PRAXIS, REFLEXIVITY AND IDENTITY: CAREER LEARNING IN THE UNDERGRADUATE CLASSROOM

by

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Abstract

As emerging professionals, students require opportunities to explore aspects of their identity and engage with praxis and phronesis in order to think purposefully about the moral implications of their actions. Biochemistry students learn advanced technical skills that have the potential to change the human and natural world in novel ways, and many of these practices, like gene editing, have unknown long-term consequences. These technical skills are not value neutral, and as emerging professionals, students ought to engage in praxis in order to examine how to act for the greater social good with the skills and knowledge they attain during their degree. Each day in the classroom is an opportunity for praxis where students consider who they are, who they becoming, and how their disciplinary learning informs their professional identity. Praxis combines theoretical and technical understanding with lived experience as a professional and incorporates principled-actions in service of a better world. Phronesis, is a mindset oriented towards the moral and ethical implications of one’s actions as a professional, and it originates from sustained praxis.

This research explores the professional identity third-year biochemistry students developed through strengths-based reflection in a laboratory course. The students in this study submitted a reflection about their experiences and learning associated with Gallup’s StrengthsFinder assessment. Critical discourse analysis was applied to interpret their reflections and to identify influences on the development of professional identity. Each student’s submission provided an example of the narratives student’s internalized from their observations and experiences up until this point in their degree. When analyzed together, broader social narratives emerged that depict the importance of student’s sense of agency as emerging professionals. When students name their strengths, they take power of their role in learning and developing their professional identity. Preparing career ready graduates with praxis as professionals transcends skills and job training. It prepares students to be purposeful in their lives and to act with a sense of what is morally right. For this type of career learning to take place, instructors must make intentional choices to include and prioritize professional development in conjunction with disciplinary-content.
Lay Summary

Biochemistry students learn advanced technical skills that have the potential to change the human and natural world in novel ways, and many of these techniques have unknown consequences. Each day in the classroom presents an opportunity for students to learn how best to apply their skills for their future professional goals as well as the greater social good. To include this kind of learning, students ought to practice critical self-reflection about their strengths and skills. Over time, critical self-reflection can help students to refine their sense of self and begin to investigate the moral and ethical implications of their skills and actions. Many universities with undergraduate programs aspire to prepare graduates for the world of work, but can mistake job search preparation for professional preparation. If universities aspire to prepare professionals, it is important to incorporate critical self-reflection in the classroom where skills and discipline-specific knowledge are gained.
Preface

This thesis is original, unpublished and independent work of the author, Kimberley Rawes. The data reported in Chapters 4–5 was covered by UBC Ethics Certificate number H18-03476. The project was titled “Strengths-based Praxis in a Biochemistry Lab” and the principal investigator was Dr. Kerry Renwick.
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Dedication

For Janet B. Richards. Many years ago, you wrote to me:

Here is a book that will be your very first in your own library. I say your own, because even when you are all grown up and not ‘very young’ you will, I think, enjoy the poems on these pages. One is never alone with a good book. It enriches life and develops the mind and spirit and heart.

I wrote this for you.
Chapter 1: Introduction

Throughout any given work day, I pass by senior students hosting campus tours for prospective students and their families. Families and prospective students visit campus to experience this university and make an informed choice about their post-secondary options. There is a similar theme in the questions that I overhear during different tours. For example, some of the questions I hear sound like: what academic disciplines are available that align with my interests and future goals? I’m not sure if I want to go into journalism or health care, and I want to leave my options open. How much will tuition cost? And housing? Are there scholarships or bursaries available? What kind of campus life and extra-curricular choices are available? For the last four years, I’ve been involved in the sustainability club, student government, and volleyball. What about work on campus opportunities, internships, or co-op? My best friend’s sister told me that it is really important that I get an internship in first or second year. Are there supports for things like tutoring or counselling? Each question signals the kind of experiences that prospective students consider when selecting a post-secondary school. The 2017 CIRP Freshmen Report (Higher Education Research Institute, 2017) stated that 85% of first year university students expected their education would improve their ability to attain a better job at the end of their program. For many students, their choice of school was predicated on the career outcome that their institution and degree propose.

In response to student’s interest in the experiences they build during their degree, universities and career practitioners look to embed career development as a result of experiential learning. A scan of the latest career practitioner conference agenda shows the range of interest in embedding career development in different co-curricular components of the degree experience (CACEE National Conference, 2019). Typically, one to one advising, workshops, events, co-curricular programs, job boards, or online learning are common modes for students to connect with campus career centres. This emphasis on embedding career development within experiential learning serves to expand the places and spaces where students engage in their personal and professional growth (Stirling,
Kerr, Banwell, MacPherson, & Heron, 2016). While experiential learning offers rich opportunities for students to explore their interests, values, strengths, and future goals, the degree experience, and in particular the study of an academic discipline, provides opportunities for students to develop their professional identity. Each day in the classroom is an opportunity for students to consider who they are, who they becoming, and how their disciplinary learning informs their professional identity.

1.1 Research Question

In this research, I explored how third-year biochemistry students developed their professional identity as a result of strengths-based reflection in a laboratory course. To understand professional identity for this group of students, I asked the following questions: How did students describe their strengths? Did they use particular examples, metaphors or symbols? What meaning did they attribute to their strengths? When looking to apply their strengths in the future, what thoughts, choices or actions did students estimate might be different given the conscious application of their strengths? Finally, where were the connections between theory, experience, and critical reflection demonstrated?

1.2 Researcher Positionality

For over ten years, I have worked as Career Educator at a large, research-intensive, university. In this career I have listened to countless stories from students about their previous experiences and future aspirations. Each time someone sat in my office seeking advice about their next steps, I noticed how frequently they knew what they wanted. They did not need a psychological assessment, extensive research into the labour market, or detailed education plans towards a particular credential, although these are useful tools that can inform one’s choice. Students came with their own goals for their future, and these aspirations were largely driven by a purpose unique to each student.
Some of the major career theories attend to the uncertainty, unpredictability, and inevitable change in one’s profession over a lifetime (Bright & Pryor, 2005; Gelatt, 1989; Mitchell, Al Levin, & Krumboltz, 1999). Given that a career is a deeply personal choice, the person and their unique identity is not explicitly addressed by major theoretical frameworks. Instead, environmental factors like economic recession, or family illness, are prioritized over the assets and attributes that individuals, in this case students, bring and develop further over the course of their life. This tension stoked my curiosities and provoked my examination of the variety of adult learning theories that may be applied to enhancing students’ career development during and beyond their degree. In this research, I focused on learning theories that directly addressed professional identity development and provided relevant emphasis for emerging professionals.

Throughout this research, I held a variety of roles: researcher, career practitioner, and instructor. Each of these roles informed various components of this research, as I sought to integrate academic learning with lived experience and professional insight. At times, this created tension where no one perspective was distinct from another. In other instances, this enhanced the degree to which the data could be analyzed and animated. Reading the written reflection assignments from students transported me back into the classroom where Dr. Read and I facilitated in-class activities, or easily reminded me of conversations had with students over the years of advising and workshop facilitation. The years of lived and professional experience invited a nuanced observation and attention when combined with the rigor and theoretical frame of reference of academic research. The addition of a researcher perspective to my professional experience transformed my axiological orientation to my work. As a result of this research, I believe career development is a subject rich in imagination and aspiration, and is illustrated through the stories that we tell, are told about us and others, and that society tells broadly. My intention in this research is to bring a new perspective about the principles of practical wisdom to the field of career development within higher education.
1.3 Research Overview

For the last five years, I have been exploring career learning beyond traditional settings like workshops or one-on-one appointments. Through a partnership with a Biochemistry professor, Dr. Jason Read, we co-facilitated one in-class activity in the first term and a reflective writing assignment in the second term of his third year laboratory methods course. Each year, there are approximately 160 students registered in the course. As part of the course assignments, students practiced their scientific communication and presentation skills twice in this yearlong course. For the first round of practice, students selected a scientific paper on any topic with their laboratory partner and completed the StrengthsFinder Assessment (Lopez & Louis, 2009). They prepared a six-to-eight-minute presentation with their laboratory partner and arrived to class ready to present to a small group of six peers. After receiving peer feedback on their presentations, students reflected on their strengths and shared their insights with their laboratory partner.

In the second semester, students collaborated with their laboratory partner to present a scientific paper based on a theme for the year. Themes range from topics such as diabetes, cancer to neuronal diseases. Once they completed the presentation, each student was assigned a critical reflection journal of approximately 300 words that required them to respond to one of three questions:

i) what impact have they noticed from identifying their strengths in term one;

ii) can they identify two examples where they observed their strengths after our in-class activity; or

iii) what is something they have learned about themselves that could be applied in a future laboratory setting?

This opportunity, like countless others during an undergraduate degree, provided a window for
students to name their strengths and explore their professional identity. To ground my inquiry into professional identity, I applied the theoretical frame of phronesis as defined by Kemmis (2012). Kemmis provided four domains describing professional identity: theoretical perspective, technical perspective, practical perspective, and critical emancipatory perspective. Phronesis is situated in the third domain, practical perspective, where individuals pursue, engage, and sustain praxis over time. Phronesis asks professionals to act with a principled approach in their practice where one is prepared to accept “the irreversibility of our own actions, and the irreversible consequences of our actions” (Kemmis, 2012, p. 154). This irreversibility means that one must balance the uncertainty and unpredictability of any situation with the intention of good and beneficial outcomes for all involved.

For emerging professionals, phronesis is built through praxis sustained over time. Phronesis is not content knowledge or a specific theoretical orientation that can be taught (Kemmis, 2012). Instead, it is a set of behaviours that attends to the principles, morals, or ethical dimensions to do good as a professional, no matter one’s field or discipline. It originates in the praxis of individuals and serves to unite individuals who are also seeking to do address the injustices and oppressive structures that have been constructed and reified over time. Countless advising appointments and workshops have informed my belief that students desire to do good in the world or make change as a result of their professional goals, even when their goals are yet undefined. Without naming phronesis, the search for a meaningful career is often one where students are working towards aspirations that are informed by phronesis.

To examine the layers of meaning and impact that originate from each student’s written assignment, critical discourse methodology (Fairclough, 2011) informed my line of inquiry and interpretation. Each student’s critical reflection assignment provided an example of the narratives students internalized from their observations and experiences up until this point in
their degree. Fairclough’s definition of critical discourse analysis in education highlighted the important constructs of genre, discourse, and style (2011) where the actions, beliefs, and attitudes of each participant are examined. Further to this, the symbols of professional identity were interrogated through this methodology in order to examine the broader social narrative of professionalism. Given the axiological orientation of my theoretical frame, critical discourse analysis supported my investigation of the impact social narratives about the world of work had on individuals, in this case students.

In sum, I have explored how third-year biochemistry students developed their professional identity as a result of strengths-based reflection in a laboratory course. The literature review in chapter two covers the available examples of career learning embedded in coursework and makes a distinction between embedded career learning and career development courses. It investigated the discussion about skills and professional development amongst biochemistry educators, and it included the broader debate in higher education about the role of schools to prepare career-ready graduates. Chapter three, Plan of Inquiry, outlines the methods and methodology applied in this research. The data and analysis in chapter four described the major findings from the inquiry. Significant findings and further areas of research are identified and described as part of the discussion in chapter five. From this analysis, I drew conclusions in chapter six which have implications for students, their families, career practitioners, educators, and higher education administrators. Specific recommendations for each of these audiences can be found in the final chapter.

1.4 Key Terms

To provide clarity throughout this research, the following key terms are defined: professional, professional identity, strengths-based, critical reflection, praxis, phronesis, and career learning. Lesley Scanlon (2011) examined the many histories and dimensions of who is a professional. She acknowledged the unique context of the twenty-first century
where knowledge and service place new demands on workers. A professional is one who works in “knowledge-based service occupations” where post-secondary education is required and there is an “agreed standard of ethical behaviour” (Scanlon, 2011, p. 17). Professional identity originates in how one builds and rebuilds themselves when they learn and critique new knowledge, skills, and practices (Scanlon, 2011). To Scanlon, knowledge and service are inextricably linked for a professional, as is the dynamic nature of the world of work.

**Strengths-based education** has a long history tracing back to Dewey, and takes the philosophical position that there are positive abilities and accomplishments inherent in every learner (Lopez & Louis, 2009). In a contemporary sense, Lopez and Louis (2009) defined strengths-based education with five components: one, measure an individual’s strengths; two, individualize aspects of the learning environment with choice so that students can exercise their strengths; three, network with peers and others who support and affirm one’s strengths; four, deliberately apply one’s strengths in and beyond the classroom; five, intentionally develop strengths through purposefully selecting extracurricular roles, courses, or other degree experiences where one’s strengths can be applied. In the context of this research, strengths-based education applied all five principles at various points in time during the laboratory course.

Caroline Kreber defined **critical reflection** in such a manner that to paraphrase her does injustice to her ideas. She argues for “[r]eflection that shakes the dogmatism of life-practices is known as *critique* or critical reflection” (Kreber, 2013, p. 88). For her, the element of challenge and inquiry, with a tone of subversion to hegemony are central to reflection. She continues with the added dimension where “the knowledge resulting from critical reflection on traditions or structures, and grasping how they have evolved and continue to influence, is emancipation or empowerment” (Kreber, 2013, p. 88). In this research, critical reflection is an inward analysis of thoughts, behaviours, or actions where students investigate and critique the context where they are situated. This investigation aims to fulfill the “dogmatism” that Kreber challenges in her definition.
Praxis, as defined by Kemmis (2012), is the “[d]oing’ action, involving practical reasoning about what is wise, right, and proper to do in a given situation (p. 149). Praxis combines theoretical and technical understanding with lived experience as a professional and incorporates principled-actions in service of a better world. Phronesis, is a mindset that comes from sustained praxis (Kemmis, 2012). It consists of four characteristics: first, curiosity to understand situations may not be what they initially present; second, open-mindedness to see a situation in new ways; third, an openness to new experiences that may transform or shift one’s initial understanding; fourth, commitment to act in service to a greater good and accept responsibility for actions and their consequences. In this research, praxis is the actions to do good for the world that come from principled professionals and phronesis is the mindset or character that comes from sustained praxis.

Finally, career learning is grounded in career construction theory (Savickas, 2006) and work-based learning theory of recontextualization (Evans, Guile, & Harris, 2011). Career construction theory, or Life Design as some practitioners call it, asserts that the narratives individuals ascribe to their previous experiences inform and influence their future vocational actions. Here, career is deeply personal and the layers of meaning and direction evolve throughout one’s life. Career is not solely a role, journey, or path in life. Career is the story we chose to tell ourselves about our previous work experiences and our intended future. When the work-based learning theory of recontextualization from Evans, Guile, and Harris (2011) is incorporated, the student experience in higher education is foregrounded in order to draw connections and reshape learning across experiences. An undergraduate degree is rich in various disciplines, styles of assignments, extra-curricular roles, social circles, and potential skills developed. Students frequently move between “sites of learning” (Evans et al., 2011, p. 9) where they test and apply disciplinary skills to coursework, community projects, or part-time work. Recontextualization prioritizes activities and pedagogies that support re-examining, re-shaping, and re-applying learning across some of these sites of learning. What one learns in a biochemistry lab may also have value and application in student government and vice versa. In this research, career learning
accounts for the stories and meaning students place on their experience, and invites them to recontextualize their experiences throughout their degree and well after they graduate.
Chapter 2: Literature Review

In this chapter, I analyze and synthesize the literature focused on career learning embedded in the classroom. There are a few examples to date where educators have shared examples in their teaching with the academic community as a whole. The instances offered in the literature come from academic disciplines where a professional outcome is synonymous with the title of the program: nursing, surgery, psychology, and veterinary studies. To better understand what is meant by embedded career learning, I examine examples of courses where the sole topic is career development for students. Next, I draw from biochemistry educators and their discussions about skills in their classrooms. From here, I examine the tensions between two agendas: the pursuit of the discipline versus the pursuit of employability. Lastly, I introduce the theoretical framework apply to my research question.

2.1 Career embedded in the classroom

In the following three examples, career learning is identified and its manifestation in the classroom is thoroughly described. The fourth example features career learning as a result of undergraduate research experience, however, I argue that the characteristics and setting are similar and warrant investigation as if the learning transpired in a teaching laboratory.

The first example, takes us to a psychology department in a private liberal arts college in New Jersey where career learning is described as concepts and content students can learn a classroom setting. The authors identify both traditional and non-traditional forms of career learning inherent in the classroom environment (Ciarocco, 2018). Traditional approaches require a discipline-specific course and include assignments that teach students resume and cover letter writing, labour market research, job search skills, and knowledge about how to
select and prepare for graduate school. The authors describe broader professional skills as forms of career learning. This content includes concepts like self-management skills such as time management, adhering to deadlines, following instructions, and group work (Ciarocco, 2018). While this example does illustrate how career development can be framed from a disciplinary lens and embedded into the course selection for students as part of their major, there is still potential for a deeper kind of embedded career learning. Concepts and skills related to job search and graduate school application are practical and necessary for many students, however, the necessary mechanics to surface deeper forms of identity development and meaning making throughout a degree experience are not described in Ciarocco’s courses. The non-traditional approaches suggested by Ciarocco include class presentations about career planning or flexible modules faculty could adopt to augment their courses across the degree (2018). Practically speaking, there are limitations to consider with the non-traditional measures mentioned here. Class presentations can certainly provide some degree of intervention and illustration of career learning, however, they tend to be offered as a substitute to course content and instruction, therefore, students de-prioritize attendance or engagement if there are other pressing assignments or responsibilities. As a result, students disengage, because the material is not relevant to their grades or tasks required to complete the course. In addition, the nature and quality is highly variable depending on the skill of the presenter and attunement to the needs of the students. Finally, available time is scarce in many undergraduate courses due to the volume and variety of concepts possible within a course.

The second example of career learning embedded within the curriculum is described as a series of modules linked to year levels and focused on providing discipline-specific norms for academic success, such as writing with APA style guide, as well as job search skills and graduate school planning (Ciarocco, Dinella, Hatchard, & Valosin, 2016). While this does begin
to align career development as a topic within the discipline, it does not describe the career
learning that comes from reframing discussions with peers, enhancing skills as part of an
assignment, or receiving feedback from a professor.

Halonen and Dunn (2018) identify upper-level courses as ideal for career-embedded
learning and present a multitude of potential ways for surfacing career learning in the third
example at two institutions: a mid-sized public school in Florida and another small private
liberal arts college in Pennsylvania. Three strategies illuminate the skills and career potential for
students: pedagogical approaches such as problem-based learning, reflective writing, or peer
feedback; high impact practices (Kuh, 2008) with a disciplinary lens; and capstone courses
where an external assessor like an employer or alumni provides feedback on course
assignments. These are rich examples of the career learning embedded within a discipline.
When students undertake assignments that facilitate practice and praxis, they are invited to
draw connections between their emerging professional identity and disciplinary knowledge.
They also benefit from practice in settings that mimic the environment of the world of work and
help to diminish the difference students feel between the academy and what is so often called
‘the real world’.

All three of these examples are situated in psychology programs at different institutions
in the United States. There is something somewhat predictable about career development
topics nesting within this discipline, and I will explain that coincidence more when I examine
career development courses.

This next example of career learning embedded in the degree experience comes from
science students at a public research-intensive university. The authors assert that students
become scientists as a result of undergraduate laboratory research, and these additional
opportunities provide structured learning for students to participate in a community of practice
with faculty and peers (Hunter, Laursen, & Seymour, 2007). They distinguish undergraduate research from teaching laboratories, however, there are many similar characteristics between both that deserve comparison from a pedagogical perspective. After interviewing and assessing materials from 367 participants, Hunter, Laursen and Seymour (2007) conclude that undergraduate research facilitates a kind of learning for students that can be described by both students and faculty supervisors. Their findings are theoretically-sound and poetically simple: students master concepts, confidence, and competence as scientists through practice, feedback, and mentorship from faculty. Their identity forms in relationship both to the work they perform and the individuals they work with in the laboratory. The authors distinguish the learning during additional research experiences from teaching laboratories based on criteria that I would argue resembles the same characteristics as declaring a major field of study. To participate, students compete in an application process. Once accepted, they are assigned open-ended topics by supervisors, perform tasks commensurate with their level of knowledge and skill as determined by their faculty supervisor, and meet weekly for feedback. Additional opportunities like seminars, field trips, or other professional development are offered outside the laboratory (Hunter et al., 2007). While these experiences are limited in number and considered exclusive by many students, the criteria and vetting to declare a field of study is often similar. Many departments limit participation in their majors programs on the basis of academic performance, intentionally scaffold content and concepts to the year level of the intended audience, and provide feedback through assignments and weekly class participation. Where teaching laboratories differ from undergraduate research experience is fully within the discretion of professors and administrators. In order for many students to complete courses successfully and advance through their degree, laboratory courses are taught in a fail-safe manner that ensures most experiments, if followed like a recipe, will yield consistent results.
This mechanistic approach to learning relegates science to content and concepts that students memorize and retain rather than learn and apply. In a simple way, it lowers the required engagement for many students and reduces the practical and applied nature of laboratory learning. However, if teaching laboratories were resourced with staff and time commensurate with the number of students expected in the course, it would be possible to provide laboratory experience that is more reflective of an undergraduate research project as described by Hunter, Laursen, and Seymour (2007).

In all of these examples, the classroom is full of career learning if a faculty member wishes to highlight it. The construction of a course is a particular setting and that environment can be staged to mirror the world of work in a myriad of forms. This mirroring helps to familiarize students with the world of work and facilitate the connections they may draw between themselves and their discipline. There is no one setting that most mirrors the entire world of work, and therefore, any classroom environment can illuminate a student’s emerging professional identity development. If left unattended, career learning can go largely unnoticed for students.

2.2 Career development courses

There are a number of examples in the literature where career development is not embedded in a particular course or across a degree, but instead, it is the subject of a course on its own. It is important to describe these career development courses so that a distinction can be made between examples where career is embedded in the classroom. Folsom and Reardon (2003) provide an overview of career development courses from 1971 – 2001. In their comparison, they find that many courses rely on an instrument or assessment to help with self-knowledge or decision making. Some courses set out with a pragmatic goal. For students to
graduate with a credential at the institution, they must be retained to complete their studies. As a result, some career development courses intend to improve student retention, improve career clarity, or support job search skills (Folsom & Reardon, 2003). Courses vary in length, focus, format, and theoretical approach. They also vary in role of faculty member. Some courses are taught in a discipline-specific format while others are taught by staff or faculty associated with the campus career centre. In another overview of career courses, this time specifically for psychology students, Landrum (2015) finds similar conclusions to Folsom and Reardon. Landrum speaks to faculty members who are considering starting a career development course and attends to the history, evidence, and various strategies used to ensure students can make career choices, effectively search for jobs, and attain employment after graduation. He concludes his review with the assertion that faculty members and departments, and not campus career centres, are responsible for communicating job opportunities within their discipline and the merits of an education in that field. Landrum declares, “simply put, if psychology educators cannot tell a convincing, evidence-based story about the beneficial effects of an undergraduate psychology education to students, faculty, parents, citizens, employers, and accrediting agencies, then who will?” (2015, p. 12).

The psychology field is at interesting nexus here that Landrum fails to acknowledge. While forming evidence-based arguments is not a skill reserved for any one discipline, the field he is describing is both inter- and trans-disciplinary. The study of career development is often organized as a topic within psychology. The world of work intersects with nearly every field, and some disciplines are solely focused on the world of work – such as Organizational Behaviour or Management. This paradigmatic challenge often situates career as “everyone’s job” and “no one’s job” at the same time. This may be one reason why career development courses focus on job search skills and the tangible outcomes like attaining employment while
more qualitative measures about the sustainability of employment or purposeful career planning remain at the progressive edge of what is possible.

Another perspective comes from a career coach and college educator. Austin (2011) surveyed thirty people evenly divided amongst students, campus career counsellors, and hiring managers, and inquired about career preparation and readiness as a result of career courses in his dissertation. As a result of his findings, he argues for a mandatory system of career courses across the academic experience that would “elevate career development to parity with other academic disciplines” (p. 95) ensuring that graduates are ready to market themselves to potential employers upon collecting their parchments. However, his definition of career learning and courses is limited to job search skills excluding dimensions of meaning making and identity development in favour of concepts like branding where sales tactics and financial gains are the measures of success. Austin remarks that “by training students to monetize their education” (2011, p. 98), institutions will benefit from stronger alumni and donor giving that results in less work for that department. He also links graduate employability to the brand of a school, suggesting that career development courses that teach job search strategies will enhance the reputation and marketability of a school. This dissertation reads like a dog-whistle for capitalism and the neoliberal agenda in education. For many students, financial stability is the bottom rung on Maslow’s hierarchy of needs: a necessary component, but not the top of the pyramid. There is so much more to career development than job search, marketing skills, and selling the brand reputation of a student. Focusing and bounding students career learning to these topics is morally reckless and short-sighted. I do not want to diminish its importance, especially for students at or below the poverty line who are using education as a means to a positive economic future. However, our institutions have bigger social responsibilities that Austin ignores by presenting capital and financial prosperity as a value-neutral accomplishment.
There are three examples of career courses that are worth discussing as they come from disciplines adjacent to biochemistry. The first example illustrates career development focused on principles of professionalism for future surgeons. The second takes a different approach by emphasizing career resilience in future nurses. The third example is not discipline specific and provides a sterling example of the power narrativity and constructed knowledge for career development. In 2012, a small class was the site of a pilot project with the goal to imbue medical students and future physicians or surgeons with the necessary principles of professionalism (Hultman et al., 2012). The course was not mandatory, totaled four-hours spread over one hour sessions, and had no impact on students’ final grades. Content was divided into four areas: thinking, acting, functioning, and becoming a professional and delivered through readings, discussions, journal clubs, and other traditional academic approaches. As a result, students could “define professionalism, identify attributes of the professional, understand the importance of professionalism, and integrate these concepts into practice” (p. 221). There appeared to be little room for their own experience to be addressed in the course until assessment came in the form of a multiple-choice survey. Students reported a greater desire for mentorship, modeling, and personal experience to better understand professionalism in final feedback to instructors. The course, as the authors described it, lacked substantial room for the students to move beyond debating concepts of professionalism to unpacking their own positionality and interpretations of professional praxis. This could be in part because of the emphasis on clinical practice throughout medical school, and an assumption that practicum placements provide career learning in addition to hands-on experience. However, the authors make no note or gesture to such belief.

Faculty at a Canadian nursing school began implementing career development into the curriculum with the hope of building career resiliency and extending the average five-year
professional life of nursing graduates (Waddell et al., 2015). The authors intended to foster “the capacity of students and graduates to survive and thrive at all stages of the career continuum” (p. 171). The course content comprised eighteen hours spread out over nine separate three hour workshops and hosted at the beginning of each term. Activities included visualizations of student’s ideal career or day, asset-based personal reflection, and goal setting to encourage action. The greatest impact reported by students came from self-assessment, career planning, and career decision making. Students reported higher levels of confidence after participating in the course (Waddell et al., 2015). What is unclear from this article is the detail for each activity and a more qualitative description of the personal insight students gained as a result of their confidence.

The final example of career development courses truly encompasses the depth and complexity of career development. The current context of labour market demands adaptability and optimism in the face of uncertainty, and in response, students need to be equipped with the ability to construct their own career and future (Grier-Reed & Conkel-Ziebell, 2009). Over the course of one semester, three modules invite students to explore and develop their career while learning strategies they can continue to apply after the course concludes. In the first module, students explore their identity through dimensions of race, class, gender, religion or spirituality, ability, and other traits. Using reflective frameworks, narrative inquiry, and career instruments provide a rich foundation for the remainder of the course to build. In the second module, students articulate future goals, obstacles, and strategies to overcome obstacles through visualizations and activities like lifelines or fictional-obituaries.

By the third module, students plan for experience, take steps to attain experience, and align their choices with what the learned about themselves. Here, traditional job search skills are taught including resume writing skills. In addition, a final presentation, portfolio, and final
paper integrate learning across all three modules. This course demonstrates a constructivist and narrative approach to career that transcends job search skills or a reliance on assessment instruments. Instead, students author and interrogate their own stories in a manner that encourages capacity and self-efficacy. Students attend to their deeper held beliefs and assumptions about career through the activities in module two. The activities in module three can augment and actualize the sense of purpose and identity students develop in the two proceeding modules. There are few, if any, other examples of a course so intentionally woven together that is grounded by career construction theories in such a thorough manner. This course truly is an example of what is possible when a talented educator applies theory to practice in all domains course design.

Often, career development courses reduce career learning to self-exploration and job search skills. They emphasize tools like resumes, interviews, and career-research that many students could learn in any setting. Many rely on instruments that intend to help students gain self-knowledge and career clarity but rarely encourage a student’s authorship or agency over their own life story. Literature about nuanced career development theories, critical reflection, and active engagement in life design is plentiful. However, there is only one example of this work woven together in a course for undergraduate students. As a Career Advisor, this signals for me the need for aspiration and imagination when it comes to course design for career development topics. The topic of life, who we are becoming and what we want to contribute to the world, is riddled with possibility if we dare to surface it.

**2.3 Biochemistry skills**

The American Society for Biochemistry and Molecular Biology (ASBMB), the American Chemical Society, and International Union of Biochemistry and Molecular Biology convened
educators from these disciplines to map and report on the skills students gained during their degree (Caldwell, Rohlman, & Benore-Parsons, 2004). As a result of these efforts, it has become easier for colleagues across institutions to examine, assess, and reflect on the technical skills, or bench-skills, developed through their academic programs and make any further inquiries into the educational experience of students. There are a vast array of techniques and theories students could learn and each institution must account for its context such as departmental strengths, local economies, and student population when crafting the goals and objectives for a program. The skills matrix created by Caldwell, Rohlman and Benore-Parsons (2004) assists departments in evaluating their programs against a coordinated and collective inventory representative of the discipline as a whole, rather than the specializations of its individual faculty members.

Broadly speaking, students learn how to analyze raw data and academic literature; apply appropriate models and theories to determine error or meaning when provided with a data set; create, design, and test an experiment; analyze strengths and weaknesses in a procedure, theory, or abstract concept; and communicate results verbally and visually (Caldwell et al., 2004). These skills, along with the foundational techniques and concepts are taught in a laboratory setting where practice and apprenticeship underscore the classroom experience. In addition to these skills, there are common pedagogical approaches that encourage these professional skills. Independent research (Hunter et al., 2007), capstone courses (Aguanno, Mertz, Martin, & Bell, 2015), problem-based learning (Silva & Galembeck, 2017), process-oriented goal inquiry learning (Loertscher, 2009) transcend traditional laboratory instruction and offer rich learning for students. They demand more from students than their ability to read and follow instructions. They also emphasize iteration and collaboration to
develop and deepen learning. Students are ushered to repeat cycles of learning where they prepare, try, and refine their understanding of concepts or techniques.

Some would argue that undergraduate biochemistry curricula emphasizes technical knowledge and assumes that transferrable skills are learned implicitly throughout the process of conducting experiments (White, Benore, Sumter, Caldwell, & Bell, 2013), thus they do not merit explicit instruction. However, the laboratory setting is ripe with potential for students to practice a range of skills in gradual ways over the duration of the semester through planning, performing and interpreting experiments. Inquiry-based pedagogies support students to iterate their skills over time in a course, and with feedback students developed greater ability to make decisions about their experiments like selecting reagents, instruments, and reporting.

The authors for all of these papers neglect the broader discussion of career prospects as a result of a biochemistry degree. Schuster (2009) writes a brief opinion paper on a disappointment that I have heard many times in conversation with faculty members. Students are largely unfamiliar with what career options are open to them as a result of their discipline-specific training. Common professions like physician, lawyer or academic researcher may be named by some students, however, the breadth and depth of possibilities is often not apparent to students or parents. There is the opportunity with different theoretical grounding to take students deeper and recontextualize their analytical skills inward. Could career be an experiment that students practice and try over time? If so, what would happen to their choice of extra-curricular activities or engagement in the classroom with that approach? How? What are the strengths or challenges from that approach? Where might it align with other internal qualities like strengths, values, culture, or external variables like race or socio-economic class? Biochemistry students undoubtedly develop a high degree of analytical skills that could be
mobilized inward for critical reflection provided that the appropriate scaffolding and relevance to course material is illustrated.

### 2.4 Academics vs. employability

The debate between academics for knowledge and/or employability populates the pages of *The Chronicle of Higher Education* (Blumenstyk, 2019; Buurma & Heffernan, 2018; Churchill & Brown, 2011; Field, 2018) and seeps into other sector-specific outlets such as *Inside Higher Education* (Aoun, 2015; Flaherty, 2019). The questions evolve in a series of steps backward to clarify issue such as what are universities doing to prepare career-ready graduates? What role ought universities take in preparing career-ready graduates? What is meant by career-ready graduates? Academic learning and employable-skills are first pitted against each other as distractions from the other. Yet, thought leaders like the American Association of Colleges and Universities attempt to reframe the debate and reconceptualise the false-dichotomy of learning and career-readiness (Schneider, 2015). There are countless more reports to name (Career-Ready Education, 2019; Gallup, 2014) intended to inform administrators and policy-makers about the strategic potential for universities to adopt or advance certain agendas. So what does that mean for the classroom or laboratory?

A query in peer-reviewed journals for “employability” yields authors writing largely out of the United Kingdom setting. Cox and King (2006) assert that students, schools, and employers benefit from more employable graduates. Students gain employment after graduation and speak positively about their education and its merits. Schools are then represented as the genesis of that success for students and prospective applicants see the value of the education, possibly driving up applications. Schools then select stronger and stronger applicants to educate and provide to employers who also speak highly of the caliber and quality of
employees as a result of a particular program. Fallows and Steven (2000), similarly suggest that students pursuing degrees must learn general employable skills like communication and critical thinking skills as well as an ethos of pursuing life-long learning so that they can adapt and grow with the evolving labour market. Pool and Sewell (2007) propose a model for higher education institutions to adopt when pursuing employability in the curriculum. The model aims to convene faculty and staff in communicating clearly and consistently what the university defines employability as and how the institution prepares students for the world of work.

However, many of these authors are not critical of their own assertions. A notable omission from the discussion is the implications around employer influence on curriculum. Instead, the authors focus on creating clarity and completion of the degree process for students as a result of their approaches. This simplification leaves open the potential for transformation or deeper growth in pursuit of a degree. Speight, Lackovic and Cooker (2013) take us to the University of Nottingham and focus attention on this very debate as administrators and faculty attempt to embed employability into the curriculum. Through interviews with faculty, administrators, students and employers, the authors found that “employability” was understood “in an instrumental way” (p. 123) that led to tensions and discrepancies about the role of higher education. The authors assert that until “employability” is unpacked and redefined with a more sustainable and holistic view, it will continue to create tension in the academy. Instead, employability can be conceptualized as capability for students, as this invites integration and alignment between discipline knowledge and skills applied in the world of work (Speight, Lackovic, & Cooker, 2013). In this piece, and in others, the debate about the role of the academy to prepare career-ready graduates appears to land on a middle ground where students learn skills as a result of their schooling. However, these
skills are not neutral and the influence employers have over academics varies greatly by institution.

2.5 Implications

The classroom is a setting ripe with career learning. The skills and potential for professional learning and growth in the classroom are inextricably linked to the skills and attitudes of being an engaged and active learner. However, there are few examples of this work represented in the literature. Instead, the examples of career development courses, of which there are plenty, portray an instrumental approach that prioritizes content about job search skills rather than applying the ample literature available in domains like critical reflection, active engagement, or current career development theories. These courses are another site of possible improvement for universities, as the topic of career and professional identity invites potential and purpose. With respect to biochemistry students in particular, their disciplinary learning opens up possibility in teaching laboratories and in research experiences where students can critically reflect on their professional identity. Again, this learning is only surfaced when it is prioritized and described explicitly by the faculty member through assignments, mentorship with graduate students, feedback in work product, and through additional professional development like guest lectures. Meanwhile, the university environment as a whole is debating its role in supporting and developing students for either academic or other futures. With this in mind, I begin to wonder what would happen if career learning was supported and scaffolded across a degree experience. Could universities help students to “become” professionals and contributing citizens as a result of their degree? This research intends to investigate an example that will provide insight to that very question.
Career learning extends beyond the setting of a resume workshop or one-on-one advising appointment. The pursuit of a degree is a portion of time towards a person’s career that creates a multitude of rich learning moments from the people, places, and positions that students explore. By reframing career as a story layered with interpretation, rather than a role, and investigating one opportunity for identity development in an unlikely setting, I hope to understand how third-year biochemistry students developed their professional identity as a result of strengths-based reflection in a laboratory course.

To do this, I will draw from the work of Stephen Kemmis and his interpretation of phronesis. On the surface, phronesis is a set of actions to do good as a professional in the world cultivated by the mindsets of curiosity, engagement, and lifelong learning (Kemmis, 2012). In a more nuanced way, phronesis flows from praxis when individuals pursue, engage and sustain critical reflection over time. It accounts for how and who we become as professionals when we situate ourselves along the following perspectives: theoretical, technical, practical, and critical emancipatory. Theoretical and technical might be the most familiar to many – what does one know to be true and what can one do or produce with that knowledge. For so many science students, the theoretical knowledge is the basis for much of their undergraduate degree. Depending on their program and individual aspirations towards research, students may develop more technical skills beyond the fail-safe environment of teaching laboratories.

Practical and critical emancipatory perspectives stretch professionals in who and how they operate beyond mastery of their discipline (Kemmis, 2012). The practical perspective activates one to discern and connect what one knows to be true with what one knows to be just. Phronesis is a principled approach to being and becoming a professional that invites a purposeful ethos where one considers both their actions as well as the social, economic, and
political influences broadly at play. Phronesis is not content knowledge; it cannot be taught because it is not a concept or thing to know (Kemmis, 2012). It can be developed over time through experience and praxis because it is about one’s moral character. Many of our beliefs and values are informed by our experiences and the manner in which we engage and negotiate those experiences over time. So how does a university classroom teach the unteachable? You create the mindsets and habits and conditions for students to pursue this avenue of intentional and purposeful action. The site of this research, a third-year biochemistry methods course, created both the conditions and the habits for students to explore their emerging professional identity. For students in Dr. Read’s BIOC 301 class, the strengths-based critical reflection activities in term one and term two emphasized praxis as a skill the warrants practice and a habit that can lead to deeper professional learning. The intended value of the exercise is in the act of praxis, not students’ retention of their Top 5 strengths as dictated by Gallup. For Kemmis (2012), phronesis can only be encouraged and developed through sustained praxis, and it is up to the individual professional to incorporate it throughout their career. Phronesis cannot be taught, but can be cultivated under specific conditions. Namely, a desire and aspiration to act prudently, courageously and wisely. Furthermore, it requires that an individual face uncertainty, act to the best of their abilities, and to learn from that experience over time. In Kemmis’s (2012) words, “We arrive at knowledge and understandings borne of experience, but experience also teaches us the limits of what we know, of what we have learned” (p. 158). We become purposeful in who we are and the work that we do. We accept responsibility for our actions and their consequences – even when unintended or beyond our control. For emerging biochemists, it is increasingly important that students learn the ethical and moral implications of the latest gene-editing technique, as societies begin to explore new methods for human-control of the natural world.
Since publication in 2012, researchers continue to build on Kemmis’s notion of phronesis and identify the sweeping impact it can have on individuals, systems of schooling, and world challenges. To date, many of the advances to his premise put the humanity of our students, classroom spaces, and institutions as unalienable principles when addressing contemporary challenges. Phronesis reminds us that teaching is not purely about technical proficiency, but one where values and beliefs form a moral compass that guides one’s actions. This moral compass points to a direction of education that reflects humanistic beliefs for all parties involved – teachers, students, administrators, and beyond. This direction, one where the wholeness of a person and the who-ness of that individual, is incorporated across disciplines and into each layer of learning: physiotherapy students (Patton, 2016), social entrepreneurship students (Zhu, Rooney, & Phillips, 2016), business ethics courses (W. P. Jarvis & Logue, 2016), professional development for teachers (Aspland & Macpherson, 2012), PhD candidates participating in a supervision group (Jankelson, 2013), and scholarship of teaching and learning (Kreber, 2014). The development of phronesis is an imperative for students and professionals. It centres learning around the humanity of each scholar rather than preferencing knowledge as content to be retained unquestioningly and unproblematically. It invites the affective and cognitive domains to entangle and engage for the individual, as well as centering the learner as an active agent in pursuit of their goals. Career learning and one’s professional identity is inherently a question of agency and aspiration as students begin to interrogate who they are and who they intend to become.

When applied at a broader level, phronesis can be used to critique, assess, and advance the governing systems and structures administering schools (Aspfors, 2012; Mahon, 2014; Thwaites, 2013). Kathleen Mahon (2014) argues that praxis is an imperative for students and faculty, as it ensures that the university community reflects on the structures and systems
which may otherwise go without interrogation and fall to the influence of neoliberalism.

Paradoxically, praxis can serve to dismantle and reorient the university towards sustainable practices (2014). Trevor Thwaites uses phronesis to frame his argument that education is more than measuring skills like functional literacy or numeracy, and teachers, as professionals, are “capable of making decisions and knowing what counts as suitable curricula for their students, teachers capable of making critical and informed judgements and evaluations” (Thwaites, 2013, p. 208). Praxis is an opportunity for the individuals working within education to create, enforce, and adapt the policies and strategies that govern the operations of teaching and learning. Appraising and adjusting these systems is not a value-neutral act, and praxis that incorporates phronesis serves to guide professionals and systems towards a moral good. Prioritizing career learning, and the moral direction of that priority, is dependent on the individuals leading and influencing education systems from positions of institutional authorities, governments, and industry sectors. Thus, the institutional strategies towards career learning reflect a broader narrative of work and professional identities that students see modeled explicitly.

Finally, phronesis can mobilize professionals across disciplines towards global issues. Environmental leadership, and the various epistemological orientations to that notion, serve as one example where phronesis unites wisdoms from various contexts towards a single goal: for example, climate action (Edwards, Biloslavo, Kwaymullina, & Kwaymullina, 2013). Phronesis allows us to draw connections across disciplinary lines to tackle large social issues using diverse knowledges and skills to solve a common problem for a better good. This would be Kemmis’ (2012) example of professionals take a moral stand in their work. “We not only want good professional practitioners, we want practitioners who will do good” (Kemmis, 2012, p. 148). Phronesis is born out of a desire and aspiration for the greater good in professional
education, work and experience. Thus, professional identity through praxis is a broadening of academic experience beyond merely the acquisition of content knowledge.

The latest advances in biochemistry and molecular biology techniques are raising ethical questions about how much we can alter life as we know it. Universities training students in these techniques at all levels have a moral responsibility to ensure that graduates can act justly in an evolving world. Yet this goal, as aspirational as it is, requires tangible interventions and intentional activities for students to learn and grow. Dr. Read sometimes reminds me that biochemistry is a discipline firmly rooted in the objective and observable universe where the focus is molecular biological processes that enable and life. Critical reflection is not a bench-skill. The white coat, goggles, and pipettes used day in and day out are concrete tools to examine the precise and replicable processes of a cell in its pursuit of life. Week after week, students practice how to develop cultures of bacteria, pipette solutions, and examine DNA. However, it is that understanding of complex systems and focused observation that, when turned inward, uncovers a myriad of motivations and internalized narratives as complex as a biochemistry itself. The inner world students can explore through critical reflection uncovers the deep structures of school, work, and life. The training of analysis and observation from previous protocols becomes essential because reflexivity demands analysis between the concrete, the theoretical, and future possibilities.

Critical reflection and the inward analysis and observation students activate when approaching an assignment of this nature might be a departure from the protocols and expectations of laboratory methods. However, the shift in analysis and observation is significant because of where the power and authority rests and not because the skill is applied in a new or different setting. Unlike a laboratory where the schema of the discipline is set by established experts and rigorous peer review, the student is the authority and expert on themselves. The
analysis and meaning making cannot be checked against a standard expected result with neatly defined parameters outlined by a standard operating procedure. Instead, the results are left to far more complicated, sometimes competing, expectations where peers, parents, societal, cultural, and economic expectations intermingle.

Given my professional experience as a career advisor, an educator alongside the professor in this course, my role as an educator is impacted directly by own ability to learn and reflect alongside my students. As a result, my praxis is an element in this research, and I am therefore evident in the narrative that is presented in this thesis.
Chapter 3: Plan of Inquiry

The room hums with chatter and fits of gentle clapping signal each small group progressing through individual practice presentations. Every now and again you can catch a word or phrase like “RNA transcription” or “protein denatures”. After a brief break, laboratory partners return to their seats and debrief the practice. Giggles fill the room as questions fly through the air. How did that go? What needs to change next time? How can they earn even two-percent more next semester? As the discussion lulls, I step in and guide the group through a series of activities that shift the analysis from their presentation skills to their personal strengths.

For the last five years, Dr. Jason Read and I co-facilitated one in-class activity in the first term and a critical reflective writing assignment in the second term as part of his third year laboratory methods course. Typically, students wore lab coats and goggles to apply their theoretical knowledge into specific skills used in the laboratory. However, these activities invited a new combination of investigation and interrogation for students alongside their technical learning. As a career advisor, I noticed that the greatest amount of career learning was happening outside the typical workshop or advising services hosted by the campus career centre. Instead, students in those workshops talked about their observations and conclusions from their experience as a volunteer, student leader, summer or co-op employee, or learner in a major course project. With that in mind, I set out to explore how students developed their professional identity through strengths-based critical reflection in a biochemistry laboratory methods course. In this chapter, I describe who these students are, how they were selected for this research, and how the data was generated. Next, I introduce the methodology that
guided my line of inquiry and illustrate its fit with the audience and research goals. Finally, I outline of the steps I took to process the data given my theoretical frame.

This study analyzed the individual reflective writing from students in Dr. Read’s biochemistry class. To be considered as a participant for this project, individuals met the following criteria: attended the University of British Columbia, completed BIOC 301 taught by Dr. Read, completed the reflection assignment scheduled in Term Two, and provided consent to release their reflective writing assignment. Each year, the class is composed of between 140 to 160 students. A majority of students declared their major in biochemistry while others selected this laboratory methods course as an elective. This smaller portion of students in BIOC 301 are studying similar life sciences disciplines such as pharmacology, physiology, or integrated sciences. The institutional demographics of this class are somewhat homogenous: third or fourth year undergraduates majoring in a life science discipline. From an institutional perspective, the university tracks how many students are Canadian citizens, permanent residents, or international students. BIOC 301 is representative of the campus average composition of domestic and international students.

These cursory categories tell a kind of story, but the individuals in the room prove difficult to sort into neat categories. Generally speaking, there are students who are the first in their family to attend post-secondary school, from historically marginalized communities, financially privileged, managing mental illness or medical conditions, or separated from their families and the support they offer. Their unique circumstances and individual motivations for selecting this discipline or course vary. As distinct as this group might be, it is also representative of the diversity and homogeneity on countless university campuses. Who they are and who they are becoming is central to this research question, yet, these social categories reveal little about the intersectionality of each person’s identity and what that identity means for
each student. To understand who each student is, I relied on their reflective writing and their own words to signal how they conceptualize their strengths and situate themselves in their discipline. The use of “I” statements in each of the assignments indicates the perceptions and interpretations about themselves and the world around each participant. When woven together, the data begins to narrate a relatable experience of career learning and professional identity development that transcends the individual participants and can be generalized to others with similar positionality. With this context in mind, it is important to also understand the activities leading up to the reflective writing assignment.

3.1 Biochemistry 301

While developing necessary bench-skills, students practiced their scientific communication and presentation skills twice in this yearlong course. For the first round of practice, students selected a scientific paper on any topic with their laboratory partner and completed the StrengthsFinder Assessment (Lopez & Louis, 2009). They prepared a six-to-eight-minute presentation with their laboratory partner and came to class ready to present to a small group of six peers. When the presentations are completed, students are invited to reflect on the results of the StrengthsFinder assessment. To do this, students determined which descriptors resonated with them and articulate those strengths in their own language. Then, students are prompted to consider how each strength has positive and challenging impact on their academic tasks and responsibilities. The independent reflection concluded with a prompt where students identified an example that demonstrates a particular strength in their Top 5 results. Once the independent reflection has been fulfilled, students debrief their reflections with their laboratory partner: what strengths do they see in themselves? How do they describe that strength? And how might they use their strengths to prepare for the presentation in the second
term? The discussion concludes a three-hour laboratory class with comments from the group about what was easy, challenging, and meaningful about practice presentations and identifying their strengths. Students are reminded that the emphasis for the assignment is on practicing two skills: presentation and critical reflection. Any debate about the validity of the *StrengthsFinder* tool and the accuracy of the results is gently coaxed into a discussion that to disagree with your personal results still requires reflection and answering questions, ok, if not – why not? What do you see instead? and the purpose of the activity remains intact. Students are reminded that their analytical and observation skills here serve them best when they are specific, succinct, and provide meaning to their interpretation, as each person will draw a variety of unintended conclusions. In the last ten minutes of class, students return to the lab where they pick up their bacterial cultures that have been growing since the previous week. In the second term, they will retrieve the DNA from these cells and continue developing their technical skills.

For the remainder of the academic term, students continued work in the laboratory and prepared for a December exam. Midway through the second term, students prepared for their second presentation. This presentation was graded based on their performance and students are required to select a paper within a broad topic such as diabetes, cancer, and neuronal disease. In the week following the second presentation assignment, each student is asked to write 300 words in response to one of three questions:

1. What impact have they noticed from identifying their strengths in term one;
2. Can they identify two examples where they observed their strengths after our in-class activity; or
3. What is something they have learned about themselves that could be applied in a future laboratory setting?
This activity provides an opportunity for students to reflect and examine their future aspirations and the meaning they ascribe to those beliefs if given the time and encouragement.

### 3.2 Methodology

As a frame of inquiry in this project, I was influenced by critical discourse analysis because of its emphasis on a close reading of the text to indicate personal interpretations that signal broader discourses and social ideologies (Fairclough, 2011). Each reflection on learning revealed a student’s narrative about what they are internalizing about what they have observed, heard, and experienced (Fairclough, 2011) to this point in their degree. Critical discourse analysis, as described by Fairclough, relies on three key constructs: genre, discourse, and style (2011). Genre is observed in the actions individuals take – what do they say or write? Discourse is observed in the beliefs, ideas, or attitudes, which are conveyed implicitly through our word choice – how is it said?; and lastly, style is observed in the signals or symbols we embody that reify our beliefs and behaviours. Each participant in this project brought their own unique perspective to their understanding of strengths and the naming of those properties is rich in meaning and layered with context. This research collected and analyzed a single assignment of critical reflective writing from a seemingly homogenous group - third-year biochemistry majors – and the nuances in what each participant’s writing signaled their individual identities and social positioning. When data saturation was reached, the broader discourse of professional identity for students came into focus. Finally, the narratives about the world of work were foregrounded, and I probed for the symbols that embody professionalism and serve to enforce the beliefs and behaviours for biochemistry students.
In particular, this research explored what students included in their reflective writing assignments and how is this used to interpret the student’s stories of their experiences in the field of biochemistry. To facilitate this exploration attention is given to:

1. How do students describe their strengths?
2. What examples do students use to demonstrate self-awareness?
3. Which symbols or metaphors or icons are present in the examples?
4. When students consider their strengths, do they emphasize the Gallup-produced definitions or have they ascribed their own definitions and interpretations?
5. When looking to apply their strengths in the future, what thoughts, choices or actions do students anticipate might be different with conscious application of their strengths?
6. Where are the connections between theory, experience, and critical reflection demonstrated?

Applying critical discourse analysis methodologies to this line of inquiry invited two sets of causal connections to surface in the professional identity of undergraduate students: the social structures and practices students have been immersed in as part of their studies, and the agency each individual exercises as part of their engagement in their studies (Fairclough, 2011). They described instances and examples that are both products of their environment and within their own sphere of control to influence and negotiate. Critical discourse analysis revealed the context of each student while also illuminating the nuances of broader social norms in part due to the sample size and variation within this homogenous group.

Like any methodology, critical discourse analysis has limitations to address. One of the main limitations also comes from its best strength. As critical discourse analysis highlights the contours of understanding, social norms, and layers of meaning ascribed to language, this methodology cannot reveal an objective narrative or absolute conclusion. Rather, it can reveal
the researcher’s perspectives and interpretations on what students shared (Mogashoa, 2014). As a researcher, I can only review the words from my own perspective and will be limited by my frame of reference. My various identities, such as gender or race, as well as my roles as researcher, educator, and career advisor, place a specific positionality on my interpretation of the data. Another researcher with different roles, or a different set of socially constructed identities may reveal different interpretations. The research design may have addresses these concerns in more depth had there been additional input from participants. For example, follow up interviews, participants reviewing analysis and providing input, or other forms of engagement where students could confirm or clarify their intended and communicated ideas in their reflective writing.

Despite what critical discourse analysis can showcase as a methodology, it does not have a “mechanical causality” (Fairclough, 2011, p. 122) where learning guaranteed positive social change. A reframed idea or belief does not ensure a sweeping transformation of broad social practices. Rather, critical discourse analysis inquiry examined the phenomenon of change in actions, relationships, beliefs, or attitudes which may be present at an individual level. The analysis itself however does not produce the necessary change of the institutions and practices problematized in this research. Instead, further research at the macro-perspective is needed to fully examine the narratives, institutions, and materials at play. With this research and methodology in mind, further areas of research could include inquiry into the narrative of career at universities, the impact of racial and gendered representation of professionals on university students, narratives of first-generation university students search for stability and economic security as a result of their degree. Change at this level becomes increasingly complex and contextual. Critical discourse analysis attends to this complexity and any action meant to shift the narrative, institution, or material world must be met with sufficient
power relative to the system being addressed. For the purposes of this project, the frame was set at the individual level to better understand the general population of students attending higher education in Canada.

Critical discourse analysis emphasized how text both represents, teaches, and sustains narratives. Narratives about career are communicated to students explicitly and implicitly from peers, family, faculty, university officials and media. Statistics on employment after graduation catch a concerned parent’s attention and are mentioned over dinner conversation. A sibling graduates and requires further technical training before a professional credential can be granted. An industry is disrupted by technology and a parent is laid off, required to re-credential, after decades in their profession. University recruitment materials designed to promote the school depict happy faces alongside lists of job titles graduates pursue. These texts go unexamined by many students, and the texts that students create of their own understanding of career are not represented in career development literature. Critical discourse analysis illuminated the narratives that students defined and described about their own orientation to career and life. A quick search of six major career development journals reveals four examples where researchers used discourse analysis (Ezzedeen, Budworth, & Baker, 2015; Irving, 2011; Stead & Bakker, 2010; Sultana, 2014). It was surprising to see two journals with no mention of critical discourse analysis, especially in a field where story, personhood, and institutions intersect so closely. Each reflective writing assignment in this project emphasized the stories that students tell themselves about their current skills and anticipated future after a major technical skill and methods course.
3.3 Methods

This research project intended to explore the attitudes and beliefs of third year science students through reviewing one reflective writing assignment that originated from an undergraduate laboratory course. Participants consented to share their assignment with this project after completing the course and receiving final grades from the instructor. As a researcher, I operated at arms-length from this course and have no responsibilities for grading assignments. The distance between researcher and participant reduced power and persuasion over participants and ensured participants provided consent free from undue influence. To lower the risk further, I reviewed assignments after Dr. Read submitted final grades for each student, so there was no incentive for students to participate. Participants completed the original assignment two or fourteen months before the start of this research.

To recruit participants, Dr. Read emailed students who were registered and completed reflective writing assignments in BIOC 301 during the 2017-18 and 2018-19 academic years. Each class was comprised of approximately 140-160 students. Due to the course size and the possibility of a small response rate, all students registered in BIOC 301 for the academic year 2017-18 and 2018-19 were contacted and invited to participate. Students reviewed the details of the research electronically and directed any and all questions to me via email, telephone, or if needed, in-person communication. Participants were asked to submit their consent electronically using the UBC survey tool, Qualtrics. Participants entered their UBC student number, email address, and indicated their consent by responding “yes” or “no” on the form. The individual consent released one reflective writing assignment per student into the research data. The original assignments were submitted electronically to the instructor through the UBC learning management system, Canvas, and individual files were automatically labelled by student number. Participants did not need to resubmit the assignment directly to the research
project. Instead, assignments were submitted by Dr. Read on a student’s behalf once consent was granted. Students who do not respond or indicate “no” in the survey were not included in the research project. All findings were reported anonymously and participants are not identified by name. Instead, direct quotes are attributed with initials. Finally, all research activities were completed in accordance with review and approval from Behavioural Research Ethics Board, and certificate information can be found in the appendix.

To analyze the research data, all assignments from each year were compiled into a single folder and loaded into NVivo software. From there, the assignments were sorted into folders according to the question students chose in their assignment. This folder structure allowed for assignments responding to similar assignment questions to be coded in succession. Each round of coding included all assignments and processed the corpus one participant at a time. The first cycle of coding examined the corpus and identified in vivo (Saldaña, 1999) codes that originated in participants’ voice. The first cycle of coding also focused on value statements (Saldaña, 1999) where students described their strengths, values, beliefs, and attitudes about their skills and future career. Phrases like “I need…” or “it is important to me because…” or “I believe that…” signposted these codes. ‘I’ statements were central to indicating the explicit narratives, or genre, students internalized about professional identity. Eleven themes emerged from the codes: self-awareness, intentional behaviour, future application at work, lab partner, strengths and weaknesses, practice presentation, affirmation, efficiency, feedback, quality of work, and skills.

In the second cycle of coding, I developed a codebook based on Kemmis’s (2012) theoretical framework to identify instances where students writing demonstrated characteristics of theoretical, technical, practical and critical emancipatory perspectives on professional identity. Again, “I” statements were central indicators of a student’s description of their
professional identity. Each of the four theoretical domains contained approximately four themes originating from a range of one to seventeen codes per theme. Every code reflected a single statement, idea, or word that students used to reflect on their professional identity.

Two responses from the entire data set were excluded from coding: one assignments that copied text directly from the StrengthsFinder report and the other contained grammatical errors that impacted the researcher’s confidence in understanding the intended meaning. When analyzed and evaluated as narrative features describing the internal or external perceptions students held about their professional identity, themes recounted a broader discourse from the student perspective about the role they play in their profession and in authoring their own narratives.

Critical discourse analysis enables researcher reflexivity in a way that parallels what students experienced in this course. What I write here changed what I knew, thought, felt, valued and emphasized in my own perspective (Fairclough, 2011) as a practitioner and researcher. My professional identity, and my broader who-ness as a career advisor, an educator in the classroom, and a researcher influenced the dimensions and perspectives that I perceived in the student assignments. At times, I was able to listen to the student voice with different perspectives in mind: career advisor, educator in the classroom, or researcher. Certain nuances to what was written and what was not written, compared against much of that professional experience and the various perspectives I held. By the end of this research, my own praxis has led me to consider deeper dimensions of justice and purpose in the actions of my day-to-day duties as a professional.
Chapter 4: Findings

I like to stand off centre at the front of the room, because I’m not looking to stand in a position of authority over today’s class. When the chatter breaks momentarily in their small group discussions, I interject and invite the group back together. I start with a question to signal that the discussion is going to continue, but this time, as a large group, rather than in pairs. “What was your reaction to your StrengthsFinder report, or even taking the assessment to begin with?” There is an audible pause before the first comment. Some students wait to see if I will break the silence. Others are thinking about their response and how honest to be. I wait.

“I loved my report! It made me feel so good to read nice things about myself. I normally wouldn’t think about that kind of stuff” one student shares. I nod and affirm their response. A few more positive comments come in. I watch as some students cross their arms and begin to sit back in their chairs.

“Where are the critics? There’s lots here to be critical of. What are some different perspectives?” I probe. A small discussion builds, and I establish trust with the class. What they have to say matters, and I will welcome their thoughts.

Each participant in this research completed a written reflective assignment three months after engaging in a practice presentation and strengths-based in-class activities. As a researcher, it is important that I layer context onto the data that I am about to analyze, and so my own experiences of that place and time help me to focus on what students write and what they omit.
in their assignments. I held three roles in this research: guest instructor, career practitioner, and researcher, and throughout this chapter, I draw from all three roles to understand and explore the data. This chapter also captures the voice of students participating in this research through use of their words and the narratives implicit within these words.

In this chapter, I argue that biochemistry students articulate their professional identity across four dimensions outlined by Kemmis (2012): theoretical, technical, practical, and critical emancipatory. Theoretical notions of professional identity sound like descriptions of how a student defines themselves, describing their strengths, and exploring the limitations of their strengths. Technical notions of professional identity sound like identifying skills, the role of laboratory partners in succeeding, symbols and indicators of quality in work product, and future applications of skills learned in a biochemistry laboratory. Practical perspectives on professional identity illustrate mindsets like confidence and its role in work, habits that drive success like attention to performance or collaboration, and the conditions like mindfulness or adaptability that support learning. Critical emancipatory notions of professional identity highlight place and privilege within higher education. Through this data, I explored notions of praxis and phronesis for biochemistry students in the hopes that students begin to describe their own moral responsibility as professionals. Phronesis engenders students’ responsibility for the consequences of their actions, and with that responsibility, students also gain agency for the story they tell about their career and professional life.

4.1 Theoretical | What is true? How do I know?

Students responding to questions of truth and meaning making are sounding out the words to an internal literacy that Freire would be proud of. They are making the “ba” “be” “bi “bo” “bu” for themselves (Freire, 1970, p. 211) and starting with the first questions that
demonstrates a “disposition to seek the truth for its own sake” (Kemmis, 2012, p. 149). No matter the age or motivation, asking questions to find truth is an important part of one’s professional identity development. In this section, I will explore the themes that emerged from students who, in turn, considered the state of the world and their place in it. Three overarching themes are used to outline the discussion below: “who I am”, “objectivity”, and “strengths and weaknesses”. In each, I will provide examples from students reflective writing and my analysis.

4.1.1 Who I am

More than half of the participants in this project used the reflective writing exercise to interrogate who they are and how they describe themselves. Their comments reflected themes of self-awareness where they used new language to describe themselves to themes of validation or affirmation that assured them that their observations were accurate. Strengths are a curious intermediate ground between attributes and skills. Each of the thirty-four Gallup-defined qualities describe an action or observable behaviour that indicates a certain quality. The strategic strength described by one participant, C. L., is a good example of that. Other strengths describe one’s approach to organizing tasks, completing tasks, building relationships, and influencing others. This student identifies a main strength – being strategic - as a personal quality and describes how it shapes their work:

[A]s a strategic individual, I can be quick at coming up with alternative approaches, and also quick at noticing patterns in data; these characteristics can potentially give me more insights in experiment design and data analysis. However, I also learned that if I become unduly confident in being strategic, I may not be aware of the assumptions I made in formulating the answers, or other drawbacks of my strategy (C. L.).
C. L. named one important attribute that they see connected to two major tasks as a biochemist: experimental design and data analysis. The student commented on the speed of this skill as central to their competence, but also the gateway to this positive trait becoming a liability. They signaled the importance of speed being a factor in planning experimental design and analyzing data by the use of the phrase ‘more insights’ but they did not describe what that ‘more’ is relative to. One could assume it is their peers, but that was not clear from the student’s comments. Nevertheless, there was a tone of confidence in the anticipation that these behaviours would yield “more insights in experiment design and data”. Yet without prompting, the student was quick to cite how this trait has inescapable weaknesses if approached in an uncritical manner. To some degree, C. L. conflated who they are with what they can do, yet their description provided an opportunity to ask for more observation and definition – what kind of alternative approaches? What does it mean to be a “strategic individual”? Who else do you know with that quality? What do you admire about them? Why? Without answers to these questions from C. L., I am left to consider how iterative reflection about their strengths, some of these questions might be addressed. And, hopefully, they are important to C. L. as well.

Parsing who we are from what we do is not entirely possible. In this case, C. L. sought evidence of who they are through their behaviour and particular actions where they excel. From here, I am reminded of Kemmis’s (2012) notion of theoretical knowledge. As professionals, what we do defines what kind of professional we are: nurse, educator, architect, etc. Who we are in those roles can be defined by what we bring to how we do that work, and as a result, who we are and what we do is inextricably linked. To define our who-ness, we look to our behaviours as data points of ‘identity for the full constellation of possibilities to appear.
4.1.2 Objectivity

No matter the audience, personality assessments are divisive. Some people find them informative and others grapple with their inadequacies. During the in-class activities, when the tool was introduced, I actively took the role of critic at the front of the room. This intentional strategy invited students to name their challenges, questions, and concerns in a thoughtful way first, in order to further the discussion and later to encourage students to rely on their own interpretation whilst attending to the appreciative principles of strengths. The discussion had the momentum of fits and starts until the group established trust with me and was assured that I did in fact, recognize the limitations in the instrument. Once that trust was established, the group began to write their own descriptions of their strengths and told stories of how they recognized those behaviours in their day to day activities. When students came to write their reflective assignment in Term Two, I was curious to see who continued to wrestle with the tool and its supposed objectivity. This student made brief mention of the tool and its ability to be an objective measure of a person. They noted that “through the assessment, a mostly unbiased third party shows me an objective viewpoint of my strengths and weaknesses, providing insight to my short comings and where I can improve” (J. S.). Another student wrote “I was pleasantly surprised. I found [StrengthsFinder] useful in that it confirmed the abstract strengths that I knew about myself into concrete terms” (S. S.). Both comments typified many of the comments from the in-class activity in their written assignment months later. There was comfort and affirmation for students when they reviewed their strengths because an external and empirical instrument validated their initial observations. Many students sought evidence for their reasoning and beliefs. However, the epistemological orientation of what qualifies as evidence, while not named explicitly, looms in the subtext when words like “unbiased third party”, “objective
viewpoint”, “abstract” and “concrete” terms are strung together. With objectivity comes the hope for certainty.

Inevitably, there were students who critiqued the content presented to them. Whether in front of a classroom of hundreds of students, or one on one in an advising appointment, this signaled to me that a student was invested in thinking critically for themselves, and one major goal of the education process was accomplished. If they shared that opinion in front of their peers during the in-class activity, I would have taken it as an invitation to work together through friction towards a new understanding. When faced with a comment like, “the test is extremely limited in what it can tell you about yourself” (H. C.), I would encourage a student to continue with a gentle prod like, “tell me more” with a sincere tone. In this case, the student expanded on their claim without prompting:

You are placed into these cookie-cutter categories – many of which are not well-defined or extremely similar in nature. It’s the same scenario as when people say they’re introverted or extroverted: these terms leave no room for variation. Most people are probably both to varying degrees, but as humans we have this desire to try to group things into categories without looking at how the individual characteristics are connected. [StrengthsFinder] cannot quantify your personality attributes; it only provides a crude qualitative diagnosis (H. C.).

The student identified the biggest limitation of instruments when they attempt to locate one’s professional identity. They “place” or ‘label’ people – no matter how much flexibility a model has, it is ultimately used to name and categorize. In addition, the student highlighted the artificial and arbitrary nature of categorical systems when categories “aren’t clearly defined and overlap” with other categories. Frustration becomes palpable in their words “these terms leave
no room for variation”. This framework and mental model did not fit for this student. The tools of self-reflection and psychometric assessments are rarely, if ever, developed by students themselves. Instead, these instruments impose a structure onto a participant in an attempt to define and provide language for them. At no point in H. C.’s assignment did they address themselves or place their own experience and definitions of their strengths into the writing. As part of the in-class activity, I mentioned this important distinction. This framework is simply provided as a starting point for critical reflection or an internal analysis. If students chose to disregard the framework, they were still asked to critically reflect – what are your strengths? How would you describe them? What is important to you about them? The act of critical reflection is aided by the framework, not dictated by it, and thus the in-class activities invited students to create their own definitions and layer their personal interpretations after considering the results of their StrengthsFinder assessment. Nevertheless, a mental model that doesn’t fit created resistance that was unavoidable for H. C..

H. C.’s statements depicted how strongly one might reject systems of categorization that do not fit an individual. They continue:

The results of the test are ultimately based on how you see yourself or on how you want to be, rather than how you actually are. There’s automatically a level of bias and subjectivity that are implied in the results, and as a result these types of tests tend to just confirm things that you already believe. Humans are innately (and unavoidably) self-obsessed, and so we tend to have an image of ourselves that is difficult to alter (H. C.).

The emphasis on “actually” in the first sentence was striking. For H. C., there was a degree of distrust in their own experience and observations as signaled in their previous statements “how you see yourself” and “how you want to be”. Objectivity reigned supreme, as H. C. suggested
something was missing in the cleavage between how one sees themselves and who one aspires to be. H. C. emphasized objectivity and the external world, and yet the student does not use a single “I” statement in their assignment. They elected to use “we” and “you”, and spoke outward and of an ‘other’, rather than of their own experience. They rejected the invitation, not once but twice, to describe their strengths, yet they did not abstain from participating. Their participation can be interpreted as an active protest to the systems and structures that have defined and described a world that is poorly defined and ill-fitting for H. C..

If I met with H. C. as part of a one-on-one appointment to talk about their strengths, I would have pushed the papers from the report to the side of the table. When a pause emerged in the conversation, I would have affirmed their critiques and suggest that we move the discussion to what they think instead, thus opening up the potential for H. C. to express themselves and be seen more fully by the someone acting on behalf of the university. Dismissive and fatalistic language like “innately and unavoidably” would have rung in my ears, and depending on body language and other communication cues, I might interject to say “tell me where that comes from for you.” By now, I would be searching for multiple examples in H. C.’s own language to mirror the deep thought and analytical skills they demonstrate. If possible, I’d like to ask, “What would happen if you flexed this muscle inward? What might you find?”

The question ‘What are my strengths?’ can open all kinds of epistemological doors: what do I believe? How can I be sure? Where do my beliefs come from? For students beginning to ask questions about what is objectively true, they are exploring the kinds of questions and layers Kemmis (2012) calls “theoretical reasoning about the nature of things” (p. 149). These steps into building a professional identity provide a basis for them to continue drawing from and layering onto with each act of reflection.
4.1.3 Strengths and weaknesses

As part of Gallup’s definition of Strengths-based Development (Rath, 2007), each strength in the framework is inherently neutral. While the language of strengths is rooted in positive orientation, a core principle of strengths-based development (Rath, 2007) encouraged students to consider that their top five strengths were also their top five weaknesses. For each strength, students identified examples where the strength would produce positive results and other examples where that same strength would result in challenges. The context and individual instance when a strength was in play signaled a consistent behaviour or approach that students could analyze with attention to environment influences beyond their control. Thus, examining a person’s top five strengths revealed their top five weaknesses. For many students in class, this idea departed from a dichotomy where strengths and weaknesses are opposing behaviours. Months after the in-class activity, students commented on the idea of strengths as weaknesses or weaknesses as strengths with selected phrases like “I never considered” (W. J.) or “qualities I had viewed as weaknesses” (B. A.). Some also described greater attention to the context to their behaviours with statements like “clarify the reasoning behind my habits” (C. T.). Students adopted the intended philosophy of strengths-based development when they described their behaviours as neutral and offered positive or negative consequences to their actions depending on particular setting or environment.

Out of the six students who commented on their strengths as weaknesses, and vice versa, T. C. drew from the abstract concept first, provided a personal example, and then moved back into the theoretical outcome their strength may create. They wrote:

The greatest strength can become the greatest weakness, if demonstrated in an inappropriate context or to an exaggerated extent. For example, one of
my top 5 strengths was “deliberative”, which is accurate in most situations as I often carefully consider my options and their repercussions before making a decision. However, being constantly deliberative may unnecessarily prolong or delay an action that is urgently required, lowering productivity and disrupting work-life balance (T. C.).

In T. C.’s example, their ‘I’ statement described the example of their strength as a positive behaviour. Their strength as a weakness was not described using a qualified example of how frequent or likely the weakness may become. In one way, the writing style here typifies the strength the student selected to describe. T. C. anticipated their potential challenges in the future and began to address those in the present.

Each statement exists in a rich context layered both implicitly and explicitly by factors like race, culture, gender, privilege, family of origin, health, and countless more. For young professionals exploring the theoretical dimension of their identity (Kemmis, 2012), these constructs play a major role in layering context to a particular setting and person within that setting. Much like strengths and weaknesses, who we are changes in relation to each context. The interplay between context and behaviour indicated if a behaviour is a strength in one setting but a weakness in another. This suggests to students that professional identities are living, changing, and growing constructs, and that students can learn from both success and challenge through critical reflection. What is learned, unlearned, and relearned can be done with purpose and curiosity.

To understand the theoretical dimensions of professional identity, students described the intricate link between who they are and what they do. In the first theme, Who I am, students described their behaviours and defined them in their own terminology. Some based that initial terminology off the StrengthsFinder frame while layering their own language on the
tool. They described their actions and attributed those behaviours to an internal quality of themselves. In short, who we are is reflected in what we do. In the second theme, Objectivity, the limitations of tools like StrengthsFinder were revealed. Reflective frameworks can create lasting impressions on individuals while also inviting epistemological questions about what counts as knowledge. While one student was critical of the framework, they chose not to describe their own interpretation, but rather emphasized the problematic nature of systems and categories to describe people. Finally, the third theme, Strengths and Weaknesses, illustrated the relativity of our behaviour and the influence context has on our actions. One behaviour may be an asset in one setting and prove to be a challenge in another setting.

In this section of theoretical understandings of professionalism, many students entertained notions of what Kemmis would call “disposition to seek the truth for its own sake” (2012, p. 149). Students named their strengths and sought aspects of the truth in their strengths as part of their assignment. They explored their strengths to better understand themselves and for the lasting knowledge it provided each individual.

4.2 Technical | What can I do?

For science students, much of their disciplinary learning is honed in practical settings where laboratory techniques and tools meet scientific theory. In his course each week, Dr. Read imparted a principle from Biochemistry to students in the laboratory, and at the end of the three-hour lab, students review evidence of their skills against a predictable result. Kemmis (2012) would call this part of professional identity development the “means-ends or instrumental reasoning to achieve a known objective or outcome” (p. 149). The technical domain featured prominently in the reflective writing from many students who participated in this research. Learning the necessary techniques and procedures required of Biochemists was
a necessary step towards seeing themselves as professionals within this field, and a combination of technical skills and transferrable skills were present in the reflective writing students submitted. In this section, I describe students’ responses in four themes: employable skills, relationship with lab partners, quality of work, and future applications.

4.2.1 Employable skills

Dr. Read strategically prioritized assignments where students developed presentation skills in his laboratory course, so that students could connect their bench skills to both industry and academic applications of science. Whether preparing for an interview, or presenting a paper in a journal club as part of a graduate program, students require a fluency in their ability to communicate complex information to audiences with varying degrees of knowledge. Additionally, many of the technical skills that students learned in BIOC 301 apply to a variety of professional industries, graduate disciplines, or clinical degrees. Students also intended to improve their skills through deliberate practice and peer feedback. One student highlighted their skills when they write:

Public speaking [h]as always been a major weakness of mine, thus getting to practice in a small group and receive constructive criticism from my peers helped me identify aspects of my presenting skills that I can focus on improving in order to give better presentations in future classes, labs, or jobs. Additionally, it gave me the opportunity to observe others who are good at public speaking and presentations, and to learn from the way they approach their presentations (S. C.).

The opportunity to practice, receive feedback, and observe others signals the applied nature of presentation skills, yet, S. C. attributes their performance to a personal deficit or “weakness”.
As I have argued previously, what we do is inextricably linked to who we are. This statement from S. C. seems to affirm the flipside of that principle: when we are not pleased with what we can do, it becomes a personal trait reflecting our worth and capability. These assumptions often go unchecked, as peers and mentors can be quick to suggest tactics to improve skills in emerging professionals.

Another key skill that Dr. Read intended for students to learn during his course was effective teamwork skills. Through my experience as a career advisor, I have found that this theme is a common grievance for countless professionals at many stages in their career. Teamwork and how one manages oneself in groups is a lifelong skill, yet it is rarely attributed to a set of behaviours or micro-skills. In this case, the litmus test for good teamwork was the absence of dysfunction. For example:

I was lucky in that my lab partner and I communicated really well and never got impatient or frustrated with each other, so we were both very comfortable in pointing out each other’s mistakes and supporting each other in re-doing procedures. I think that this aspect of communication will greatly benefit me in future lab positions, since I learned how to effectively communicate, explain, and discuss why I did a certain step of the procedure in order to gain better feedback about possible sources of error (Y. L.).

Y. L. attributed teamwork to luck and comfort. In many examples that students shared, effective collaboration was ascribed to the individuals and the absence of difficulty or tension, rather than how the individuals engaged. Who they worked with was more important than how they worked together. As a professional in most work settings, one rarely gets to choose who they work alongside. Learning how to collaborate with others is an essential skill for professionals and will sustain students over time rather than reducing teamwork to selecting
professionals one likes. Nevertheless, this student locates one necessary practice required for teamwork and personal management: giving and receiving feedback. They name the steps involved in communicating, explaining, and discussing, which suggest a mutual approach to understanding rather than directive or deficit-based statements. They hint at curiosity as being important and suggest improvement and lifelong learning as the intention of feedback. Like the presentation skills mentioned above, students are keen to improve and enhance their skills through intentional activities in class with peers and instructors.

4.2.2 Laboratory partner

At the outset of this work with Dr. Read, we designed both in-class activity and reflective writing assignment to address self-awareness and improve awareness of difference between laboratory partners. Laboratory partners emerged as prominent characters in countless written assignments. In contrast to the employable skills theme above where collaboration was described by students, in this theme not all statements about laboratory partners made direct references to the skills required for effective collaboration. Some partners were sources of accountability (W. J.), conflict (L. E.), or strength and support (K. L.). Laboratory partners also allowed students to unlearn previously formed beliefs about shared work. In one example, they explained that:

One other thing I learned from the exercise was how to connect with my partner. Because I’ve had many bad experiences with group members not working or doing their part, I’d always have to lead the team and do the majority of the work. So the interaction and discussion with my partner taught me to trust him and not dominate the whole presentation and give him some space to work as well (K. J.).
Moving forward, this student unlearned the belief that teamwork will disappoint them and partners will underperform in tasks. K. J. relearned that in order to disprove that belief, their lab partner needed an opportunity to contribute on their own without input or influence from the student. The behaviour described and the choice of the word “dominate” suggested that the student attempted to control others due to a lack of trust. For many students, the lack of trust in others is a common concern due, in part, to the risk to their grades if a colleague fails to perform. The construct of grades to denote performance can be criticized at another time, yet grades have real impacts for students: declaring a major, receiving or maintaining a scholarship, volunteering in a research setting, or applying to post-graduate programs. Many of these examples ask for a transcript and rely on some degree on the calculation of performance based on grades. Teamwork can be an indirect threat to eligibility and qualification for future opportunities, and as a result, students are reluctant to relinquish autonomy over their performance and future aspirations.

Prioritizing teamwork as a part of classroom learning can address the issue of trust and performance. This student explains that:

Self[...]reflecting and communicating the findings about the characteristics that were pointed out in the personality test with my lab partner really helped me improve my understanding about our team dynamics. We communicated aspects of our personalities to each other and now we are a lot more understanding of each other’s actions (P. D.).

P. D. shared their strengths with their laboratory partner and through this discussion, improved their partnership. The discussion about strengths has impacted their understanding of each other. Implied within P. D. and K. J.’s description of their laboratory partner is the conclusion that students are not taught how to collaborate. It is assumed that teamwork and collaboration
is a known skill that does not warrant instruction or attention alongside disciplinary content. However, both examples describe the benefit of explicit and dedicated assignments within disciplinary content to better address the skill of teamwork and the quality of work produced as a result of teamwork.

### 4.2.3 Quality of work

Professionals can measure the quality of their work using countless variables including accuracy, time, creativity, and compliance with codified standards. For students participating in this research, work was described as an exercise of instruments and technical production: it must be free from error and generated with attention to accuracy and time. W. L. noted that “During the lab, I am able to focus during the lab, maximize the efficiency while maintaining no error while following through the procedure, and end up finishing the lab very quickly”. Correct techniques can be measured by a student’s ability to perform experiments yielding predictable results and generating data free from errors. In addition to accuracy, time and speed of production were described as useful performance indicators. This theme continues in another student’s writing:

> We have to prioritize which tasks to complete first to finish the lab on time and to use shared equipment more efficiently. For the formal experiment, we also got a chance to organize how fast we could work in the most efficient way possible (N. M.).

The race to complete a major experiment sometimes seems to overshadow any assumed beliefs about accuracy and substitutes for quality in this student’s rendering of skilled practice. Time is one facet in a complex system of work production. Both examples symbolize a productivity-narrative that students internalized where time and production are major factors in
determining the merit of their efforts. What is absent from this theme, and the students who discussed the quality of their work in a technical sense, was the moral responsibility of their instruments or skills. Later, student responses in the practical perspective of professional identity addressed notions of their performance in terms of quality and challenge many of the impressions of a productivity-narrative they previously held.

4.2.4 Future applications

Out of a possible forty-seven participants, thirteen students selected a reflection prompt designed to integrate and recontextualize their knowledge of their strengths to other settings like future laboratories or other campus roles. One student stated that the in-class activities and written assignment “helped me both in school, and in my recent co-op job applications, because awareness of your personal strengths and flaws are very important when going to interviews for potential jobs” (S. C.). As students begin to think about their future, they begin to draw linkages between what they know, what they can do, and how they see themselves. This is the beginning seeds of a praxis. One student provided examples of their strengths as they emerged in their role as a residence advisor. They write:

I have noticed that I like to push the people on my [residence advising] team to develop their talents in a variety of ways, and to explore esoteric trains of thought to their wildest conclusions. Knowing that I have these traits enables me to feel more comfortable and confident in my actions, as I know that at the very least, I have the basic level of empathy and problem solving to deal with these situations, on top of my training [as a residence advisor] (Y. S.).

For Y. S., comfort and confidence in themselves was an outcome of internal reflection and identifying personal strengths. These behaviours transcend the biochemistry discipline and also
appear in examples students can clearly identify from extracurricular roles. The student commented on the unique combination that their strengths, in addition to their training as a residence advisor, combined to enhance their performance as indicated by their phrase ‘more comfortable and confident in my actions’. For many students, their technical skill and training matters and who they are in that technical training matters. As they begin to consider how certain skills or knowledge may apply to new and different settings, new interpretations of what they know, what they can do, and how they see themselves emerge.

To understand the technical dimensions of professional identity, students focused their attention on the technical laboratory methods and skills they learned. The techniques and procedures of biochemistry, as well as the laboratory setting, were imperative to students sense of professional identity. The combination of technical and transferrable skills present in their critical reflection writing assignments indicated the importance and distinguishing features that the academic discipline has on a student. In the first theme, Employable skills, students described the skills they learned and often reflected on the transferrable skills that will follow them in their profession rather than the exact techniques applied in the laboratory. Drawing these linkages between assignments and deeper skills gained is an important part of ensuring that students can articulate their employable skills in relation to future opportunities like research labs, co-op applications, or job interviews after graduation. In the second theme, laboratory partner, students highlighted an assumption that teamwork is an intuitive skill that does not warrant explicit instruction. Typically, laboratories or classrooms with team assignments provide an opportunity to practice teamwork, but without explicit instruction, and students attribute effective partnerships to who they work with rather than the skill of how they work together. In the third theme, quality of work, students described working effectively towards mastering their technical capacities. As part of that description, they emphasize speed
and efficiency over quality. This is a reflection of a broader narrative of productivity where students learn to prioritize speed over process. In the final theme, Future applications, students were prompted to consider the future applications of their skills and knowledge. Many of them recontextualized their learning and began a deeper kind of thinking that hinted at the start of praxis. They considered what they knew, what they can do, and how they saw themselves.

4.3 Practical | Who am I becoming?

When students critically reflect on their strengths, they located and interpreted the who they are becoming as an emerging professional. As a result, they actively defined their reasoning behind their choices and behaviours. Three themes – mindsets, habits, and conditions – provided a frame for emerging professionals to move beyond the technicality of their actions and into the practicality of their actions. Mindsets, habits, and conditions allow for one to evaluate if their actions were appropriate given the contextual variables at play in a particular situation. In the words of Kemmis, “[a]n uncertain practical situation is, by definition, not a situation of a known and decided type, for which pre-existing aims, means and strategies are clearly relevant and applicable” (2012, p. 151).

Each day there is some degree of uncertainty and unpredictability for most professionals. Students face similar uncertainty and unpredictability in their work: novelty in concepts, theories, or skills being taught; challenges that arise from learning complex content; varying expectations from different instructors; cultural differences between current and previous schools or countries of residence; new and emerging life roles like romantic partnerships or introductory work roles. The emergence and shifting nature of these factors can create uncertainty in the present – who am i? – and in one’s future aspiration – who am I becoming? Investigating one’s mindsets, habits, and conditions lead students to examine what
might be right and what ought be in a particular situation rather than a general sense of right and wrong or routine best practice. It allows individuals to be open to their experiences, see things from new perspectives, strive to be open to new and different ways of being in the world, and finally, think critically in order to act for a greater social good. In this domain of professional identity, students linked their actions with the consequences and moral implications of their actions.

4.3.1 Mindsets

When students critically reflected on their strengths, they described both thoughts and feelings. For some students, the assignment attended to both cognitive and affective domains of their learning. Confidence emerged as a significant theme of the mindsets present or implicit in student’s assignments. Some students named confidence directly while others used words like “comfortable” (Y. S.), “stabilizing” (S.S.), “decisive” (P. D.), or “thrive” (S. A.). The absence of confidence also appeared in a few examples where students indicated feeling unsure or insecure about their abilities. One student described the extent to which their lack of confidence impacted their performance and behaviours in class:

[StrengthsFinder] has impacted my self-concept. I have always been very insecure about being called “slow” because I would equate it with being “stupid”. It has become such a big fear of mine that I’ve noticed its effects in my day-to-day activities. For instance, I often take a back seat in class discussions because others quickly answer the question while I’m still formulating the problem in my head. I’ve grown more hesitant to taking on new challenges and I’m usually afraid to work with others because I’m worried that I may not be able to keep up with them (S. S.).
The student focused their attention on their perceived mental processing speed. Time and pacing appear, yet again, as an indicator of success. In this example, time appears as an internal driver of criticism and judgment that has negative repercussions instead of a race to perform and produce. While S. S. named cognitive descriptors such as “slow” or “stupid” the emotional weight to this terminology is far from neutral. Instead, it serves to undermine and erode the students sense of self. These thoughts reinforce long-held beliefs suggested by the use of “always” that influence their behaviour and actions. S. S. offered examples of daily activities in class where these beliefs created fear and compounded into longer term impacts like reluctance to seek out “new challenges”. They continue:

However, [StrengthsFinder] framed this trait as being very thorough and accurate, which is also true of myself. This activity showed me that I am not slow because I lack the ability to think fast. Instead, I subconsciously force myself to go slower so that I can analyze all the information at hand and weight the consequences before making a decision. […] If I learn to view being “slow” in these various positive ways, this shift in mindset can be immensely beneficial because I will feel more competent and confident. By viewing this as my strength, I can take on challenges with a new perspective: if I am doing things slower than others, it is because I am taking the time to fully understand the task and to produce something accurate, whole, and meaningful (S. S.).

Mid-way through the reflection, the student reframed the belief that they are slow into a positive trait by selecting “thorough” and “accurate” as likely outcome from their behaviour. S. S. embraced the benefits of their current behaviour, instead of trying to change that behaviour. They reshaped their perception as a result of the in-class activities confronted aspects of their
identity that no longer felt true or purposeful to the student. It is important to draw a distinction here that the student does not make. It is the student who named and made meaning of these thoughts and actions themselves, not the StrengthsFinder tool alone. Considering the student’s self-criticism, the emphasis they placed on the StrengthsFinder tool providing the framing or insight is congruent with the lack of confidence they described. However, the tool simply offered the means of analyzing that information differently.

Confidence appeared implicitly in the thoughts students described. When students labelled their identity using roles like “investigator” (P. U.) or “double agent” (A. A.), they communicated a different perspective on confidence. The choice of the word ‘investigator’ suited the biochemistry field, and research-intensive higher education broadly, as this title is often one held by faculty members and other role models who occupy positions of authority or power at their institution. The student stated:

I have learnt that I can tackle such difficult situations and believe that I can apply my improved ability to troubleshoot in any research environment as research is a field that relies on how investigators can think quickly and critically (P. U.)

Problem solving and adapting to difficult situations are ubiquitous with any kind of work; yet, confidence is interlaced with the imagery of research. Principle Investigators connote the highest levels of achievement and success to many science students, and they are uniquely privileged in their status at a research-intensive institution. They symbolize power and knowledge and the highest achievements in their discipline, often recognized in national or international domains. Photographs of the latest award-winning investigator materialize on an institution’s homepage, and students internalize these stories as accomplishments to aspire
towards. Thus, confidence accumulates when students take steps to emulate investigators as conscious or unconscious role models.

Another student, A. A., selected a different metaphor to describe confidence. A. A. selected the imagery of espionage to illustrate confidence, and in particular, rooted it in their double-major in Arts and Science. “I thought I wouldn’t like converting so far into arts, but now I know I can thrive as a double agent” (A. A.). For one to be a double agent, one must have fluency in the two places – in language and culture – to navigate undetected. The vivid depiction of transmitting top-secret knowledge from one faculty to another without being caught brought a smile to my face every time I read it. The confidence depicted by this student rests in their ability to “thrive” in two seemingly distinct settings.

Finally, one student communicated confidence using verbs referencing skills and wrote them as nouns instead: “Overall, this course has taught me how to be a better experimenter, a presenter, and a critical thinker” (L. C.). Experiment became experimenter. Present became presenter. Critical thinking became critical thinker. The student emphasized the embodiment of these skills by stating they learned “how to be a better…” rather than how to do or perform these tasks. Embodying the role of critical thinker, presenter, or experimenter suggests that this student internalized skills as characters in their story of becoming a professional.

Whether affective or cognitive, confidence in one’s actions and an emerging sense of responsibility for those actions is a positive indication that biochemistry students see themselves as emerging professionals. The actions students identified like participating in class, solving problems in the lab, or taking on roles experimenting and presenting data offer relevant and timely examples where students began to take ownership for their actions. This ownership is the seed of responsibility and accountability that Kemmis referred to later in his description of phronesis as the moral character to “think practically about what should be done
under the circumstances (2012, p. 156). For students to grow into professionals that can think critically and act with principles, they must have confidence in themselves and their professional identity. As much as the presence of confidence is important, the noted absence of it indicates the need for students to attend to their affective domain in the learning process because of the impacts it has on cognition.

### 4.3.2 Habits

Many of the behaviours and expectations that students practice and refine during their degree become habits they rely on during later phases of their career. In order to encourage phronesis in students, educators invite students to habitually stay open to learning, making mistakes, and learning from those mistakes in an iterative fashion. Students in BIOC 301 described their professional habits using themes like performance, collaboration, and self-improvement.

In the first example, performance was defined as effort and preparation in order to succeed in W. J.’s presentation with their laboratory partner. W. J. commented that “I feel the need to be responsible for preparing a good presentation with my partner, and this pushed me to put in a lot of effort into researching materials and practicing for the presentation”.

Productivity is no longer measured along the axis of time and accuracy, as it was for many students in the technical domain of professional identity. Instead, W. J. attributed their work product to broader notions of quality that are determined by accountability to a peer in the field. The quality of their work indicated their reputation and responsibility to another person’s reputation as well. The productivity-narrative here has shifted, and W. J. revealed that performance at work is no longer measured on an individual basis. Instead, the work is reflective of the pair of emerging professionals.
Just as quality of work was discussed previously, teamwork was also discussed previously as part of the technical domain of professional identity within themes of employable skills and laboratory partners. Within the practical domain of professional identity, collaboration looks nuanced in comparison to the term teamwork. In the previous themes of teamwork, two individual actors were working towards a common goal. Teamwork was a strategy to divide and share work. However, in this theme of habit, collaboration denotes a practice where peer input and performance is fundamental to accomplishing the work in the lab. The work in the laboratory cannot be accomplished alone. There is too much work to be done as a single person, and one benefits from the thoughts and input from a partner to produce better work. For example, the student notes that “I learned in this lab that in order to be efficient in such a demanding environment, I need to be able to trust my partner and have full faith in them” (S. M.). Collaboration transcends mere individual competency and becomes a professional imperative. The environment demands it from the student. Efficiency is no longer an autonomous venture, but rather an endeavour for two scientists. Each scientist must maintain trust so that each partner has “full faith” in the work product of the other. The interdependence of professionals has become a habit for this student that will hopefully continue into their professional life.

The final habit that students described in their writing was self-improvement. Students described their openness and willingness to learn from their experiences and improve themselves for the future. One student remarks that:

I always strive to be a better version of myself with every new day. If I am not developing and improving as an individual, then I am not happy. As such, the whole experience in term 1 was a great stepping stone for future self-growth (S. C.).
Self-improvement is an ongoing process that presents itself each and every day for this student. Each day provides an opportunity to iterate and refine how this student sees themselves and what they do. Furthermore, each academic term builds on the previous term, as this student suggests one is a “stepping stone” to the next. Implicit within this reflection is the importance of on-going and iterative self-improvement. It is habit, not a single task that can be completed, as the habit of doing it is the only way to fulfill it.

H. R. described how they moderated and adjusted their behaviour by shifting which strengths were serve them in a particular setting. They wrote:

Interestingly, because the day of my presentation was so busy, I had to compromise my "input" strength, which often leads to me spending excessive amounts of time working on my project, with my "strategic" strength, in order to prioritize my tasks so that everything would be accomplished as best as possible (H. R.).

Input, a strength defined by Gallup (Rath, 2007), is gathering and collecting information, ideas, objects, or relationships. Strategic is defined (Rath, 2007) as spotting patterns, pathways, or approaches to a goal or outcome. The first strength, input, was no longer an asset to the student’s goal and the behaviour began to undermine the student’s intentions. In response, H. R. identified another strength and refocused their actions through the lens of their strategic strength. This compensation and flexibility helped H. R. to achieve to a desirable outcome given the constraints on the situation.

After two terms at the bench, students described habits of performance, collaboration and self-improvement that have the potential to sustain them in their future professions. They learned that their performance is no longer satisfied by an efficiency paradigm where time and accuracy are the sole variables of quality work. Instead, the changing expectations and
environments demanded different approaches from students, and even in mistakes, they learned to recognize circumstances where new tactics are required. Previous habits of individuality dissolved as students begin to see collaboration as a professional imperative to their work as scientists. They learned the importance of reiterating and refining what they know about themselves. Finally, students sought to apply their strengths to adapting and changing contexts. All of these responses moved their actions and perceptions from formulaic to emergent and responsive. With habits of performance, collaboration, and self-improvement, students can attend to the deeper implications of their actions and their consequences.

4.3.2 Conditions

Professionals adapt and re-adapt their actions and choices as a result of noticing the changing conditions where they are immersed (Kemmis, 2012). While many students focused on themselves as part of their reflective writing, nine students identified an aspect of their environmental conditions that impacted their professional identity. Two themes emerged from nine examples: unpredictability and future aspiration. The transition from lecture halls, textbooks, and the theoretical knowledge to one of practice-based learning set in a laboratory is highlighted by one student. They described the unpredictable nature practice-based settings provide in contrast to other classrooms:

What we can’t learn from textbooks or slideshows is the chaotic atmosphere in a lab. More often than not, things don’t go as planned in the lab. Always having followed structure, or given the exact steps to carry out, this was first hard to deal with it as I’d always look for a solution in the procedure given to us. However, with time I have learnt to approach unexpected situations with
more calmness and I push myself to think out of the box and come up with feasible solutions and reasonable rational to explain my observations (P. U.).

P. U. described the previously formulaic nature of teaching laboratories where they “followed structure” and were “given the exact steps to carry out”. They contrasted this with the uncertain and unpredictable laboratory environment that Dr. Read sees as something to “deal with” or address. By intentionally removing the outline of detailed instructions, students are forced to confront an environment much more like the one described by Hunter, Larsen, and Seymour (2007) as part of undergraduate research experiences. This setting provides opportunity for students to build tolerance towards the unknown and unpredictable results of scientific experiments. P. U. described this as “pushing myself” or coming up with “feasible solutions” as well as providing a “reasonable rational”. The paradigmatic language of scientific method shines through in this student’s description of the laboratory setting while connecting their personal qualities like “calmness” and work ethic to success in that environment.

For some students, the experience of the course was an experiment in its own right: do they want to continue working in these environments? With a time-bounded experience like a one or two term course, students can experiment with ideas and subjects within or across disciplines. E.Y. reflects in their suitability in the future with laboratory settings:

The [in-class] activity reinforced that I naturally want to work on something I really believe in, so I should be looking for work that meshes with my values with core beliefs that align well with me [sic]. I ended up changing my approach slightly when filtering jobs to apply to for co-op (E. Y.).

Critically reflecting on their strengths and the setting where they applied their strengths confirmed future work goals for E. Y.. Their choice of descriptive language like the adverb
“naturally” or phrase “really believe in” suggested a relationship between their professional identity and the settings where they can best apply their strengths and excel. The connection between internal and external factors continued when E. Y. stated they sought co-op roles that “meshes with my values” as well as “core beliefs” and “align” across those domains. In both academic and industry-bound professions, one’s professional environment becomes a necessary element when seeking congruence between personal strengths, values, skills and professional aspirations.

The conditions, or setting, where a professional is situated provides a myriad of factors that influence their actions. The changing nature of these conditions provides an opportunity for iterative and on-going learning if the professional is open to examine and interpret that learning. Whether the unpredictable nature of the laboratory and scientific experiments, or the suitability of a student to the field of biochemistry, attention towards one’s conditions sets a boundary on what emerging professionals can control while also identifying the influences that professionals must consider when making choices or taking action. The actions a professional takes are rarely value-neutral, and noticing the complicating factors in one’s actions opens emerging professionals up to the moral and ethical dimensions of their work. The choices and actions professionals make matter to those they are in service to.

Within the practical perspective of professional identity, I examined the mindsets, habits, and conditions that inform one’s actions and choices as a professional. For students to grow into professionals that can think critically and act with principles, they must have the mindset of confidence in themselves and their professional identity. The habits, like performance, collaboration, or self-improvement, that students practice and perpetuate during their degree indicate many of the habits they continue to rely on during later phases of their career. In order to encourage phronesis in students, educators invite students to habitually stay
open to learning, making mistakes, and learning from those mistakes in an iterative fashion. Finally, emerging professionals respond and navigate the changing conditions where they work. Their actions and choices have irreversible consequences, and thus, noticing the environmental influences on their actions help emerging professionals navigate what Kemmis called the “practical situation” (2012, p. 151) where a pre-existing solution or approach is not always applicable or appropriate.

4.4 Critical Emancipatory | Where am I situated?

Starting with the theoretical, Kemmis (2012) situates critical emancipatory professional practice at the opposing end of a continuum for professional identity development. Much of his rich analysis emphasized developing praxis and phronesis for professionals. However, he hints at the fourth stage where professionals collectively can seek to be critical and dismantle systems of oppression. Kemmis (2012) positions oppression within a broader landscape of “irrationality, injustice, suffering, harm, unproductiveness, or unsustainability” (p. 149) and, as a result, barriers that exist in both the human-created and natural worlds are subject to potential emancipation. Out of all of the participants in this research, one student made explicit mention of their privilege and the corresponding barriers that create that inequality. This singular mention is worthy of analysis as the collective that Kemmis (2012) requires for critical emancipation is reached when the student shares their thoughts with an audience. In this case, the audience consisted of the reader marking their assignment, and later, a researcher who analyzed their assignment. They wrote:

I try to think of my schooling in the bigger picture, and try to realize that several individuals do not even have the opportunity to stand where I am standing, so I am incredibly blessed to be able to study what I love –
therefore, I should make the most of it to myself, and grades should not define my learning (K. L.).

Place and body symbolize privilege for K. L. when they comment that where they “stand” is a place of privilege, and it is not open to “several individuals”. This insightful statement hints to a longer history and context of exclusion that continues in higher education today, and one that is particularly held at the University of British Columbia. The Vancouver campus occupies the traditional, ancestral, and unceded territory of the Musqueam people. The relationship between Musqueam and The University of British Columbia is complicated and layered with power that begins with the occupation of the land where campus was built and persists through the colonial systems of schooling that oppress Indigenous students to this day.

4.5 Conclusion | Where did we go?

Biochemistry students take steps towards developing their professional identity when they engage in critically reflective practice. Student responses were located across all four dimensions of professional identity: theoretical, technical, practical, and critical emancipatory. Within the theoretical, they explored who they are, what their strengths are, and what the limitations of their strengths might be. They asked epistemological questions about what kind of knowledge counts, and explored knowing for the sake of learning. In the technical perspective, students described learning necessary skills that can be applied in a variety of work settings, their laboratory partner played in their success, interpretations of productivity and how best to deliver quality work, and future opportunities where they may apply their skills. The technical perspective of professional identity was the most prevalent for students in their third year of coursework, and the technical expertise was a defining feature of many students sense of professional identity. In the practical perspective of professional identity, mindsets like
confidence, habits like collaboration, and conditions like uncertainty featured prominently in how students began to understand their actions and motivations at a more sophisticated level. Finally, critical emancipatory perspectives of professional identity emerged for a single student as they contemplated place and privilege in a colonized setting.

Throughout this data, students defined themselves, highlighted their experiences and skills, contextualized their strengths with personal interpretation and were critical of systems of power and oppression. In the next chapter, I will discuss what students gain as a result of locating their professional identity through praxis.
Chapter 5: Discussion

Dr. Read leans nonchalantly against the table in the corner of the room. His tall stature and casual attire convey approachability and authenticity rather than authority to his students. I ask, “Dr. Read, would you describe one of your strengths? Does an example come to mind?” He pauses and then the idea appears on his face. As he begins to describe how his analytical nature created a kind of paralysis when purchasing a new mobile phone, I scan the faces and body language from the students in class. I see some nods, smiles, and a few focused faces. Dr. Read begins to conclude his story, and I ready myself with the handout for the next activity. With papers in my hand, I ask one more question. “Ok, I can see how someone with a background in critical thinking skills, like a professor in biochemistry, might seek out data to make an informed choice. So how are these strengths different from your analytical skills? What makes you sure they are strengths and not skills you learned? Wouldn’t most people use data to make a decision?”

Dr. Read pauses again. He begins to explain, and then he looks to me with a smile on his face. “But even if I didn’t agree with StrengthsFinder, I still need to reflect on myself to answer that question. Aha! You tricked me into reflecting! Argh!” he exclaims with fake indignation. The classroom erupts with laughter, and I begin to explain the instructions for the next activity.
As Dr. Read and I began to create the series of in-class activities and term two reflection assignment, our intention was clear: incorporate critical self-reflection, grounded in a strengths-based approach, so that students could draw connections between their identity and their experiences. The *StrengthsFinder* assessment is an instrument used to enhance critical reflection rather than replace it, and some students may be distracted by the results of the assessment. To underscore this intention, during our preparation we agreed to model the practice together at the front of the room each time we taught together. Students would be able to see the ongoing practice of critical reflection as well as the impact it has on how Dr. Read and I understand ourselves as educators. Given his role as a two-term, third-year, instructor and departmental advisor, there is ample time for students to build trust and rapport with Dr. Read. However, I appeared as a new face for a single day in their degree experience. My unfamiliarity served as a foil for Dr. Read, however, he firmly held the power of influence due to his ongoing connection to students in the department. Embedding career learning in courses could not be enacted without the authentic congenial relationship between us as educators. Furthermore, career learning in courses could not be sustained without the mutual respect for role and expertise we each bring to this collaborative endeavour.

### 5.1 Significant Findings

In this chapter, I argue that when third year biochemistry students critically reflect on their strengths, they begin to engage in praxis about their professional identity. As emerging professionals, students ought learn how to act for the greater social good with the skills and knowledge they attain during their degree. Biochemistry students learn advanced technical skills that have the potential to change the human and natural world in novel ways, and many of these practices, like gene editing, have unknown long-term consequences. These technical
skills are not value neutral, and while discussions about the moral and ethical implications of techniques are present in many classes, these discussions do not explicitly attend to a deeper investigation of students emerging professional identity. For students in university, no matter their discipline, the skills and knowledge they learn has immense potential, and when paired with praxis as part of their professional identity, leads them to think purposefully about the moral implications of their actions.

My first significant finding is the notion that students are emerging professionals. Students named their strengths and described their attributes without needing a role or future role. To become a professional, one does not need a professional specific role. Rather, being a student is a role rich in experiences where students can interrogate their emerging professional identity. Their experiences as students in the classroom provided examples where they noticed strengths, skills, and attitudes of a professional, and related their own behaviour to those constructs.

My second significant finding focuses on the phenomena of agency for students, educators, and schools. For students, when they name their strengths, they take power of their role in learning and developing their professional identity. Educators exercise agency in their classrooms with the pedagogical choices they make, and incorporating critical reflection requires agency on the part of the instructor. Often times, attending to professional identity of learners is not immediately seen as disciplinary-specific learning, however, what students learn about themselves can engage them deeper in their discipline. Schools have agency to incorporate phronesis, or not, in their preparation of emerging professionals. This may be helped by a habit of praxis and culture of phronesis inside the classroom and across the extra-curricular opportunities students participate in. My third significant finding focuses on the role models and representations of professionalism students encounter. Students model their
habits and mindsets off the expectations professors set. When professors model praxis, students are influenced by the expectations and implicit messaging they encounter. My fourth significant conclusion focuses on privilege and the relationship between praxis and one’s ability to examine and interrogate the systems of power in which they exist. Praxis and phronesis leads students to think purposefully about the moral implications of their actions, and this is an important aspect of their emerging identity as professionals.

5.1.1 Student as an emerging professional

Students begin to develop their professional identity before selecting a future role or profession. Amongst the participants in this research, a small number named roles or future professions where they intend to apply their knowledge, skills, or attitudes. In the few examples where students described becoming scientists, academics, or researchers, they linked their skills to these future roles generally, however future roles were not a prominent feature in the critical reflective writing assignments. The absence of specific roles or technical bench skills from the discussion about professionalism is noteworthy. Instead, students investigated their inner narratives about what is true for them, what they can do, who they are becoming, and where they are situated in their current role as students without emphasis on a defined profession in the future. Many participants described being a student as a role with ample experiences to reflect on and build towards a future professional identity. Thus, praxis in relation to one’s professional identity does not predict a certain role or type of experience, but rather a certain approach to understanding one’s experience. A similar phenomenon can be seen in other examples of phronesis in the literature. For doctoral candidates learning to embody life as researchers (Jankelson, 2013), or for experienced researchers interrogating their practice (Kreber, 2014), their professional identity is a result of their sustained and collective
praxis. For biochemistry students in this research, they did not rely on a defined future path like clinician, business developer, or patent agent in order to take steps towards their professional identity. Instead, their professional identity is born from their sustained habit of praxis and is not limited by role. To draw from Kemmis (2012), "It is the happening-ness of praxis that we must commit ourselves to if we want to learn or develop phronesis" (p. 158). Their professional identity is a product of their experiences, personal interpretation and future aspiration.

Kemmis describes the need for phronesis and makes a very important distinction. Phronesis is not a prescribed set of moral or ethical virtues, a unifying code of behaviours, or one particular interpretation of what is good and right. Instead, Kemmis proposed an important nuance:

- do we want to re-moralise the professions so that every profession will recover its own version of the intention to care above all else for the life and health of the client and the community, and to do no harm? If so, is our desire that these professionals will always know the good in advance and for all times and circumstances, and therefore act correctly in every case? If we do, then once again we may be hoping for another version of techne, a set of universal moral principles from which we can deduce the correct way to act, in every circumstance. In short, perhaps, we are asking for a set of principles that will function as moral rules (as in techne) (2012, p. 153).

Phronesis is a disposition, or quality, in a professional who intends to act wisely and justly given the circumstances they face. Professionals acknowledge the inherent uncertainty in what they know and don’t know, as well as the irreversibility of their actions to address the situation. As technology changes at a rapid pace and the pursuit of profit continues to drive the economy, professionals are under increasing pressure to perform. Yet, their performance, much like the
skills of an undergraduate student, are not value-neutral. Professionals must learn how to make choices and take actions with responsibility and integrity (Mahon, 2014). Their identity and their actions are inextricably linked, because their actions are a reflection of their personal values and moral character. A student develops their professional identity beyond job or role when career learning is embedded in the classroom as praxis, rather than content knowledge or job search strategies.

The current examples of career embedded in the curriculum describe exploring career paths for a particular discipline, learning to write academically, writing resumes, and preparing graduate school applications (Ciarocco, Dinella, Hatchard, & Valosin, 2010). Instead, career learning, as defined in this research, is rooted in the meaning and narrative students have about professionals, the world of work, and their future position within it. Phronesis attends to learning as future professionals who do what is right, or just, rather than simply learning to do what their knowledge and skills enable. Embedding critical reflection focused on personal and professional growth is not a consistent practice for many students across their degree, and yet it has immense potential to further a student’s engagement in their discipline while practicing necessary skills to navigate future professional life.

5.1.2 Agency

For students, naming their strengths is an act of power and self-determination as they develop their professional identity. For educators, pedagogical choices in the classroom, especially when incorporating critical reflection, requires agency on the part of the instructor as these educational instruments are not consistently viewed as integral to learning disciplinary content in all subjects. Finally, schools exercise agency when they engender phronesis as part of one’s professional practice for students, faculty, and the campus community.
Students claim power as they name, or even reject naming, their strengths when they are given the opportunity to critically reflect. This power allows them to begin to see the active role they take in their own learning towards an eventual career. As students began to articulate the examples and instances where their strengths resonated, they were taking active steps to define and describe these terms in their own language as observed in section 4.1.1. (p. 44-45). In a Freirian sense, they named a deeper internal structure with their own interpretations that built an internal literacy, which cannot be otherwise taught. There were many students who found the StrengthsFinder results resonate and enhance the language they used to describe themselves as evidenced by the comments in section 4.1.3 (p. 50-52). For some students, self-assessment tools prescribed categories that felt limiting and undermined their agency. For example, one student, who strongly disagreed with the use of StrengthsFinder and similar tools, described self-assessment tools as having “cookie-cutter categories” (H. C.) that were not useful because most people should be able to locate themselves within any and all of them. Throughout the students’ clear and thoughtful critique outlined in section 4.1.2 (p. 46-49), they used second-person language to externalize and other themselves from the exercise.

In class, and in the written assignment, students were asked to describe their strengths. There was no expectation that students rely on the language provided by the tool, rather, that they find their own meaning and language to describe themselves after sparking ideas with the tool. All students were invited to disregard elements of the assessment, or the assessment entirely, provided that they still engage with the questions: what are your strengths? How would you describe them? How might this strength help you? How might it hinder you? What do you want your lab partner to know about your strengths? When writing months after the in-class activity, H. C. selected fatalistic language to describe people as “innately” and “unavoidably” self-focused. Their use of second and third-person voice
externalized reflection rather than engaging internally. This choice hints at the possible lack of agency students feel in school, and the prevalence of prescribed activities and expectations.

For praxis and phronesis to be sustained, students ought learn how they control their narrative of professional identity through their language and interpretation. Who they are and who they are becoming is best described by each individual. Professional identity cannot be bestowed, assigned, or imposed. Instead, Kemmis (2012) argues that “we are prepared [to be professionals] by experiencing the irreversibility of our own actions, and the irreversible consequences of our actions” (p. 154). Thus, it is imperative that students understand and explore their actions as they see them and take an active step towards examining their experiences.

Educators assert agency in the pedagogical choices they make when they embed critical reflection for professional identity development in their discipline and course material as evidenced in the comments from students in section 4.2.2 (p. 55-56) as well as section 4.3.2 (p.68-69). The comments in both sections describe the outcomes of specific activities in Dr. Read’s class that occur as a result of the specific activities, both *StrengthsFinder* critical reflection as well as other components such as laboratory methods or professional skills. There are few examples in the literature of career learning embedded throughout the degree experience for undergraduate students (Ciarocco, 2018; Ciarocco et al., 2016; Halonen & Dunn, 2018). However, professional programs providing specific role preparation to future professionals, such as in nursing (Waddell et al., 2015) or surgical science (Hultman et al., 2012), pay close attention to career development through co-curricular programming. These efforts take place outside of class time and operate on an opt-in and event-based model. This creates an issue of access whereby students who do not have other responsibilities outside of class might find it easier to attend. Many students are increasingly pressured to maintain part
time or full time employment, volunteer roles, and other family or community obligations. For students with these various life roles, participating in additional scheduled commitments outside of class time presents barriers to access learning. These barriers discourage and prevent students from developing their career in preparation for graduation.

However, these are the simplest barriers to dismantle in career learning, as they are the ones most often created by individual educators. Departmental advisors or faculty members advocating for students can suggest alternatives or redesign this programming at term or yearly cycles. There can be a built in cycle for praxis with the start of a new academic year presenting new opportunities to revamp or design strategic approaches to address career learning. In addition to time, it takes creativity and risk for professors to imagine what a course might gain from different pedagogies or assignments. Halonen and Dunn (2018) provide some examples of various ways that professors might embed career learning in senior level seminar courses, and they make particular mention to projects, problem-based learning, service learning, high impact practices (Kuh, 2008), as well as the possibility for alumni or employers to provide feedback on assignments where their expertise aligns with course content. These excellent examples of career learning embedded in courses can only excel when professors recognize both their agency and the available support from other departments at the university. Thus, individual educators exercise agency when they make decisions about how professional identity and career learning is positioned and which students can develop their professional identities during their degree experience.

Finally, universities have agency to incorporate phronesis, or not, in their preparation of emerging professionals. This may be helped by a habit of praxis and culture of phronesis inside the classroom and across the extra-curricular opportunities students participate in. Students described work in Residence Life in section 4.2.4 (p. 58) as an opportunity to apply their
strengths and impact the campus community. From this example, I see that praxis in the classroom has potential to impact extra-curricular roles. Thus, praxis is part of the culture of an institution encourages, enacts, and instills the practice. This phenomenon has been investigated where both the individual educator the wider department or university engage in praxis to facilitate potential change and assert a moral direction for the school (Mahon, 2014). Whether at the departmental or programmatic level or the individual course level, actors with a system of schooling make choices about how and when students develop their professional identity, and the means they investigate and interrogate their own professional practice is worth examining.

5.1.3 Modelling

Students model their interpretation of professionalism from examples within their experiences. Professors are a major part of the degree experience and signal importance to students by emphasizing specific knowledge, skills, and attitudes from both a disciplinary-specific perspective as well as general professional perspective. Due to the size and scale of many teaching laboratories, professors structure protocols and techniques into predictable conditions that nearly guarantee a student’s success if they follow the instructions. Some instructors referred to a “cookbook style of learning” (Aguanno et al., 2015; Caldwell et al., 2004; Hunter et al., 2007; Silva & Galemebeck, 2017; White et al., 2013) where students approach their skills as formulaic techniques to memorize and complete as referenced in the comments of N. M. (p. 57). These conditions are diametrically opposed to those of a research laboratory and neglect to expose students to the inherent unpredictability, mistakes, and iteration necessary to succeed in a laboratory (Hunter et al., 2007). Instead, teaching laboratories using this cookbook method are perfectly poised between efficiency and accuracy.
Much like a person learning to cook at home, students can follow the directions and produce a reasonably consistent outcome across the class.

While this approach may be a necessary strategy to teach hundreds of students with finite instructional hours, students learn how to respond to that system of expectations. When students described the quality of their work, they paid careful attention to the relationship between time and production (p. 57). Implicit in their writing was the question what is the best possible grade that can be obtained in the least amount of time or effort? Here, students observed certain values about work indirectly communicated by individual professors and modelled by the university as an institution. Completion and speed are valued as quality outcomes rather than a deeper engagement throughout the learning process – observing mistakes, making corrections, taking calculate risks, and experimenting. The work of iteration and deeper engagement is reserved for research settings and not teaching laboratories. Many of the hallmarks of a genuine experiment, such as imagination and creativity (Simon, 2001), are missing from the cookbook style of teaching, and instead Bobbitt’s mechanized curriculum manifests (Bobbitt, 1918).

For students who have only experienced the cookbook-style laboratory course, critical reflection is difficult to locate along the axis of time and effort. Praxis can sometimes be seen as a distraction from the ‘real’ work. When planning these activities over four years ago, Dr. Read was quick to offer a portion of participation marks to incentivise student attendance and completion of in-class activities as well as the written reflection assignment. However, praxis facilitates paradigmatic shifts. One thematic example of this shift came from the many students who commented on the nuance of their strengths as neutral behaviours with both positive and negative consequences depending on the setting (p. 50-52). In this case, students began to see the importance of context and setting rather than their initial intention when interpreting
their previous behaviours. Other students illustrated examples where they applied their strengths and learning from BIOC 301 to extra-curricular roles or other courses where partner or teamwork is required (p. 58). As their learning is reshaped and configured to suit a new setting, these individuals attested to the merit of praxis and its importance in future learning. For example, P. U. made this point (p. 68) when they described their shift from formulaic laboratory assignments to procedures that required deeper thinking, planning, and troubleshooting. Their paradigm has shifted, and critical reflection is no longer a distraction from productivity or efficiency. Now, it is central to advancing the quality of the work being produced. A similar paradigmatic shift happens when students no longer see their lab partner as a convenient way to divide responsibilities but rather an integral partner whose contributions are essential to completing the task at hand. Modelling praxis and providing multiple opportunities for students to practice critical reflection as part of their course encourages an eventual paradigmatic shift. For students who encounter that shift early, they can continue to develop their professional identity with each iteration of praxis.

5.1.4 Privilege

When students exercise agency and engage with critical thinking, they are using praxis as a distinctive form of action, and this practice can result in awareness of and critique of systems of power and privilege. One student, K. L. reflected on their ability to attend university as a privilege that many others cannot achieve in section 4.4 (p. 71-72). K. L. did not expand on the potential barriers such as cost or distance that prevent individuals from attending university, however, they did suggest that the place of university is an important one when they say "several individuals do not even have the opportunity to stand where I am standing" (p. 71). K. L. points to a particular history at The University of British Columbia that is also symbolic of
other institutions in Canada. Limited access for both individuals as well as historically marginalized populations is far more complex than critiquing the measures of academic performance that dictate an applicant’s eligibility for higher education in North America. The University of British Columbia symbolizes a particularly controversial territory for those who know the many histories of the land, as it occupies the traditional, ancestral, and unceded territory of the Musqueam people (Lau, 2015). Aaron Lau (2015) provides a high-level overview of UBC’s unique history with Musqueam through his Sustainability Scholars report. In this, he surfaces the researcher-community relationship that has been particularly problematic as knowledge is extracted from the minds, bodies, and heart of communities through documenting stories, language, spiritual objects, cultural practices, and bodily fluids. He references the unethical practices of one research as recently as 1980 when the professor collected blood samples from First Nations communities and continued to use the same samples for additional studies without individual or community consent (Lau, 2015). This is one example of many in the academy-community relationship that has eroded trust and continued to exploit Indigenous bodies, place, and knowledge to further the goals of academic institutions.

Unfortunately, the complex and contested history between Indigenous communities and educators extends the experience of trauma and genocide that Indigenous students witnessed or encountered as a result of residential schools. The legacy of colonization continues to perpetuate harm for some Indigenous students attending higher education (Pidgeon, 2008, 2016). Whether measured by social determinants of health, socio-economic status, or level of attainment, Indigenous students experience systemic barriers as a result of colonial structures that are present in our schools, and The University of British Columbia still has far to go towards decolonizing and Indigenizing the academy. Yet, without collective praxis
towards critical emancipation, it is impossible for individual educators and our collective of professionals to attain a respectful relationship between the university and Musqueaum. Phronesis acts as the entry point to challenge individual and collective privileges that engender structures of oppression and unsustainability (Kemmis, 2012). Praxis and phronesis imbue professionals with the skills to engage in their work and to transfer that knowledge to other roles in their lives.

Phronesis does not end with individuals as professionals. Phronesis equips individuals with a moral compass to navigate the world, and when collaborating with others, to share a consistent direction towards virtues like freedom from structures and systems of oppression. From Kemmis’ (2012) perspective, “phronesis is no more than a commitment to do our best under uncertain and thus more or less unpredictable circumstances—to act for the best for all of those involved and affected (p. 153). Phronesis reminds individuals and communities, that we have agency to attend to the injustices we encounter. Phronesis invites us to use our privilege as people and professionals and ally ourselves where appropriate. In this way, praxis and career learning transcend the world of work and expand the notion of career to include civic engagement as an important outcome of professional life. Career learning means so much more to students, schools, and society than mere job preparation.

5.2 Limitations and Future Research

This research centres on how students conceptualize their identity, and yet, there is relatively little demographic data collected about each participant. Some of this was an intentional desire to maintain anonymity and maintain the privacy of participants to encourage their submission of personal reflective writings. However, there are many questions about various dimensions of identity such as socio-economic status, race, culture, or gender that
cannot be addressed in this research. This lack of information about each participant creates a major limitation in the depth of analysis that can be conducted and the conclusions that can be made. Given that many of the elements of critical reflection are founded in personal experience, and personal experience is inextricably linked to gender, race, socio-economic status and so many other markers of identity, there is a dimension of analysis that cannot be explored at this time. Future studies with this group of participants could focus the research inquiry on racialized or gendered interpretations of professional identity for university students. Further research could also examine the employment outcomes of students who demonstrated greater fluency with praxis. In addition, the data collected originated from reflective writing assignments in a third year biochemistry class, however, there is no disclosure from students about participants’ prior experience or practice with critical reflection. Some may have extensive practice with critical reflection, increased comfort with the insights generated, and greater fluency with their internal observations. Broadly speaking, this research also invites questions of the narrative of professionalism within universities. What is it? How is it conveyed? And which actors influence the interpretation of professionalism? Finally, what is the impact these narratives have on students?

5.3 Recommendations

There are a many future research questions that may be derived from this research. Future studies with a cohort of students throughout their degree could observe sustained praxis over time and enhance the understanding of phronesis in different university contexts. Additional studies with this existing group of participants may expand cultural, gendered, and racialized notions of praxis or professional identity. Finally, from a broader perspective, when career development is discussed in a higher education context, the student voice is often
absent from published articles. The only example of discourse analysis in career development (Stead & Bakker, 2010) emphasizes discourse analysis as an intervention and is not attentive to the unique context of university students career development. In addition, the literature cited surrounding career development courses (Austin, 2011; Folsom & Reardon, 2003; Grier-Reed & Conkel-Ziebell, 2009; Hultman et al., 2012; Waddell et al., 2015) or career embedded in coursework (Ciarocco, 2018; Ciarocco et al., 2016; Halonen & Dunn, 2018; Hunter et al., 2007) does not incorporate the perspective or voice from students.

Critical reflection and praxis connect individuals to who they are and who they are becoming. Career learning and phronesis are inherently a person-centred concepts, and yet few examples incorporate the voice of participants into their published findings (Aspfors, 2012; W. Jarvis & Logue, 2016; Mahon, 2014; Patton, 2016). A central component of this research has been the including the student voice as an active point for discussion. From a Freirian perspective, the voice of participants is essential in illustrating the personal interpretation of one’s professional identity. Professional identity is understood through the interpretation of narratives and previous experiences, and yet, many of those narratives and experiences are not present in the literature to date.

5.4 Conclusion

In this chapter, I have argued that biochemistry students begin to engage with praxis about their professional identity through strengths-based critical reflection. With respect to their professional identity, students position themselves as emerging professionals when they define or refine who they are becoming regardless of the role in which they aspire. Their actions, and the agency originating in those actions, allows them to begin to see the active role they take in their own learning towards an eventual career. Furthermore, classrooms are settings where
students begin to enact their own professional identity while observing how professors model professionalism. Lastly, critical reflection in the classroom encourages students to think purposefully about who they are becoming and where they are positioned in terms of power and privilege. All of these observations are the beginning seeds of a greater professional principle, phronesis.

Professionals oriented towards phronesis learn to navigate the uncertainty and irreversibility of their actions overtime and aspire to do good as a result of their actions in spite of the elements of unknown. They are not limited to a single or prescribed set of norms towards goodness or morality, rather, professionals engaged in praxis continuously learn and navigate towards a better future removed from injustice, oppression, and unsustainable practices. In this way, phronesis is not content to be taught, but a practice where students begin to locate their professional identity through praxis.
Chapter 6: Conclusion

Each pair of students sits together in an animated discussion. There are moments of laughter across the room that erupt like popcorn. As I gaze around the room, I notice partners nodding in agreement as one person shares their personal reflections with the other. Two pairs exchanged papers to quietly read their partners responses. One person in the back left corner is focused on their mobile phone while their partner sits awkwardly avoiding eye contact. Dr. Read signals to me that he’s going to open the laboratory and get some equipment ready for the last task of the day. As he slips out of the room, I gather the group one last time. By this point in the day, students have reflected on their strengths, shared their insights with their laboratory partner, and possibly gained insight into the strengths of their partner. Before they return to the lab for one last task, I ask them to consider what actions they could take now that they know this information about themselves and their partner. I wait for a few moments before hands rise from the group.

“I just never thought of these things as positive traits, like, you know, I just thought like, they were not useful in a real way. My partner told me that they rely on me to keep us focused, so that’s like a good thing, I guess.” They offer and then trail off with a shrug.

“Yes! You’re right. I can see how that new perspective might be different if you haven’t seen the benefit in that strength before. Can I ask you a follow up question?” I pause and wait for their permission before
continuing. “Now that you see focus as a strength instead of a weakness, what action might you take now or how might that knowledge help you in this course?”

“I guess I’ll stop holding back so much and that means we can get more work done” they respond. I wait for a few more responses from others to see what other observations and messages can be made from peers before I begin to conclude the lesson.

“There might be other examples like this where you notice how an insight can lead to action, and some of those actions might help you in this course, another course, a volunteer role, or even part time work. When you think about your co-op applications or summer job interviews, these strengths can be in the back of your mind when you pick examples to share” I say. Dr. Read returns to the room, and I ask him to inform the class about the reflective writing assignment in second term. A few students reach for their bags and the sounds of shuffling papers fills in the background.

For the last five years, I have been experimenting with pedagogies that encourage students to explore their professional identity within their coursework. In partnership with a Biochemistry professor, Dr. Read, we designed in-class activities and one reflective writing assignment for students to explore and articulate their strengths. This opportunity, like countless others during an undergraduate degree, provided a window for students to examine their professional identity and make meaning of their classroom experiences towards their future aspirations. In a Freirean sense, the degree experience is full with opportunities where students name and build
literacy for who they are and who they are becoming. Building from that perspective, this research explored the professional identity (Kemmis, 2012) of undergraduate biochemistry students across four domains: theoretical, technical, practical, and critical emancipatory perspectives. Student responses spanned all four domains and illustrated a diverse set of understandings about one’s professional identity. They position themselves as emerging professionals when they define or refine who they are becoming regardless of the role in which they aspire. In particular, the skills and knowledge students learn has immense potential, no matter their discipline, and when paired with praxis as part of their professional identity, leads them to think purposefully about the moral implications of their actions. In this way, career learning lives at the nexus of so many facets of a student’s life – present and future, skill and goal, theory and practice, self and community. It is a powerful place of aspiration and imagination for students, their families, and the communities they are a part of. Strengths-based critical reflection encourages students to maximize their degree and set them towards their future with purpose and responsibility for the consequences of their actions, even in uncertain circumstances.

6.1 Closing Thoughts

When students critically reflect on their strengths, they focus their analytical skills inward and take active steps to name and claim who they are and who they intend to become. Students are not bound to a role or professional designation when they consider future aspirations, instead, the emergent professional is defined by their own interpretation of their assets and qualities. These assets and qualities manifest in the classroom as students practice applying their strengths to work. Each cycle of practice invites students to iterate how they examine, define, apply, and adjust their perspective and behaviour. Through these actions,
students exercise agency and self-determination that is derived from praxis. A new skill and lifelong practice, praxis emerges and can guide future professionals towards phronesis throughout their life.

Classrooms are spaces where students practice enacting their burgeoning professional skills and identity. Professors play a key role in modelling the expectations and conventions of professionalism to the students they teach. Their presence, as world-class experts in their field, signals to students what is required of them and what will benefit them in the future. Students see the importance of critical reflection as a professional practice when instructors make intentional choices to incorporate praxis into coursework. In many courses, students rely on a recipe-like mentality to complete assignments with minimal effort and maximum yield in the form of grades. When professors subvert this practice in their own classrooms, learning transforms from content to engagement. A student's mindsets, habits, and context are now instruments for deeper learning about the discipline and who one is in relation to their field. For example, students describe newfound levels of confidence in their abilities and a sense of responsible for the impact of their actions or inactions with others. Whether participating in class discussions, solving problems on teams, or analyzing data, these insights serve students to apply their strengths in future roles that could be as soon as their next semester or into their first years as a working professional.

For this type of career learning to take place, instructors must make intentional choices to include and prioritize professional development in conjunction with disciplinary-content. Just as agency is imperative for students, agency is also imperative for educators. Choices on the part of the instructor in a course, administrators in departments, and institutions as a whole to prioritize an integrated approach to career and disciplinary learning have an impact on students and the opportunities they encounter to intentionally develop their professional identity. When
praxis is woven into the culture of each layer in a school system – students, educators, administrators, communities – the collective phronesis from each individual actor creates a momentum towards broad social change. Phronesis unites the work of professionals across disciplines in order to solving global issues (Edwards et al., 2013). It allows us to draw connections across disciplinary lines to tackle large social issues using diverse knowledges and skills to solve a common problem for a better future.

In education, phronesis encourages students to think critically about who they are becoming and how dimensions of power and privilege intersect with that identity. Structural oppression and privilege can be observed in students critical reflective writing without explicit questions that prompt themes of power or social justice. With continued efforts towards praxis in the classroom, schools will be preparing professionals who can act with responsibility and integrity even in uncertain and emerging circumstances. Preparing career ready graduates with praxis as professionals transcends skills and job training. It prepares students to be purposeful in their lives and to act with a sense of what is morally right. Professionals use their skills and strengths based on a sense of what will have broad social benefit even in an uncertain and evolving future. If we want to prioritize professional identity development and career learning in higher education, it must encourage phronesis.

6.2 Recommendation for Students and Families

In order to have professionals who think and act with purpose and virtue, we need to shift the narrative of career that gets reinforced in day to day conversations. Parents and family members, when you are in casual conversation at home, over a meal, or at family gatherings, I invite you to shift the question from “what do you plan to do with that degree?” to “what strengths do you notice in your degree? How might you apply those strengths?” Start
conversations about how you see your strengths as a help or a hindrance in the different roles that you hold – student, sibling, partner, parent, employee, business owner, and others.

Share examples of instances when you noticed your perspective change as a professional. Highlight the influences that contributed to that shift in perspective. Illustrate examples of instances when you notice your strengths and values informing your choices. Ask young people to describe how their strengths and values influence a choice they are making. Each question and story is a moment to learn.

**6.3 Recommendation for Career Practitioners**

The places and spaces where career practitioners are used to working are not always the places where students engage in career learning. Students don’t need more programs, extra workshops, or additional one to one coaching with career advisors. Rather, they benefit from opportunities within their experiences to consider their professional identity through critical reflection. Over time, they need to build a habit of praxis in order to examine their moral disposition. Although laboratories and lecture halls can be interpreted to be sites for disciplinary learning and technical skills, students gain personal and professional insight. These revelations can be maximized, and students can be intentionally encouraged to make them, when professors assign critical reflection and model the impact that comes from praxis.

**6.4 Recommendation for Educators**

Preparing career ready graduates can invite debate and controversy about the role of the higher education institutions (Blumenstyk, 2019; Schneider, 2015; Speight et al., 2013). The pursuit of academic goals is not always commensurate with the goals of industry, and it need not be. However, professional identity development and career learning does not
necessitate aligning academic programs to fulfill the expectations of industry. It does not need to measure success of graduates based on the rate of employment or the salary range in their first job after graduation. Instead, students can begin to develop their professional identities and equip themselves for the future where they see the moral consequences of their actions.

Personal and professional learning does not have to be happenstance or implicit for students to encounter. Personal and professional learning doesn’t have to come from extensive one on one mentorship that can be difficult to scale for large institutions. Instead, personal and professional learning can be brought in at scale through the assignments and expectations that professors and educators set across the institution. These assignments and expectations signal a story and interpretation of what it means to be a graduate and professional. The stories we tell about ourselves and our career matter. They matter to us and they signal explicit and implicit messages to others about the world of work.

6.5 Implications for my practice

I started seeking to understand learning and learning theories when I grew tired of providing answers to the same questions for students in advising appointments and workshops. I noticed that, at best, my team of advisors would have capacity to see less than one-quarter of the university population through one to one advising or workshops at the campus career centre. Moreover, I noticed that most of the experiences students identified as important in their future did not take place in student services. Some of these experiences include: co-op, internships, capstone courses, undergraduate research, or community based experiential learning (Kuh, 2008) to name a few. As a career advisor, the workshops and advising that filled my calendar were not aligned with the areas of impact students described. This opportunity to take career into the classroom has proven to expand what I see as possible
for career learning at university. As Kemmis (2012) has implied, the deeper my theoretical background, the more refined my technical instructional design skills, and the deeper connection I see between theory, practice, and own positionality – the greater my desire to do good for career learning. Education has been a stabilizing force in my life, lifting me out of poverty and the insecurity in my family. I seek to promote “goodness” in my profession and continue to improve universities for students looking to make life and their communities a better place.
References


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Appendices

Appendix A: Research Materials

Appendix includes:

- Research Flyer
- Letters of Contact to Participants
- Participant Consent Form
A.1 – Research Flyer

Informed Consent to Participate:
Strengths-based Praxis in a Biochemistry Lab

Purpose: Many undergraduate students are motivated to attend post-secondary education with the implicit promise of a better job and life after graduation. During their studies, students are keen and interested in exploring and authoring their own sense of purpose and meaning, but are rarely given space and time in the classroom to do so. What would happen if it was positioned alongside discipline-specific knowledge? Through a partnership with a Biochemistry professor, I co-facilitate one in-class activity and a reflective writing assignment within a third year laboratory methods course. This research project will explore the reflective writing assignments to understand how students author their skills, strengths, and future goals.

Project Procedure: If you agree to participate and provide consent through online consent form, your participation allows the researchers to review one reflective writing assignment completed during BIOC 301. Participants do not need to submit the assignment directly and no additional writing or reflective exercises are needed. This project requires a minimal amount of time (5 minutes or less) to participate. Once permission has been granted, the researchers will review each writing assignment and conduct a critical discourse analysis to investigate the learning that took place.

This research project may help to:
1) Enhance understanding of effective career development activities during an undergraduate degree.
2) Encourage future activities with evidence-based outcomes for students to develop their sense of identity throughout their degree.

A summary of the research findings may be prepared in plain language for participants who express interest in the project.

Confidentiality: Every effort will be made to maintain confidentiality and participant anonymity. Research findings will only identify participants writing using a fictional name and where possible, themes will be reported using composites of multiple participants describing the same
theme. The composites will also be given fictional names, as the theme and illustration of the theme is most important – not the identity of the individuals contributing to that theme.
All data files will be kept in accordance with UBC Privacy Matters recommendations (local hard drive that is password protected and encrypted) and include encrypted storage devices and authorized cloud back up tools (i.e. Workspace 2.0).

**Consent:** Please understand that participation in this project is entirely voluntary and that you may refuse to participate or withdraw from the project at any time.

**Contact:** If you have any questions or desire further information about this study you may contact Kimberley Rawes by phone at [redacted] by email at [redacted]. You may also contact the Principle Investigator, Dr. Kerry Renwick, by phone at [redacted] by email at [redacted].

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.
A.2 – Letters of Contact to Participants

First email

Hey Everyone,

It has been a while since you finished BIOC 301, and I wanted to reach out to invite you to participate in a research study conducted by a graduate student in the Faculty of Education. Kimberley Rawes, graduate student in the Faculty of Education, is interested in learning about what you wrote in your reflective writing assignment assigned in second term of BIOC 301.

Participating in this study means consenting to her reviewing your assignment. There is no additional survey or interview needed. I can forward your completed assignment to her after you provide your consent. The total time commitment would be less than 5 minutes.

If you are interested, you can review the full consent form attached and provide your consent here: [https://ubc.ca1.qualtrics.com/jfe/form/SV_bJCFoTemz5gXixD](https://ubc.ca1.qualtrics.com/jfe/form/SV_bJCFoTemz5gXixD)

Any questions can be directed to Kimberley at: kimberley.rawes@alumni.ubc.ca or the contact information on the consent form.

Cheers,

Jason
Hey Everyone,

Quick follow up to my previous email – if you are interested in participating in a study about the reflective writing in BIOC 301, please review the materials from Kimberley Rawes, graduate student in the Faculty of Education. Full details of the study are attached again and you can provide your consent here: https://ubc.ca1.qualtrics.com/jfe/form/SV_bJCFoTemz5gXixD

Any questions can be directed to Kimberley (contact and email) and her contact information on the consent form.

Cheers,

Jason

A.3 – Participant Consent Form

Informed Consent to Participate: Strengths-based Praxis in a Biochemistry Lab

Purpose: Many undergraduate students are motivated to attend post-secondary education with the implicit promise of a better job and life after graduation. During their studies, students are keen and interested in exploring and authoring their own sense of purpose and meaning, but are rarely given space and time in the classroom to do so. What would happen to career learning if it was positioned alongside discipline-specific knowledge? Through a partnership
with a Biochemistry professor, I co-facilitate one in-class activity and a reflective writing assignment within a third year laboratory methods course. This research project will explore the reflective writing assignments to understand how students author their skills, strengths, and future goals.

**Project Procedure:** If you agree to participate and provide consent through online survey, your participation allows the researchers to review one reflective writing assignment completed during BIOC 301. Participants do not need to submit the assignment directly and no additional writing or reflective exercises are needed. This project requires a minimal amount of time (5 minutes or less) to participate. Once permission has been granted, the researchers will review each writing assignment and conduct a critical discourse analysis to investigate the learning that took place.

This research project may help to:

1) Enhance understanding of effective career development activities during an undergraduate degree.

2) Encourage future activities with evidence-based outcomes for students to develop their sense of identity throughout their degree.

A summary of the research findings may be prepared in plain language for participants who express interest in the project.

**Confidentiality:** Every effort will be made to maintain confidentiality and participant anonymity. Research findings will only identify participants writing using a fictional name and where
possible, themes will be reported using composites of multiple participants describing the same theme. The composites will also be given fictional names, as the theme and illustration of the theme is most important – not the identity of the individuals contributing to that theme.

All data files will be kept in accordance with UBC Privacy Matters recommendations (local hard drive that is password protected and encrypted) and include encrypted storage devices and authorized cloud back up tools (i.e. Workspace 2.0).

**Consent:** Please understand that participation in this project is entirely voluntary and that you may refuse to participate or withdraw from the project at any time.

**Contact:** If you have any questions or desire further information about this study you may contact Kimberley Rawes by phone at XXX-XXX-XXXX or by email at XXXX. You may also contact the Principle Investigator, Dr. Kerry Renwick, by phone at XXX-XXX-XXXX or by email at XXXX.

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Your Student Number

________________________________________________________________

Your Email Address

________________________________________________________________
Do you consent to participate in the study described above?

Yes  (1)

No  (2)

Do you wish to receive a plain-language summary of the research findings? If yes, you will be contacted via the email address provided.

Yes  (1)

No  (2)

End of Block: Default Question Block
Appendix B: Data Collection

Appendix B Includes

- Reflective Writing Assignment Instructions

Select one question from the list below and write a brief reflection (350 words max) in response.

Question one:
In term one, we practiced presentations and self-reflection using the StrengthsFinder tool.
What impact has that activity had on your understanding of yourself and/or your behaviour?
What is important to you about that?

Question two:
Consider your practice presentation and StrengthsFinder session in term 1. Using those strengths as a starting point, can you name two times after those sessions when you noticed a strength (or combination of strengths)? What is important to you about that?

Question three:
Imagine that you are in another lab in the future. What is something you have learned about yourself from this course that you could apply in that future lab? What is important to you about that?