substantial support will come through curriculum retreats and workshops to help departments and instructors integrate research throughout (holistic characteristic). These workshops, coupled with communities of practice, can be the launching-off point for instructors to begin making relevant connections between research and teaching and recognizing how they are truly interconnected and linked (scaffolding characteristic). By using frameworks, such as research/inquiry (Healey & Jenkins, 2009), inquiry-based learning (Levy & Petrusis, 2012), the *Wheel Model* (Brew, 2013), *RSD* (Willison & O'Regan, 2007, 2009, 2019) and the *Connected Curriculum* (Fung, 2017), dialogues and conversations with departments, units, and instructors about embedding research-enriched opportunities holistically throughout the curricula can take place. By engaging in curriculum development with LTSI staff, gaps in the teaching-research nexus can be addressed, while ensuring all parties' narratives are validated and agencies respected. Discussions around key active learning strategies that support research-enriched teaching will be an integral part of all supports provided.

All of the above resources and supports will also include discussion about the research/teaching nexus, student skill development and their significance, and address common misconceptions. In accordance with findings and recommendations for incorporating research into first-year courses by Pitton (2021), conversations around what students know or do not know about research will be important for successful integration of research-enriched curricula, coupled with discussions surrounding students' previous experiences of research and how that informs their continued growth as a researcher within their own discipline.

Lacking in the literature and interviews from this study were evaluation methods used to determine the impact or effectiveness of research-enriched opportunities. Therefore, it will be imperative that evaluation strategies be crafted and utilized to identify student, instructor, department, and program needs, and if the corresponding goals have been met. Due to this gap in the literature, UVic will stand to be a leader in development of this key piece of research-enriched curricula and teaching.

As discussed in the literature review and the focus on skills and their significance, the impact of incorporating research-enriched opportunities throughout a student's program is overly



positive (Zupanc, 2012). Together, with other resources on campus such as Librarians, Co-op and Career Staff, units, departments, and instructors, the LTSI can customize strong, embedded, holistic research-enriched opportunities that students can connect to in a relevant way that validates all narratives. This is relevant to UVic's Strategic Enrolment Management Goals, and in particular Goal 3 which notes "By 2024, 100% of all graduating undergraduate students will have the opportunity to complete at least one significant experiential learning opportunity as designated by an experiential learning notation on their transcript or a validated co-curricular record." (p. 11). UVic's Strategic Framework posits: "The University of Victoria will be Canada's leader in research-enriched and experiential learning" (p. 5). This vision is also noted in UVic's Indigenous and International plans. This initiative contributes widely to these specific strategies due to an understanding of what has been done previously with research-enriched teaching from the literature, key characteristics that experts in the field of research-enriched teaching have utilized to successfully embed research-enriched initiatives within curriculum, and highlighted research-enriched teaching taking place at UVic.





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## Appendix 1: Research-enriched teaching case study booklet

### *Research-Enriched Teaching Case Study Booklet*

This case study booklet compiles exemplars of research-enriched teaching taking place in courses at the University of Victoria from first-year through to fourth-year.

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## Thinking, Exploring, and Navigating the World Like a Viking

**Keywords:** collaborative, exploratory, scaffolded

**Course title:** Life and Death in the Viking World (ANTH398) – Dr. Erin McGuire

**Student description:** Roughly 60 students of third-year standing

**Undergraduate research:** collaborative, team-based learning, options/choice, transferable skills

**Research component:** Students have flexibility within this course to select their projects and there are three main categories of projects students can select from: experimental archaeology project, research paper, or virtual exhibition. All research projects include the proposal, blog, poster, and a written form article or essay. The focus is more on students' learning how to communicate effectively and other transferable skills throughout their educational journey.

### *Associated intended learning outcomes*

- Critically assess the evidence used in the investigation and interpretation of the Viking Age (e.g., archaeological, historical and literary sources)
- Analyse and explain content, methods, and theoretical approaches within academic articles
- Develop team, written and oral communication skills

### *Assessment*

- Students work is scaffolded throughout the semester and begins with their proposal for their project, which they receive formative feedback on.
- Students blog throughout the semester and track their research and the movements of their research over the term to end in a final research paper and a poster presentation.

### *Findings/recommendations*

- We have to be willing to take risks ourselves – some things do not always work out well and that is okay.
- Revisit it, fix it, and reflect in-between—key strategies to engage in when integrating research-enriched opportunities into the class while keeping in-mind your own workload.

### *Student feedback*

“Being able to apply theoretical skills in a practical setting always helped me engage with the course material in a more meaningful way and held my attention in a way that theoretical

classes never did. I always came away from Erin's research-based classes with better retention and understanding of the material.” – Melanie

“As an undergraduate, being able to ask a question and then find a way to answer [using experimental methods] it stoked my interest in research and my field; it was a priceless component and the most critical part of my undergraduate education.” – Taylor



## Research Experience for Biology Students with an Exploratory Project

**Keywords:** molecular biology, practical research, scientific inquiry

**Course title:** Molecular Techniques in Biology (BIOL362) – Drs. Jürgen Ehling and Ryan Gawryluk

**Student description:** 20 third-year science majors

**Undergraduate research:** research question and design, data collection and analysis, discussion of findings, interacting with researchers in student’s field of interest

**Research component:** Students enroll in this course and are tasked to undertake a class agreed upon exploratory project. Students are provided with an experimental framework and scaffolding of materials. Students lead the project design, inquiry, and general structure of the work overall. By engaging in an exploratory project, students are introduced to key aspects within the field of biology that are integral for future work, such as bioinformatics.

### *Associated intended learning outcomes*

- First-hand experience to biological research and the pitfalls that come along with it
- Exposure to the latest technology and tools in modern biology
- Experience science as a creative process through failure, success, and new skill developments

### *Assessment*

- Final research paper is broken down into the individual components of a paper and scaffolded throughout the semester with feedback.
- Engaging in proper scientific writing with feedback is a part of the learning experience.
- For the final submitted paper, students had to include their revised documents and comments about “why” certain changes were made or not.

### *Findings/recommendations*

- Bring the research technology up-to-date and stay connected to students.
- Open research-question courses can be trickier to plan, but it is important to be adaptable and flexible.
- Be transparent with the students from the beginning that the project does not always work.

### *Student feedback*

- “This [experience] taught me how important planning ahead and time management is, along with how to work in a truly collaborative group and how flexible researchers need to be around their studies. The freedom ... taught me to be an independent thinker and how to develop hypothesis based on personal research rather than from a textbook which is a crucial part of science.” – Chloe

## Thinking Like a Scientist – Delving Deep into Scientific Literature

**Keywords:** coaching, active learning, scientific literature

**Course title:** Instrumental Techniques of Analysis (CHEM318) – Dr. Dennis Hore

**Student description:** Required course for all chemistry majors that has between 60-80 students of third- and fourth-year standing

**Undergraduate research:** inter-teaching model, peer discussions, scientific literature inquiry

**Research component:** Students gain hands-on experience with a specific topic or instrument and they study it in-depth utilizing scientific literature, course materials, and other examples. Students are to become the practitioners of the field and are coached through how to read a paper by utilizing the inter-teaching model.

### *Associated intended learning outcomes*

- Understand the commonality between different classes of instruments and how that ties between different machines
- See analogies and connections between different options with the research and literature from the papers

### *Assessment*

- Final exam includes specific questions geared at aiding students in synthesizing what they have learned from the primary literature.
- Within their inter-teaching pairs, students are accountable for their own material and need to provide feedback to their partner on what worked well, what did not work well, and what are the top three things to review.

### *Findings/recommendations*

- If you want to include significant research, give students a chance to talk about it among themselves.

### *Student feedback*

- “In CHEM318, we had several "Inter-teaching Sessions" throughout the semester where we would break into small groups to read and discuss a research paper related to a topic we were covering in class. Having the opportunity to discuss these papers with my classmates was extremely helpful in solidifying my understanding of these topics, and

was a great way to explore how the concepts we were learning in the classroom are applied in the lab.” – Danielle

## Group Dynamics and Interacting with the Community as Civil Engineering Students

**Keywords:** capstone, applied research, industry

**Course title:** Cross-Disciplinary Capstone Design Project (CIVE400) – Dr. Phalguni Mukhopadhyaya

**Student description:** Fourth-year students interested in pursuing a civil project; roughly 62 students (5 to 6 in each group)

**Undergraduate research:** project proposal, numerous reports, group and poster presentation on the project, drawings/calculations/presentations

**Research component:** Students engage in a capstone project that interacts with specific industry partners and this serves as a launching pad for students interested in working in industry or pursuing graduate studies. Students engage in industry-specific projects that provide opportunities, such as finding the solution/answer before they ask a question to their industry partners and working in a team and having a better foundation for group dynamics.

### *Associated intended learning outcomes:*

- Work in a group environment
- Perform a literature search and gather information relevant to a project
- Synthesize the information into meaningful input for their projects
- Describe the project constraints, innovations and the iterative process involved in civil engineering design
- Design a civil engineering project in its entirety – idea to complete plan
- Effectively communicate verbally
- Demonstrate effective technical writing skills

### *Assessment*

- Students are provided a scaffolded process throughout the course submitting: project proposal, interim report, group and poster presentation, and final report.

### *Findings/recommendations*

- Incorporating research-enriched opportunities into classes can be tricky, but it is worth it for the students.
- Scaffolding is critical: it is important to focus on the fundamentals of science and engineering in first-, second- and third-year so it can support students undertaking independent research in their fourth year.
- Provide students the freedom to engage in a research project of their own choosing and interest.



*Important to highlight*

Freedom for students to engage in a research project that they select helps increase their overall interest and motivation in the project and the course.



## Coding Their Way to a Brand-New Web-Application with Industry Mentors

**Keywords:** hands-on, exploratory, software

**Course title:** Introductory Programming and Software Development (CSC103) – Dr. Ulrike Stege in collaboration with Andrew MacLean

**Student description:** Maximum 16 students for a pass/fail course that provides dual credit (UVic credit and high school credit)

**Undergraduate research:** work through software development process, learn as they go, and agile development and technique

**Research component:** Students undertake a collaborative research project alongside university and industry mentors, to create a technology-based solution to a local or global problem impacting 21<sup>st</sup> century youth. Projects primarily utilize web technologies and best-practices including agile methodologies and version control. A focus of the curriculum is to allow students to learn as they go, with short lectures and hands-on workshops supporting group and individual research and project development.

### *Associated intended learning outcomes*

- Students enhance their communication skills through regular communication with peers and mentors, review and retrospective feedback meetings, and their final project, pitch, and demonstration
- Students increase their technical skills in web development and learn the basics of modern software development methodologies

### *Assessment*

- Oral skills are the primary focus for assessment, providing feedback on students' ability to communicate and share with their group and their larger community.
- Part of the final project is a pitch and demonstration of their application. Throughout the semester students provide weekly updates on their project development status.

### *Findings/recommendations*

- Model allows students to engage in creative thinking, and practice design thinking skills.
- Program is a novel implementation of project and problem-based learning strategies.
- Industry mentors provide students, and instructors, with insight into career pathways related to engineering and computer science.
- Industry involvement helps ensure that curriculum remain current.



### *Student feedback*

- The Academy taught me how to navigate group work and problem solve as part of a team. It taught me better communication and offered insight into what working for a tech company...would be like.
- How much you know means nothing if you cannot communicate with those around you.
- Do not be afraid if you think [technology] is not for you, because it probably is if you have displayed an interest.
- Teamwork will take you places you cannot go by yourself.





## Investigating the Impact of Lifestyle Changes One Project at a Time

**Keywords:** collaboration, project, practical research

**Course title:** Personal Health, Wellness, and Potential (EPHE142) – Dr. Lara Luzon

**Student description:** 140 students ranging from first-year to fourth-year; this course is required for the Recreation and Health Education (RHED) Program

**Undergraduate research:** topic research, interviews, data analysis and discussion of findings, impact of changes or modifications

**Research component:** Students undertake a personal lifestyle change project which blends experiential learning and research together. Students also engage in a community legacy project in small groups and work with a non-profit organization or agency. Students not only interview those in charge of the organization or agency, but they also research around the work they are taking on and why that work is important.

### *Associated intended learning outcomes*

- Students will experience ‘putting theory into practice’ by actively participating in an experiential and research project designed to encourage lifestyle change in one or more areas of personal health and wellness.
- Students will experience how self-care can lead to caring about others by participating in a small group legacy project designed to make a difference in our community

### *Assessment*

- The group legacy project is scaffolded to award marks or completion for tasks throughout the entire semester for the project, culminating in 15% of the final grade.
- The individual lifestyle change project is scaffolded throughout the semester to support the students researching and learning and culminate to 30% of the final grade.

### *Findings/recommendations*

- Think of creative ways to encourage and engage students.
- Be gentle with the students and integrate research into the classroom in a gentle way – not all students have previously been invited to undertake research and do not realize that the world is at their fingertips.

### *Student feedback*

- “I think adding a research element to this course helps first-year students push past narrow perspectives by utilizing external expertise. Furthermore, this course is designed in a flawless fashion, so that students exercise research out of interest, rather than necessity. As a result, students search for facts, opinions, expertise, anecdotes etc., that they are directly interested in, which in turn, encourages the practice of research and analysis in their future.” – Clio



## Experiential Learning in Motor Learning Research Projects

**Keywords:** research project, research paper, practical research, formative feedback

**Course title:** Motor Learning (EPHE245) – Dr. Olav Krigolson

**Student description:** Required course for Recreation and Health Education (RHED) program and a gateway course to neuroscience courses

**Undergraduate research:** design question and hypothesis, collect and analyze data, write a paper, and mini presentation

**Research component:** Throughout the course, students engage in a research project throughout the semester in teams (or groups of three-four). The semester is organized like a paper and students have a distribution of practice over the semester. Students design and implement their project using other students in the class, then they work on analyzing their data.

### *Associated intended learning outcomes*

- To be able to plan and conduct a research study
- To understand the research process
- To analyze and synthesize the findings of the research study

### *Assessment*

- Students write a final paper in stages incorporating all the pieces of a formal research paper.
- Feedback is provided throughout so students can re-vamp and edit along the way.

### *Findings/recommendations*

- Providing students an opportunity for research is important and interesting. Students appreciate having some control in their learning.

Provide opportunities for the students to go through the research process and to learn experientially by initiating their own research project.

### *Student feedback*

“I found that my critical thinking, Microsoft Excel and academic writing skills all improved dramatically as a result of EPHE 245. I was more involved in my learning because I felt it was more self-directed with the support of knowledgeable educators.” – Alyssa

“... [W]e as students are exposed to conducting research from start to finish (experiment idea to final paper), which you cannot get from many early science courses.” – Mathew



## Getting Your Hands Dirty in Geomorphology Research Projects

**Keywords:** field work and methods, independent research

**Course title:** Advanced Studies in Geomorphology (GEOG476) – Gillian Krezoski

**Student description:** Capstone course, 12-students roughly

**Undergraduate research:** data sampling, research project design and implementation, data collection and analysis, preparation of final report and presentation

**Research component:** Throughout this course, students worked on one large project but were paired to work on similar interests that correspond to different aspects of the project. Students were provided a framework but had the freedom to work around the framework. The research process was scaffolded throughout the course from a literature review to a research proposal presentation, to collecting data and analyzing it, and finally writing the research report. Students engaged in hands-on, real-world research relevant to the field.

### *Associated intended learning outcomes*

- Conduct a literature review and summarize key aspects of a geomorphological research problem
- Develop a testable hypothesis based on previous work, and write a proposal around the hypothesis
- Plan small field campaigns
- Detect patterns and processes in field data using statistical techniques
- Prepare quality graphics for presentation of results
- Present your results in form of a poster to an audience of your peers
- Prepare a journal-style research report

### *Assessment*

- Each piece of the research project was broken down into sections that were submitted for some marks (literature review, proposal presentation, written proposal, cruise and collecting data, poster presentation, project report).

### *Findings/recommendations*

- Disconnect between what community partners need from employees to hire and the skills students are coming away with in university.
- Work with smaller scale (2-3 week) projects to get students engaged and involved early on.



### *Student feedback*

- “I found that my critical thinking, Microsoft Excel and academic writing skills all improved dramatically as a result of EPHE 245. I was more involved in my learning because I felt it was more self-directed with the support of knowledgeable educators.” – Alyssa
- “... [W]e as students are exposed to conducting research from start to finish (experiment idea to final paper), which you cannot get from many early science courses.” – Mathew



## Apprenticeship Opportunity to Introduce Indigenous Students to Research Methods

**Keywords:** Indigenous learning, practical research

**Course title:** LE,NONET Research Apprenticeship (IS320) – Dr. Rob Hancock

**Student description:** Self-enrolled by choice (120 hours with research supervisor of choice)

**Undergraduate research:** data collection and analysis, discussion of findings, interacting with researchers in student's field of interest

**Research component:** Students enroll in this course and are tasked to provide a relative area of interest for research and potential research supervisor names. The motivation for providing Indigenous students this research opportunity is that most first-generation university learners do not have any experience with research, and this course fills that gap. Students develop a workplan with the research supervisor and carry-out the work with timely progress reports and check-ins throughout the semester over the 120 hours.

### *Associated intended learning outcomes*

- Provide students exposure to research and demystify the research process
- Model what research can be done and what opportunities are available
- Develop their knowledge and passion in a specific area
- Develop familiarity with graduate-level research

### *Assessment*

- Deliverables are discussed between the student and the research supervisor.
- Students provide mid-point and final reflections on what they are learning and how they are growing throughout the research process.
- Final assignment students submit is a summary of their work and is usually in PowerPoint form presented at the annual celebration.

### *Findings/recommendations*

- Do it! Provide students an opportunity to engage in research no matter how big or small.
- Reciprocity is important—students have gifts they share with the instructors, and the instructors gain materials from the students (very ethical and relationship-based).

### *Student feedback*

- “This was my first opportunity to design and carry out my own research project which was invaluable to my learning and great for my portfolio and resume. This was very helpful for me to learn in a hands-on, one-on-one mentorship setting that is unique to an individualized course such as IS 320. After that I felt much more confident in applying my theoretical learning into practical action.” – Lydia



## **Critical Listening and Thinking from Different Perspectives of Law**

**Keywords:** interrogative, inquiry, Indigenous cultures

**Course title:** Law and Film (Legal Theory - LAW339) – Dr. Rebecca Johnson

**Student description:** Third-year students roughly 25 students enroll

**Undergraduate research:** reflection, monitoring growth over time, pushing boundaries to think outside the box, curating law through a project

**Research component:** Students work through concrete experience walking through a problem with a set of questions to open up additional questions one might have throughout the course as they interact with different medias (film, text, narratives) and blog about their reflections throughout the course. By demonstrating, practicing, and modelling the looseness of research questions, students are learning to position themselves through their own questions and gain insight into see and hearing different perspective and listening in a different way. Students have a wide range of projects to select from based on interest or based on topics that are less conventional and have different forms of advocacy.

### *Associated intended learning outcomes*

- Students will develop a more expansive literacy in the tools of advocacy that they will have to have in law
- Students will practice skills of translation and with the research to reflect on what they have learned from those encounters
- Students will reflect on the research process more-so than the output

### *Assessment*

- Students blog after every class on the reading or film that was discussed.
- A four-page reflection allows students to return to their posts and see what of their own questions has changed throughout the term and how perhaps they would answer them differently.

### *Findings/recommendations*

- By removing the fear associated with the grading aspect of some tasks, students are liberated and feel freer to share their thoughts.
- Provide opportunities for students to push the boundaries for their creative imaginations and think outside the box.

### *Student feedback*

- “This class was one of my favorite classes throughout law school. Through collaborative discussion and questioning we learned from the source materials and from one another. As a kinaesthetic learner I found the teaching and learning approaches in this class to be more effective and engaging than a general lecture style as they gave me an opportunity to participate and theorize with the materials and engage them more fully than I otherwise would have.” – Sarah

## Mapping Out Medieval Architecture and Objects Through Field Schools

**Keywords:** field school, mapping project, objects, Medieval

**Course title:** Topics in Medievalism (MEDI330/ENGL385) – Dr. Michael Reed

**Student description:** 48 students self-enroll by choice

**Undergraduate research:** local field school, mapping, object assignment, reflections

**Research component:** Students utilize an interactive Medieval map that gain information for their research projects. Then, students gain hands-on experience with field assignments to engage with specific objects from the materials during each field school opportunity with photographs and guided questions. Throughout the semester, those field assignments build on one another requiring the students to place the object in its larger, more contextual frame with other objects observed and photographed on other field excursions. These interactions then build on the skills of archaeologic, or how the object is functioning in that place and time.

### *Associated intended learning outcomes*

- Gain real value of experiential learning and on-site visits
- Hone a greater sense of how a theme or symbol fits into time
- Increase literacy in visual communications

### *Assessment*

- Students are assessed on their ability to undertake research effectively and to communicate research effectively. Testing also plays a significant role (midterm and final).
- Students are looking, interpreting, and writing their research in three individual field assignments and one major object assignment.

### *Findings/recommendations*

- Part of teaching is knowledge creation and excavation which is why research and teaching need to be linked.
- Invite students to take part of the research process and they gain an invested piece to the course and have some course ownership.
- Demonstrate to students why the past is important to discuss in our present, discussing those transcendent kernels.



### *Student feedback*

- “Dr. Reed's virtual field schools effectively allowed students to tour various sites in Victoria, and to engage with sites and objects. I have always been intrigued by the architecture of buildings, especially churches, and since taking this course, my interest has greatly increased, and I can now identify some of the features. While I was in the process of writing a paper on the Shrapnel painting found at Craigdarroch Castle, I spoke to the curator there, who asked me if I would like to submit my paper to them to be placed with information on the painting. I did this.”  
– Vivian
- “This course is comprehensive, and the instructor is clearly very knowledgeable about the material. The content is presented in an accessible and interesting way. The assignments are clearly connected to the material. The map sounds like It'll be a great addition to the course!” – Soph



## Putting Students in the Driver Seat for their Creative Work

**Keywords:** sound synthesis, crafting music, software

**Course title:** Computer Music Seminar (MUS407) – Dr. Andrew Schloss

**Student description:** Roughly 20 students in total in this year-long cross-listed course involves both fourth-year undergraduate students and graduate students

**Undergraduate research:** exploration and inquiry, synthesis of music pieces, creative and technical research

**Research component:** Students are provided patches of music and they have to study how they work using the tools that are discussed in class. They engage in a parrot assignment which is a powerful platform to do creative things with their own music based on imitation and repeating pieces. From that coupled with work in-class, students explore different aspects of creating and developing music by researching different user platforms and trying different technical programs.

### *Associated intended learning outcomes*

- Students will make music using both creativity and technology
- Students will be more effective in their own work in every dimension

### *Assessment*

- Midterm involves hosting a radio show where they showcase their pieces and talk about it on the CFUV radio show.
- Final exam is a live concert where students perform their musical piece.

### *Findings/recommendations*

- Let students go in their own direction even if you are worried they might go off the cliff.
- It is our job to help them along their learning journey, and it is important to strike a balance between allowing students to flounder and being directive.

### *Important to highlight*

- Allow students to be creative with their research, even if it seems like it is going poorly. They need to try out their own learning journey and experience new trials along the way.

## Overcoming the Challenges of Globally Distributed Software Engineering Groups, One Project at a Time

**Keywords:** global, collaboration, project

**Course title:** Global Software Engineering (SENG421) – Dr. Daniela Damian

**Student description:** Roughly 35-students with fourth-year standing enroll in this course

**Undergraduate research:** experiential learning, team-based learning, remote working, software project, interacting with global colleagues

**Research component:** Students worked in international groups for a common-purpose with every week highlighting a different topic. Students would read papers that highlight techniques in software engineering or different strategies applied, then the groups would analyze their own experiences, and communicate with one another on the impacts. Throughout the course students are working globally on a project, experiencing first-hand the environment and challenges of working in globally distributed settings; the students analyze the challenges they experience in light of existing research, and then read how those challenges are overcome and apply some of those strategies to their actual projects.

### *Associated intended learning outcomes*

- Development of methods for critical analysis of, ethical practice and interaction with a real software problem originated by a client in a different country
- Demonstrate application of best practices in collaborating in multi-cultural, multi-language, cross-national software teams
- Demonstrate effective project management skills such as work allocation, reporting structure, and requirements negotiations in international teams

### *Assessment*

- Criteria set for assessments come from participation activities throughout the course and within the project.
- Students also submit in-class project reports that highlight their reflections on the challenges of working with globally distributed groups and how their group overcame those challenges.

### *Findings/recommendations*

- Keep up with the literature and integrate intended learning outcomes with what the research indicates is relevant to the graduates.
- Attend education venues in the area of research.

### *Important to highlight*

- Providing students with an opportunity to engage in a project in globally distributed settings is a great way to have students experience first-hand what it is like to be a software engineer.

## Finding Their Way Through Social Justice – Connecting Students to the World

**Keywords:** social justice, critical thought, agency

**Course title:** Seminar in Social Justice Studies (SJS400A) – Dr. Moussa Magassa

**Student description:** Capstone course for the social justice program brings together all theory and connects it to practice with 15 students

**Undergraduate research:** reflection, participation and critical thought, project, group presentations

**Research component:** Students are helping society and asking difficult questions when they engage in the research that allows them to showcase transformative social justice and social change. Students engage in discussions around literature, as well as the pitfalls and practices within social justice and then engage in practicing what they have discussed in the real-world. Students are encouraged with reflective exercise and critical engagement in class to practice what they are learning in class, through their numerous projects, and during their research paper.

### *Associated intended learning outcomes*

- Undertake a self-designed conceptual project related to a topic of interest
- Develop, exercise and practice the ability to communicate and act respectfully across linguistic and cultural differences

### *Assessment*

- Students undertake an individual social justice project that they engage in and present to the class.
- There are group research tasks around a social justice topic that students engage with and collaboratively develop to present to the class.

### *Findings/recommendations*

- Create a link between the university and the organization within the community, if possible.
- Be clear with the students from the beginning and be aware of how direct student support needs to be.



*Student feedback*

- “Having research experience is important as it gives you a better understanding of the magnitude of Social Justice issues in the world today.” – Saloni



## Experience Through the Lens of a Broadway Producer

**Keywords:** exploration, research, creative, theatre

**Course title:** The Broadway Producer (THEA338) – Dr. Anthony Vickery

**Student description:** 20-25 third-year students interested in commercial theatre

**Undergraduate research:** budget preparation, investment pitches for musicals

**Research component:** Students actively engage in commercial theatre production and the numerous facets associated with it including but not limited to, the economic principles of creative activities, budgets and productions, pitching investment ideas for designers, talent, directors, and choreographers). Students are initially walked through production budgets and private placement memorandums with the task of creating their own for their own productions that they take ownership of and plan/prepare for.

### *Associated intended learning outcomes*

- When discussing theatre production, the students have the required skills, experience, and knowledge for productions
- Students will successfully organize themselves in different forms (e.g., spreadsheets for budget, private placement memorandums, investment pitches)

### *Assessment*

- Scaffolded assessment throughout the semester with feedback along the way.
- Students aim to break-even on their budget and work on developing a private placement memorandum.

### *Findings/recommendations*

- Go deep into less (e.g., only do a few production budgets or memorandums, but review them in-depth)
- Thoroughly prepare students for the document or research opportunity.

### *Important to highlight*

- It is key to go deep into less. Spend time delving into the depths of a few items versus trying to touch on many items.

## Practicing Canadian Theatre through the Lens of Archival Research

**Keywords:** collaboration, theatre, project

**Course title:** Studies in Canadian Theatre and Drama (THEA414) – Dr. Sasha Kovacs

**Student description:** Primarily fourth-year students, roughly 15-20 students

**Undergraduate research:** archival studies, theatre pitches, discussion and presentation of findings, engaging with sources for Canadian theatre

**Research component:** Students undertake a project that culminates in a presentation that emerges from their research of a currently practicing theatre company and is related to the historical topics of the course using archival and other secondary research materials. The presentation is in a pecha kucha format and students provide peer feedback to one another allowing students to think about the research process in more interesting ways. Students are tasked with identifying, in whatever research project they undertake, what narrative they are emphasizing when they provide and share their work in their presentations.

### *Associated intended learning outcomes*

- Engage with some of the most important sources of Canadian theatre scholarship and history (journals, websites, archives, databases) so that you can become a life-long learner with the capacity to mobilize emergent insights and innovations through your own performance scholarship or production
- Practice using the tools and skills required for the preservation of and research on performance history, so that you have the ability to transform public education about performance made in and produced on the territories commonly referred to as Canada

### *Assessment*

- Students are primarily assessed on their presentation and corresponding reflective piece, as well as on citational rigor and photography credits.
- The focus is on the research process for the students and what they have learned throughout their journey.

### *Findings/recommendations*

- Think about where students can take their research once the course is over.
- Creative practice and activity as research allow students to see how to be a part of that larger community doing work that has never been done before.

*Important to highlight*

- Allowing students to engage in creative projects helps them recognize how to take their research further once the course is over.



## Appendix 2: Research journals students can submit to through UVic

Journal name	Department/unit	UG	Grad
The Albatross	Literary analysis, critical theory, cultural studies	X	
Appeal: Review of Current Law and Law Reform	Law	X	
The Arbutus Review	Interdisciplinary	X	
The Corvette	History	X	
Ecorestoration: RNS Technical Series	Environmental Restoration	X	
Guillements	French, Linguistics, Theatre	X	
On Politics	Political Science	X	
PLVS VLTRA	Hispanic and Italian Studies	X	
Sophia: Undergraduate Journal of Philosophy	Philosophy	X	
ARTiculate	Art History		X
The Graduate History Review	History		X
Illumine	Interdisciplinary		X
Musicological Explorations	Music		X
Peninsula - Journal of Relational Politics	Political Science		X
PlatForum	Anthropology		X
VAMPS: Journal of Absurdity and Horror	Creative Writing		X
Verges - Germanic and Slavic Studies in Review	Germanic and Slavic Studies		X
Working Papers of the Linguistics Circle	Linguistics		X

## Appendix 3: Undergraduate research programs across Canada

### Internal programs and initiatives supporting undergraduate research at Canadian universities

#### *Introduction*

I searched the websites of Canadian universities to determine what internal funding and programs they had available. For each university, I searched the “Research” portion of the website and did a search for the phrase “undergraduate research” (or recherche de premier/1ier cycle) for the whole site.

I excluded NSERC, SHHRC, and other similar funding opportunities. I also excluded many instructors and academic department specific funding and award schemes and prizes.

I did not find any relevant programs, or wasn’t able to access information on relevant programs, on 52 Canadian university websites. I did find relevant information on the websites of approximately 37 institutions (depending on how you count affiliated universities and university systems).

Almost all the programs I found could be divided into two categories: 1) events at which student research is presented and 2) funding for students to conduct or assist with research under the supervision of a faculty member. Almost all the available funding falls into this second category.

In addition to the above, there were programs that promoted student involvement in community research, research prizes awarded to recognize work already complete, or aimed at getting a considerable fraction of the undergraduate population involved in research. However, these programs were much fewer in number.

#### *Research Fairs*

It is worth noting that most if not all of these events seem to have been scheduled for March or April, the conclusion of the fall term, and have either been cancelled, or (in a small minority of cases) moved online. This meant that in some cases, less information about the event was available.

A number of universities organize annual undergraduate fairs, or similar events (conferences, showcases, etc.). These often involve poster sessions and/or student presentations. Eligibility to participate in the fair seems to be aimed at allowing any interested undergraduate to apply to participate, and sometimes to permit those who had recently graduated to apply as well.

Students are invited to apply using class work and/or other research work prepared under the university's auspices. There is often a requirement that the work have received at least a specified minimum grade, and/or that the student get instructors support for their application.

These are more frequently one or two day events, but can sometimes be a week or more.

Some events do seem to offer cash prizes, but I was usually not able to find the amounts. Where I could find the amounts of cash prizes, they were relatively small. The University of Manitoba, for example, awards cash prizes of \$500, \$300, and \$200 to the top finishers in each of five categories in their Undergraduate Research Poster Competition.

### *Research Assistantships, Internships, Grants and Awards*

#### *Structure*

Programs to facilitate undergraduate students to conduct/participate in research under the supervision of a faculty member were by far the most common form of undergraduate research funding I found. In some programs, undergraduate research assistants were to participate in their supervisor's existing project, in others the faculty members were to help the student to devise their own project. Other programs fell somewhere along this continuum, and vary in the extent that the student develops their own research goals, or works under their supervisor's direction and for their supervisor's benefit.

Some programs included the requirement that the student submit a final report, participate in a research showcase, or develop some other plan to disseminate their findings.

#### *Timeframe*

Many of programs I reviewed provided funding to students over the summer between semesters, from (roughly) May to August. Some programs award both funding for full-time research work to be undertaken over the summer, and for part-time research work to be undertaken during the fall and/or winter terms. There were also some programs that did not specify a particular timeframe.

Many programs allowed one application per year per student.

#### *Amounts*

It was common for the amount of funding these internal programs provided match the amount awarded in the NSERC program, with any top-ups that that are usually provided to undergraduate recipients of federal funding. Even absent an undertaking to match the amount

awarded by federal programs, there was often a supervisor or departmental top-up amount included in the overall amount of money the student received.

Amounts awarded usually fell within the \$4000-\$6,500 range, but could be as little as \$1000 or over \$10,000.

Timelines for dispersal of the funds varied, but for larger amounts it was not uncommon for these to be issued on a regular pay schedule, rather than in one or two lump sums.

### *Eligibility Criteria*

The eligibility criteria for internal research funding for undergraduates was often similar to, or identical to, the eligibility criteria for NSERC or SSHRC funding. Some universities had a single application process for all this funding -- applicants could apply once for all funding following the federal guidelines, and be considered for all funding. Some universities made clear that their internal funding was intended for those not eligible for federal funding.

Eligibility criteria commonly included having completed first year course work, being currently enrolled and planning to return to the program in the next academic term/semester, having a minimum GPA, not having held the award more than twice in the past, and not holding an advanced degree or having begun a graduate program

### *Application Processes*

Application processes varied in the amount and type of submissions requested from applicants, and by who was required to apply.

Some universities had student applicants apply on their own (some with instructors/potential supervisor signature/approval), some required student applicants to apply together with their potential supervisors. In the case of joint applications, some were comprised of separate forms to be completed by the student and instructors and submitted individually, some specified that the pair should complete a single form together, and some required the student to complete their portion of the application first, and for the instructors member to complete the application based on the student's submission.

A small minority of universities specified that potential supervisors should complete the application on their own.



Among the universities that required more information, commonly requested parts of the application package included: a description of the project; a description of the student's role in the project and the work to be completed; a timeline of the work to be completed; a proposed budget and justification for the budget, the student's relevant coursework, experience, and achievements, including scholarships and awards.

### *Conclusion*

From the information accessible on their websites, Canadian universities are concentrating their funding efforts in research assistantships, internships and similar programs that allow a small number of undergraduates to work directly with faculty members. Many universities also hold annual events where undergraduates can present completed research.

\*\*Please note there is a corresponding Excel document that highlights the different research programs and initiatives organized by province. If you would like to request access to that, please e-mail Dr. Shailoo Bedi ([Itsidirsas@uvic.ca](mailto:Itsidirsas@uvic.ca)).