

# **Addressing the Canadian Transferable Skills Gap Through Understanding University Curriculum**

by

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# ABSTRACT

## ADDRESSING THE CANADIAN TRANSFERABLE SKILLS GAP THROUGH UNDERSTANDING UNIVERSITY CURRICULUM

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There is a gap between the skills taught in Canada's universities, and the transferable skills which are critical both for the labour market, and to help solve the world's complex problems. To address this skills gap, university curriculum needs to change. I used an existing dataset (N=7,374) to determine which fields of study led to higher use of transferable skills on the job, and found that teacher training programs stood out, and that transferable skills are critical for supervisory roles. To understand how courses are designed, and where to focus efforts for change, I conducted a survey of 520 Canadian university instructors on the approaches used for course design and updating. I found that informal tools such as course outlines were used more often than curriculum documents, and that cultures of teaching excellence had an impact on how many and which types of tools instructors use to design their courses.

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# 1 Chapter 1: Overall Introduction

## 1.1 Background

A major challenge in the 21<sup>st</sup> century is adapting to all of the changes in our increasingly technological society, with everything from the internet of things, machine learning, self-driving cars, and the ability to edit our genes – these changes are not only impacting every part of society and merging the digital, physical, and biological spheres, they are also impacting how we live, learn, and work (Schwab, 2017). A series of “megatrends” (Kovacs & Vamosi Zarandne, 2022) such as globalization, social and demographic shifts, geopolitical changes, and automation and digitization, have been noted over the last few decades. The impacts of these trends on both the labour market and society as a whole have been projected to continue to grow (Hu, 2019; Huish, 2021; Kovacs & Vamosi Zarandne, 2022; Schwab, 2017; World Economic Forum, 2016). Most of these trends have only been exacerbated and sped up by the COVID-19 global pandemic<sup>1</sup>, and some additional trends have also shifted to the forefront such as remote work, and social changes aimed at becoming more inclusive of all people (Fyfe, 2021; Huish, 2021; Kovacs & Vamosi Zarandne, 2022). All of these trends are impacting both the global and local labour market, and also have major implications for higher education (Harvey, 2000; Kovacs & Vamosi Zarandne, 2022).

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<sup>1</sup> COVID-19 was declared a global pandemic in March 2020

The turnover in the global labour market is so significant that it is referred to as Industry 4.0 or The Fourth Industrial Revolution (Kovacs & Vamosi Zarandne, 2022; Schwab, 2017; World Economic Forum, 2016). Some researchers have argued that 47% of jobs are at “high risk” for complete automation (Frey & Osborne, 2017). Others argue that while a smaller proportion of jobs (9-12%) are likely to be completely automated, far more jobs will be fundamentally changed as certain tasks (generally routine, repetitive tasks) are automated and workers must therefore focus on the more complex and creative tasks instead (Arntz et al., 2016). Additionally, these technological changes will create whole new types of jobs that did not exist before (Arntz et al., 2016; Schwab, 2017; World Economic Forum, 2016). Canada’s job market is changing just as quickly: in the next decade 50% of our current jobs, and an additional 2.4 million new jobs, will require a completely “new mix of skills” (Royal Bank of Canada, 2018). Contrary to some assumptions that increasing technology integration in society means that everyone needs to learn how to write computer code, there are instead calls to focus on the skills which will be increasingly needed in this new economy and society (Hu, 2019). These skills include some of the things that make us uniquely human - interpersonal skills, communication, critical and creative thinking, problem solving, and more – to fill the gaps that robots are unable to fill (Arntz et al., 2016; Harvey, 2000; Hu, 2019; Kovacs & Vamosi Zarandne, 2022); this has been reflected in recent books and reports with titles such as “Robot-Proof” and “Humans Wanted” (Aoun, 2018; Royal Bank of Canada, 2018) which both urge for more of a focus on cultivating these uniquely human skills in higher education.

Transferable skills in particular are needed in all workplaces (Bennett, 2002; Harvey, 2000; Hill et al., 2020; Washer, 2007), but they are not widely or explicitly taught, nor are they prioritized by higher education institutions (Hill et al., 2020; Washer, 2007). This has produced a growing skills gap and has led some to conclude that our higher education curriculum is “inadequately designed to help Canadian youth navigate this new skills economy”(Royal Bank of Canada, 2018). Therefore, it is essential that Canadian universities re-examine their curriculum, with the goal of addressing this skills gap and better preparing their graduates for this rapidly changing world.

When students enter a post-secondary program, they expect that the experience will build and enhance their skills and abilities, and that attending university will improve their job prospects overall (Weingarten et al., 2018). In fact, Canadian first-year students listed job-related motivations as their top three reasons for attending university (Canadian University Survey Consortium, 2019). Similarly, employers expect post-secondary graduates to possess the necessary skills and capabilities to be successful and contributing members of their organizations (Washer, 2007; Weingarten et al., 2018). However, while universities are very effective at instilling discipline-specific skills (e.g., Chemistry lab techniques in a Chemistry degree) within their programs, these are not the only skills required in the workplace. Employers, including those in the much-promoted Science, Technology, Engineering and Mathematics (STEM) fields, list several transferable skills as the most important they look for in employees. Skills such as active listening, critical thinking, complex and creative problem solving, time management and interpersonal skills, were rated above even occupation-specific skills in a survey of STEM employers, and they are increasingly prized in various

occupational sectors (Fyfe, 2021; Kovacs & Vamosi Zarandne, 2022; Prinsley & Baranyai, 2015; Sinche et al., 2017).

A wide range of terms have been applied to these skills that are needed in all workplaces and across disciplines and contexts, including: key or core skills (Billing, 2007; Washer, 2007), durable skills (Liddle, 2021), generic skills (Venkatraman & Wahr, 2017), foundational skills (RBC, 2018), employability skills (Suleman, 2016), and essential adult skills (Weingarten et al., 2018). Pellegrino and Hilton (2012) argue that all these terms overlap and collectively constitute 21<sup>st</sup> Century Competencies, which they alternatively refer to as transferable skills. Transferable skills, therefore, is the broadest category, and is also a more intuitive term as it highlights that these skills transfer from one context to another, so I will use this term throughout this thesis.

In contrast to what both students and employers clearly want from university programs, there is evidence that there is a skills mismatch between the skills students typically develop during their undergraduate degrees, and those needed on the job. Many transferable skills top the lists of skills that graduates wish they had further developed during their programs (Sarkar et al., 2016). Canadian universities have been accused of being “degree factories” (Royal Bank of Canada, 2018; Weingarten et al., 2018) marked by their failure to provide the necessary transferable skills that individuals need to be effective in the workforce (Express Employment Professionals, 2020c; Royal Bank of Canada, 2018). As we look to a post-COVID world, the demand for these skills is only growing, so this question is more urgent now than ever before (Express Employment Professionals, 2021; Fyfe, 2021). Therefore, significant changes are

needed within the university curriculum if post-secondary institutions are to effectively instill these skills in their graduates.

On the other hand, many arguments put forward about the value and importance of universities (or particular programs or disciplines) to society focus on how these institutions teach students important transferable skills such as critical thinking, problem solving, and communication (Degagne, 2022; Dolansky, 2020; Gertler, 2022; Moro, 2018; Washer, 2007) so it is certainly not the case that no transferable skills are being taught on our campuses. Rather, the development of these skills tends to be patchy and inconsistent (Hill et al., 2020), which is why attention is still needed to understand this problem, including where these skills are most effectively incorporated, and which programs or sectors need the most work. Therefore, it is also important to examine differences between a range of programs and disciplines.

Whenever there are calls for changes to higher education because of labour market forces, there are critics who argue that universities in particular should not be reduced to job-training facilities as they have a higher calling to society, as well as concerns about academic freedom and overreach of both government and industry into the affairs of the university sector (Gertler, 2022; Harvey, 2000; Spooner, 2022; Washer, 2007). However, there are other reasons to emphasize transferable skills development in higher education beyond the connections to the labour market and economic success for graduates. First, society is facing a range of very complex, interconnected issues which have been called “wicked problems” (Chamberlain & Mendoza, 2017), such as poverty, global pandemics, biodiversity loss and climate

change, which will undoubtedly require the same kinds of transferable, human skills to effectively tackle these issues (Chamberlain & Mendoza, 2017; Civic Action, 2018). Next, these skills are also necessary to help create and empower lifelong learners who will be able to adapt to all the changes they will see throughout their lives, in society and on the job (Harvey, 2000). Additionally, many of the suggestions typically put forward to incorporate transferable skills into higher education are well aligned with other suggestions for effective pedagogy, such as increasing opportunities for experiential and active learning, and using authentic assessments (Harvey, 2000; Washer, 2007), therefore pushing for the inclusion of these skills is also promoting high quality teaching more generally.

Universities are also charged with a key research role in society, both to directly conduct research on campus, and to train future researchers for both the university sector and for research positions in government and the private sector. In fact, 37% of all researchers in Canada work within higher education (Stephenson et al., 2020). These transferable skills are undoubtedly also critical skills for research positions both within and outside of the university context. For example, a study of graduates of both STEM and Social Science PhD programs found that a list of 15 transferable skills were seen as very important in research-related employment settings (Sinche et al., 2017). Therefore, a focus on developing transferable skills benefits both key priorities of universities in Canada (Jones, 2014).

Although all sectors of the workforce are shifting substantially, and therefore all higher education programs need to address this transferable skills gap, some fields

(such as the agriculture and food sector, known collectively as agri-food) are being disrupted far more quickly and fundamentally than others. The Canadian government has recognized the agri-food sector as one of the industries with the highest “potential for growth and job creation” (Kurtz, 2017). A recent report, *Farmer 4.0*, details the rapid and far-reaching changes that are taking place in the agri-food industry around the world, and how Canada’s industry is increasingly falling behind in both technological and transferable skills that will be needed by the farmers and agri-food workers of the future (RBC Thought Leadership, 2019). Given these massive changes to the agri-food industry, it is critical that higher education programs in this field implement similarly rapid changes to their curriculum to keep up (Halliday, 2020). However, it is unclear whether highly disrupted and rapidly changing fields such as agri-food are indeed updating their curricula more frequently and substantively, and/or if they are placing an increased emphasis on transferable skills.

There is debate about the best ways to teach transferable skills, such as within the disciplinary curriculum, or in stand-alone skills courses (Billing, 2007; Clanchy & Ballard, 1995; Washer, 2007); but that is not the only open question. There is a substantial disconnect between university-wide curriculum initiatives of any kind, and actual implementation in the classroom (Fraser & Bosanquet, 2006). If university leadership decides to prioritize transferable skills development, that change may be reflected in university-wide or even program-specific curriculum documents; but if instructors do not typically consult these high-level curriculum documents, then these priorities will not trickle down to the classroom. The usage levels of these curriculum documents by Canadian instructors are unknown.

## 1.2 Research Question and Approach

My overarching research question is: Which characteristics of higher education curriculum and usage are most relevant to addressing the transferable skills gap in Canada? I have addressed this question in two ways for my thesis project.

First, I examined whether some fields of study in higher education result in a higher rate of transferable skills use on the job, using existing dataset of public-use microdata (the Programme for International Assessment of Adult Competencies, or PIAAC) from a representative sample of Canadians (Chapter 2). I created an index of transferable skills use from multiple *skills at work* questions on this survey, and then investigated which fields of study, occupations, and other factors led to higher scores on this index. This will add to previous literature related to general student outcomes of different fields of study (Davies & Guppy, 1997; Frenette & Frank, 2016; Maggi, 2016; Sinche et al., 2017). Additionally it can help to integrate opposing views about the best approaches to transferable skill development in the literature, such as whether skills must be taught within a disciplinary context (Clanchy & Ballard, 1995) or within a skills-focused course coupled with opportunities to practice the skills in relevant contexts (Billing, 2007; Hill et al., 2020), by comparing the outcomes from the natural variation between fields of study. Overall, this chapter indicates which fields of study should be the focus of future research on transferable skill development.

Secondly, I conducted my own survey of over 500 university instructors across Canada, to understand what factors impact the development and updating of course curricula (Chapter 3). This will help to clarify how instructors make use of curriculum documents and other tools in the course design process (Fraser & Bosanquet, 2006), as well as understanding how other factors such as disciplinary differences (Carter et al., 2019), type of program (such as rapidly changing fields (Halliday, 2020), and professional programs (Carter et al., 2019; Gambhir et al., 2008)) and workplace culture within a department, university, or more broadly defined community (Manley et al., 2011) can impact the course design process.

With these two approaches, I shed light on which fields of study should be investigated further with regards to transferable skill development, as well as increasing our knowledge of the current approaches to course curriculum design and change in Canada. Together this information can help to inform future research and action into how best to promote effective transferable skills instruction at Canadian higher education institutions.

### **1.3 Structure of the Thesis**

Chapter 2 is structured as a draft manuscript for publication within a journal with a focus on scholarship of teaching and learning, such as the Canadian Journal of Higher Education, and contains an analysis of publicly available microdata from the Programme for the International Assessment of Adult Competencies (PIAAC) from 2012 (the most recent data available from this project). The data from this representative

sample of the population of Canada was used to investigate how field of study in higher education (specifically tertiary education: college and university) impacts the graduates' later use of transferable skills on the job. While this dataset is somewhat less current and provides only indirect data on transferable skills learned within higher education, it still provides important insights into the connection between field of study and transferable skills. The results of this study can be used to indicate which fields of study might deserve further direct research to better understand their strengths and true impact on transferable skill development.

Chapter 3 is structured as a draft manuscript for publication within a science journal such as FACETS, which has an integrative science section suitable for articles with a focus on science education and policy. This chapter contains the analysis of my own survey of 520 university instructors from across Canada to understand the tools and approaches used to design and update their course curricula. This included looking and whether instructors were more likely to use formal curriculum documents or informal tools for course design, which tools were used most, and how much formal curriculum resources were used during course design. Additionally, both linear and logistic regressions were used to investigate how a range of factors including institution type, disciplinary area, program type, and workplace cultural contexts impact four different dependent measures related to course design, and one dependent measure of the frequency of course updates. This survey provides a rare opportunity to learn from the course instructors themselves about how the process of course design unfolds 'on the ground' at universities across Canada, and which key tools and factors are most important to this process.

Finally, the last chapter is an integrative discussion which pulls together the key results from both studies, and discusses their connections, limitations, and some implications for theory, practice, and policy.

## **2 Chapter 2: Which Higher Education Fields of Study Lead to the Highest Use of Transferable Skills at Work?**

*A statistical analysis using data from the Programme for the International Assessment of Adult Competencies in Canada*

### **2.1 Abstract**

Given the rapidly changing job market in Canada and around the world, there have been increasing calls to address the transferable skills gap between higher education graduates and the skills needed by both society to solve our greatest challenges, and for the many new and changing jobs across the labour market. To investigate which fields of study in tertiary education in Canada produce graduates who go on to use more transferable skills on the job, I created an index of transferable skills use at work from several background questionnaire variables from the Programme for the International Assessment of Adult Competencies (2012) in Canada (N=7,374). A series of 4 Ordinary Least Squares (OLS) linear regression models were used to examine the impacts of independent variables such as field of study and occupation type, among other factors, on this transferable skills index. Teacher training & education programs were found to lead to the highest scores on the transferable skills index, suggesting that these programs should be considered as a source of inspiration for how all programs can promote transferable skill development in their students. A connection was also found between transferable skill use and management roles within the

workplace, suggesting that transferable skills are important factors in promotion to and success in management roles.

## **2.2 Introduction**

With a projection that 50% of current jobs and at least 2.4 million additional jobs by the end of the decade will all require a “new mix of skills” (Royal Bank of Canada, 2018), Canada has been caught up in the Fourth Industrial Revolution (World Economic Forum, 2016). Some of the most in-demand skills for these jobs of the future are the transferable skills (also called foundational, durable, generic or core skills (Billing, 2007; Little, 2021; Pellegrino & Hilton, 2012; Venkatraman & Wahr, 2017)) that are needed in all sectors and workplaces. These are skills such as oral and written communication, critical thinking, problem solving, teamwork, time management, organization, adaptability, and creativity (Hill et al., 2020; Pellegrino & Hilton, 2012; Prinsley & Baranyai, 2015). While some of these skills are undoubtedly developed in many post-secondary programs, a growing body of research shows that these skills are not consistently and explicitly taught and developed in depth in all programs (Bennett, 2002; Hill et al., 2020; Royal Bank of Canada, 2018), which is leading to a growing skills gap between tertiary education programs and the workforce (OECD, 2019; Prinsley & Baranyai, 2015; Royal Bank of Canada, 2018; Weingarten et al., 2018; World Economic Forum, 2016). Given that students entering post-secondary programs expect that these programs will build their skills and improve their future job prospects, and that employers expect graduates to possess the skills needed to be effective employees (Canadian University Survey Consortium, 2019; Express Employment Professionals,

2020b; Weingarten et al., 2018), it is important to both the education sector and to our broader society that we understand this skills gap and how it manifests across different fields of study in tertiary education.

There is a robust body of research into differences in outcomes between fields of study in tertiary education (Becher, 1994; Davies & Guppy, 1997; Frenette & Frank, 2016; Li et al., n.d.; Neumann, 2001; Ylonen et al., 2018). Many of these studies have focused on prestige of different programs, and on employment rate and income levels following graduation from various fields of study (for example (Davies & Guppy, 1997; Frenette & Frank, 2016)). As a result, particular types of programs are often touted as higher value than others in the popular press, for example: STEM vs non-STEM careers (Barone, 2022), technical applied programs vs liberal arts (Degagne, 2022; Dolansky, 2020). This sometimes leads to pushback, such as arguments for the value of the humanities and social sciences (Degagne, 2022; Dolansky, 2020; Moro, 2018). However, these broad groupings of fields of study can sometimes hide important nuance between fields. This lack of nuance and specificity can make it hard for students and researchers to make more detailed distinctions between programs (Frenette & Frank, 2016). Therefore, there is a need for research that looks at field of study at more specific disciplinary group levels. Additionally, the research on skill acquisition differences between fields of study often focus narrowly on just a couple of skills at a time (such as (Maggi, 2016)), or focus on only 1 level of degree program within a broad disciplinary category, such as PhDs in STEM fields (Sinche et al., 2017). In this study I address the need for a more comprehensive investigation of transferable skills development across disciplines, by using a large representative Canadian dataset

(originally collected as part of a multi-year international skills assessment project, the Programme for International Assessment of Adult Competencies (PIAAC), which is described in the methods section below) to investigate the use of a variety of transferable skills on the job, and how this is impacted by tertiary education field of study, using nine disciplinary categories.

There is considerable disagreement in the literature about the best approach to teaching transferable skills, for instance if these skills must be taught within disciplinary contexts (Clanchy & Ballard, 1995), or if a more skills-focused curriculum coupled with opportunities to practice the skills in relevant contexts is more effective (Billing, 2007; Hill et al., 2020). It is logical to suggest that fields of study which incorporate both of these approaches may be the most successful at nurturing transferable skills in their students & graduates.

Professional and applied programs of study, such as Education, Medicine, Social Work, Engineering, Law, and Business, all have a clear focus on specific roles and/or workplaces and the skills needed for those jobs, and generally have practical and experiential learning components either as part of the degree program or as a required step following graduation and before qualification to work in that career (Kumar & Greenhill, 2016; Law Society of Ontario, n.d.; Møller et al., 2021; Ontario College of Teachers, n.d.). As a result, these programs may well meet both (apparently conflicting) criteria for transferable skill development: incorporation of explicit transferable skill instruction, and opportunities to practice them, all within a disciplinary context (Billing, 2007; Clanchy & Ballard, 1995; Hill et al., 2020). Therefore, comparing these

professional and applied programs, to other fields of study which have a more theoretical focus, and which generally lack these practical experiences and have fewer experiential learning components, may provide insight into the conditions under which transferable skills can be best developed.

Holding managerial or supervisory roles within the workplace also has a clear connection to transferable skills. Hoffman and Shipper (2012) describe two sets of managerial skills that are relatively common in these positions worldwide: interactive skills and controlling skills. Many of these component skills overlap clearly with the groups of transferable skills described by Hill et al (2020), as shown in Table 2.1. This overlap suggests both that a) transferable skills should be valued among candidates for managerial positions (which is supported by an analysis of 1000 job advertisements for managerial positions that found a consistent emphasis on these skills (Bennett, 2002)), and also that b) individuals in managerial roles would have more opportunities than others to practice and further develop many of their transferable skills, since they would be used so frequently.

**Table 2.1: Overlap between the managerial skills described by Hoffman and Shipper (2012), and the associated groups of transferable skills described by Hill et al (2020)**

<b>Managerial Skills</b>	<b>Transferable Skills</b>
<b>Interactive Skills</b>	
Planning and problem-solving	Independence and initiative Thinking and problem-solving Organization and time management
Communicating goals Soliciting suggestions Coaching Training Providing feedback Expressing appreciation & complimenting good work	Independence and initiative Oral communication Written communication Teamwork
<b>Controlling Skills</b>	
Keeping on schedule & meeting deadlines	Organization and time management
Applying appropriate pressure to ensure goals are met	Teamwork Oral communication Written Communication

My hypothesis is that both professional programs and programs with an applied focus, such as Education, Business, and Law, will result in more transferable skill development that is directly applicable to workplace situations (even when those individuals end up working in other occupational sectors), because the skills are taught explicitly and there is opportunity to practice applying these skills as part of the program (Billing, 2007; Darling-Hammond et al., 2005; Hill et al., 2020). To test this, I created an index of transferable skill use on the job and investigated the impact of field of study and occupation on this transferable skill index. If this hypothesis is correct, I expect to see higher scores on this transferable skill index, among individuals who were in professional and/or applied fields of study in their tertiary education, compared to both general programs, and programs that have a more theoretical focus.

## 2.3 Methods

### 2.3.1 Source Data

The data for this analysis are taken from the publicly available microdata from the Programme for the International Assessment of Adult Competencies (PIAAC) in Canada. This original data collection was funded by six governmental agencies at the federal and provincial levels<sup>2</sup>. The dataset was made available by the Data Resource Centre at the University of Guelph and were collected by Statistics Canada in 2011-2012. Neither the original collectors of the data, the funders, or the Data Resource Centre bear any responsibility for the analysis and interpretations presented here. The original sample with 27,285 respondents was sampled from a universe which is representative of the population of Canada.

The PIAAC is an international survey and assessment of “foundational information-processing skills required to participate in the social and economic life of advanced economies in the 21st century” (CMEC, n.d.), administered to individuals aged 16 to 65 in over 40 countries and regions (Statistics Canada, 2012). The focus of the program is an in-depth assessment of 3 essential adult skills: literacy, numeracy, and “problem solving in technology-rich environments” (CMEC, n.d.), because these

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<sup>2</sup> Employment and Social Development Canada, The Council of Ministers of Education Canada, The Canadian Northern Economic Development Agency, Citizenship and Immigration Canada, Aboriginal Affairs and Northern Development Canada, and The Public Health Agency of Canada

skills are considered to be building blocks for the development of higher order skills. The PIAAC program also includes an extensive background questionnaire on the participants' education, demographics, and work experience (CMEC, n.d.); this background questionnaire is the source of the data for this study.

Data were collected in Canada using in-home interviews from November 2011 to June 2012, using a computer-based survey<sup>3</sup>, and was composed of two parts: the extensive background questionnaire, and the in-depth skills assessment (CMEC, n.d.). A complex sampling design was used to ensure that statistically reliable samples were collected to represent every province and territory, as well as Canada more generally. To effectively capture Canada's diverse population (including linguistic, cultural, and geographic diversity) a sample was collected that was significantly larger than was the case for other countries participating in PIAAC (Statistics Canada, 2012). Specific sub populations (Indigenous peoples, immigrants, and "official-language minorities"<sup>4</sup>) were oversampled to provide enough data to allow detailed analysis of these groups. All analyses included here are weighted to address this complex design and to allow for analyses that would be considered representative of the Canadian population (Statistics Canada, 2013). The following populations were excluded from the target population (which together make up less than 2% of the population of Canada): sparsely populated regions, long-term residents of collective dwellings, those living on military bases, and those living on First Nations reserves (Statistics Canada, 2013).

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<sup>3</sup> A paper-based survey was also available upon request.

<sup>4</sup> Francophones in English-speaking regions, and Anglophones in French-speaking regions

This sample use for this study is respondents who were aged 25-65<sup>5</sup>, had some form of tertiary education, were an employee, and were currently working at the time of the survey, for a total sample size of 7,374 respondents.

## **2.3.2 Variables**

### **2.3.2.1 Dependent Variable**

The dependent measure for this study was the transferable skill index which was created from a series of variables related to *skills use at work* which were collected in the background questionnaire, corresponding to several of the transferable skills groupings as defined by Hill et al (2020). All these variables refer to a current job and were collected on a 5-point scale (Appendix AAppendix A ). Nine of these *skills use at work* variables (Table 2.2, Appendix AAppendix B ) were combined into a single scale as a measure of overall transferable skill use on the job.

To decide which skills to include in this transferable skill index, I used an exploratory factor analysis (and varimax rotation) to check which of the 13 variables would fit best together (Torres-Reyna, 2010; Yong & Pearce, 2013). I found that 9 of the 13 skills fit together into a single component, with a Cronbach's alpha score of 0.843 which is considered to indicate good inter-item reliability (Howard, n.d.). The variables were combined by summation. This index measures both the number of skills used, and

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<sup>5</sup> This age range was selected to capture most of an average person's 'working years', while also providing time for tertiary education to be completed.

how often they were each used, with a range of 9-45, where a score of 45 indicated that the respondent used each of these nine skills (Table 2.2) every day at work.

**Table 2.2: The transferable skills index variable, and the nine skills use at work variables that were used to create the index.**

Variable	Description
<b>Transferable Skills Index</b>	<b>The sum of the scores of the component variables below</b>
<b>Component variables:</b>	Each of these was scored on a 5-point scale: 1 - Never 2 - Less than once a month 3 - Less than once a week 4 - At least once a week 5 - Every day
Teaching	Skill Use at Work – How often teaching people (instructing, training)
Presenting	Skill Use at Work – How often presentations/speeches to 5 or more people
Planning own activities	Skill Use at Work – How often plan your own activities
Planning the activities of others	Skill Use at Work – How often plan the activities of others
Organizing your time	Skill Use at Work – How often organize your own time
Influencing	Skill Use at Work – How often influence or persuade people
Negotiating	Skill Use at Work – How often negotiate with people in or out of your organization
Simple problem solving	Skill Use at Work – How often simple problem solving (less than 5 min to solve new or difficult situation)
Complex problem solving	Skill Use at Work – How often complex solving (takes more than 30 min to think of a solution)

### 2.3.2.2 Independent Variables

I used two independent variables related to education: field of study, and years of education. The field of study variable is a categorical variable with nine categories: Education/Teacher Training, Social Sciences/Business/Law, Science/Math/Computing, Humanities/Languages/Arts, Engineering/Manufacturing/Construction, Agriculture/Veterinary, Health/Welfare, Services, and General Programs. Secondly, there is a quantitative variable for the number of years of education attained.

I used three independent variables related to work: occupational category, managing others on the job, and years of work experience. The occupation category variable has five occupational sector categories: Management, Education/Law/Social/Community/Government, Art/Culture/Recreation/Sport, Sales/Service, and Other Occupations<sup>6</sup>. Additionally, there is a binary variable for whether a respondent managed other employees as part of their job, and a quantitative variable for years of full-time work experience.

The sociodemographic independent variables (all categorical) included age, sex, whether the respondent was born in Canada, the country or region where the respondent completed their highest educational qualification, Indigenous identity (self-identification as First Nations, Métis, or Inuit), disability or long-term illness, and the language of the survey (English or French).

The details of all variables can be found in the tables in Appendices Appendix A Appendix C & Appendix A Appendix D

### **2.3.3 Method of Analysis**

My statistical approach to this analysis was Ordinary Least Squares Linear Regression (OLS), which was performed in Stata (StataCorp, 2021). The analysis

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<sup>6</sup> There was also a large “not stated” group of occupations originally (28% of the respondents), but this group was removed from analyses because it was so highly variable, and there was no way to accurately interpret the results of this group.

consisted of a set of four linear regression models where variables were added in stages so that their relative contributions to the model could be investigated (

). I investigated potential multicollinearity issues using the variance inflation factor (VIF) function in Stata (StataCorp, 2021), and the mean VIF values were below the established threshold of 4 for further investigation, and therefore well below the threshold of 10 for serious concern (Simon et al., 2018).

Model 1 included only the primary variable of interest (field of study in tertiary education), to determine its impact on transferable skill use at work. Model 2 included field of study and the demographic variables: sex, whether respondents were born in Canada, where they completed their highest educational qualification, Indigenous identity, illness/disability, the language used on the questionnaire, years of education, and age. Model 3 included all these variables, as well as the respondent's current occupation, and their years of fulltime work experience. Model 4 included all the variables from Model 3, plus whether the respondent managed other employees on the job. Parameter estimates, standard deviations, and significance levels of these models can be found in Table 2.6.

**Table 2.3: Table of variables included in each of the four models. Categorical (and binary) variables are underlined.**

Model	Formula
1	Transferable skills index = intercept + <u>field of study</u>
2	Transferable skills index = intercept + <u>field of study</u> + <u>sex</u> + <u>born in Canada</u> + <u>tertiary education region</u> + <u>indigenous</u> + <u>disability</u> + <u>language of survey</u> + years of education + age
3	Transferable skills index = intercept + <u>field of study</u> + <u>sex</u> + <u>born in Canada</u> + <u>tertiary education region</u> + <u>indigenous</u> + <u>disability</u> + <u>language of survey</u> + years of education + age + <u>occupation</u> + years of fulltime work experience
4	Transferable skills index = intercept + <u>field of study</u> + <u>sex</u> + <u>born in Canada</u> + <u>tertiary education region</u> + <u>indigenous</u> + <u>disability</u> + <u>language of survey</u> + years of education + age + <u>occupation</u> + years of fulltime work experience + <u>manage others</u>

## 2.4 Results

### 2.4.1 Descriptive Statistics

My dataset includes representation from a wide range of fields of study, and occupational categories, as well as demographic groups (Table 2.4).

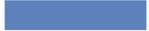
Among the fields of study categories, the largest group was Social Science, Business and Law, which made up 26% of the sample. Engineering, Manufacturing and Construction (17%), Science, Math and Computing (14%), Health and Welfare (12%) and Teacher Training and Education (11%) were the next largest groups. The smallest group was the Agriculture and Veterinary fields of study (2%) (Table 2.4).

The largest specified occupational category was Education, Law, Social, Community and Government organizations (21%), followed by Management (14%), Sales and Service (12%) and finally Art, Culture, Recreation, and Sport (3%). Half of the

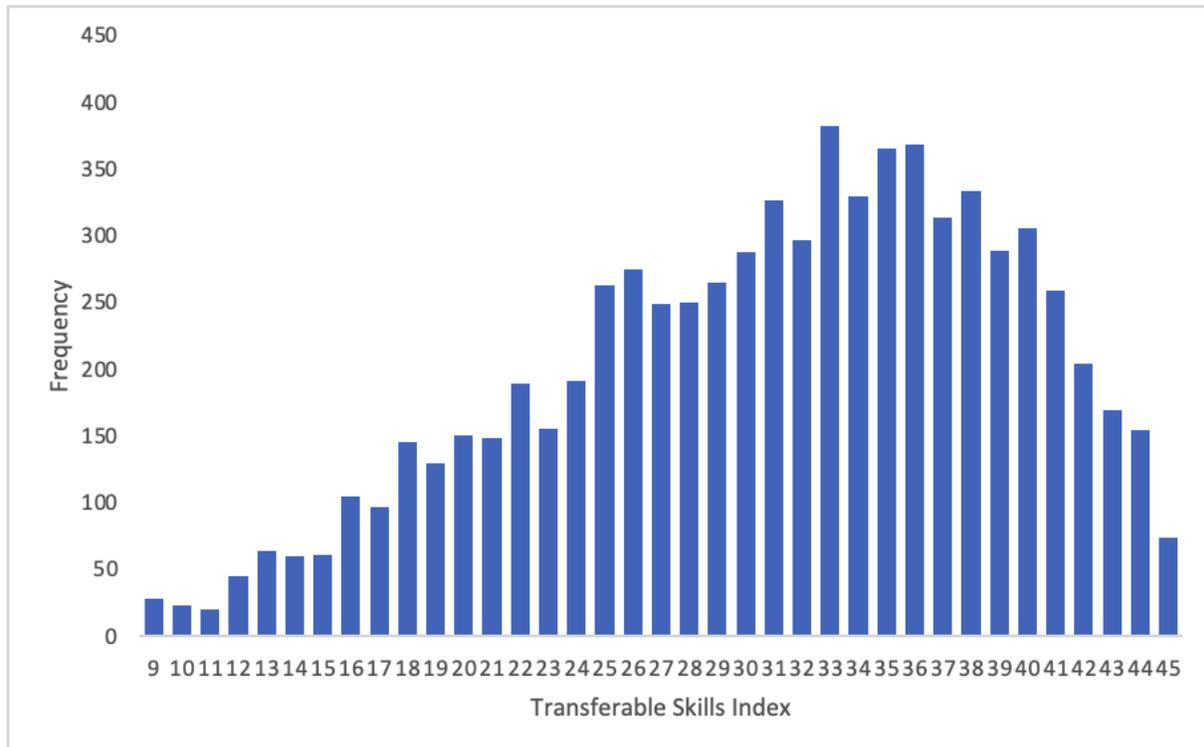
respondents (50%) were in the “Other Occupations” category (Table 2.4), which was mostly made up of the occupational categories that were least likely to be filled by university or college graduates (Appendix AAppendix C ).

Approximately 35% of respondents managed other employees on the job, while the remaining 65% did not. Just over half (51%) of respondents identified as female, and 49% as male. 69% of the sample was born in Canada, and 80% did their tertiary education within Canada, while another 5% did their education elsewhere in North America or in Western Europe, and 15% got their highest educational credential in another region of the world. Approximately 2% of the sample identified as Indigenous (First Nations, Métis, or Inuit), and 26% reported that they had a disability or a long-term illness. 80% of respondents chose to complete the survey in English, and 20% in French.

Table 2.4: Descriptive Statistics of Categorical Independent Variables (N = 7,374)

Categorical Independent Variables	Percentages	Visual
<b>Field of Study - Highest Level Education (Tertiary)</b>		
Teacher Training and Education	11.27	
Social Sciences, Business, & Law	26.15	
Science, Math and Computing	14.31	
Humanities, Languages and Arts	9.52	
Engineering, Manufacturing, and Construction	17.00	
Agriculture and Veterinary	1.54	
Health and Welfare	12.05	
Services	4.81	
General Programs	3.36	
<b>Occupation Category (NOC System)</b>		
Management	14.25	
Education, law, social, community, government	20.61	
Art, culture, recreation, and sport	2.87	
Sales and service	12.05	
Other Occupations	50.22	
<b>Manage Other Employees</b>		
Yes	35.27	
No	64.73	
<b>Sex</b>		
Male	49.32	
Female	50.68	
<b>Country of Birth</b>		
Born in Canada	69.38	
Not Born in Canada	30.62	
<b>Location of Tertiary Education</b>		
Canada	80.10	
North America & Western Europe	5.38	
All Other Regions	14.52	
<b>Indigenous</b>		
Yes	1.89	
No	98.11	
<b>Disability/Long-term Illness</b>		
Yes	26.29	
No	73.71	
<b>Language of the Survey</b>		
English	79.70	
French	20.30	

The transferable skills index distribution has a generally normal shape (Figure 2.1), but is skewed to the left, with a mean of 31.0, a standard deviation of 8.1, a median of 32 and a mode of 33 (Table 2.5).



**Figure 2.1: Distribution of scores on the transferable skills index**

In terms of quantitative independent variables (Table 2.5), the years of full-time work experience ranged from 0 to 40 years, the years of formal education ranged from 14 to 22 years (since only respondents with some level of tertiary education were included in this study sample), and the age of respondents ranged from 25 to 65.

**Table 2.5: Descriptive Statistics of Quantitative and Continuous Variables**

<b>Quantitative &amp; Continuous Variables</b>	<b>Mean</b>	<b>Median</b>	<b>Mode</b>	<b>Std Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Dependent Variable</b>						
Transferable Skills Index	30.97	32	33	8.11	9	45
<b>Independent Variables</b>						
Years of Fulltime Work in Lifetime	17.73	16	10	10.68	0	40
Years of Formal Education	15.48	16	14	1.63	14	22
Age		41-45	31-35		25	65

## **2.4.2 Regression Models**

Note that for regressions with categorical data (any variable with more than 1 line in the table), the estimates provided in the table are interpreted relative to the reference category (which has a dash instead of a numerical estimate) which is essentially a value of zero since it is the reference. This means that any negative values listed for a given category means that those values are lower than the reference category, indicating that the reference category is higher. Positive values in the table indicate that the reference category is lower.

Model 1 demonstrates that field of study in tertiary education is a significant predictor of transferable skill use at work ( $p < 0.001$ ), and this model accounts for 6% of the observed variance in skills used at work (Table 2.5). There is a significant difference ( $p < 0.001$ ) between the reference group (someone who took education or teacher training in their tertiary education program), and those trained in each of the other fields of study, in terms of their level of transferable skills used on the job. The margins for the impact of field of study in Model 1 (Figure 2.2) indicate that the highest level of skills use at work is found among those who took an Education/Teacher Training program (skills use score of 35.9), with all other field of study groupings were significantly lower than

this top group, with skills use scores ranging from 27.7 in General programs to 31.1 in the Social Sciences/Business/Law group.

Model 2 includes a range of control and demographic variables, and accounts for 14% of the variance in skills use scores (Table 2.6). The effect of field of study from Model 1 is still found in this model, with the teacher training & education group significantly different in their rate of transferable skills, compared to all other fields of study. The margins for this model (Figure 2.2) confirm that the highest level of skills use at work is found among those who took an Education/Teacher Training program (skills use score of 35.4), and all other fields of study with significantly lower scores, ranging from 28.3 in General programs, to 30.9 in Social Sciences/Business/Law group.

Model 2 shows a significant difference between males and females, with males using more transferable skills on the job than females ( $p < 0.001$ ). Country of birth also had a significant effect ( $p < 0.01$ ), with respondents who were born in Canada using more transferable skills on the job than those born outside the country. Location where tertiary education was completed was also important; there was no significant difference between those educated in Canada and those educated in North America and Western Europe, but there was a significant difference between those educated in Canada and those who completed their highest educational qualification in any other region of the world ( $p < 0.001$ ). The survey language makes a significant difference ( $p < 0.001$ ), with those completing the survey in French using fewer transferable skills at work than those who completed the survey in English. In contrast, there is no significant difference in

skills use on the job scores between Indigenous respondents and non-indigenous, or between respondents with and without a disability or long-term illness.

For quantitative variables in Model 2, the number of years of formal education had a significant effect ( $p < 0.001$ ), with more years of total education leading to higher transferable skills use. Since the respondents in this study only included people who had some amount of tertiary education, this result refers to the effect of more years of tertiary education specifically. There was no effect of age in this model, but the trend was in the positive direction (Table 2.6).

Model 3 accounts for approximately 21% of the variance in transferable skills scores, this jump in variance explained from Model 2 is likely due to the inclusion of workplace related variables. This model had many similar results to Model 2, so we will focus on the differences between the models. While the overall result of field of study stayed consistent when workplace factors were added to the model, one other field, Health and Welfare, became the next highest score after Teacher Training/Education and was significantly lower ( $p < 0.01$ ) than the teacher training group (Table 2.6, Figure 2.2). The difference between males and females is significant ( $p < 0.05$ ). Country of birth is no longer significant in this model. This model now has a significant negative effect for age (a reversal in the trend from Model 2), with younger respondents reporting more transferable skills use on the job than older respondents ( $p < 0.001$ ).

The new variables in Model 3 were related to workplace factors. First was the occupation category that the respondent works in, which did have a significant impact, with careers in the Management field having the highest rate of transferable skills use,

which was significantly higher than the other categories ( $p < 0.001$ ). The margins for occupational category (Figure 2.3) show Management fields with the highest skills use score at 34.9, followed by the Education/Law/Social/Community/Government category at 33.4, and then the other 3 categories were significantly lower than both groups, with scores between 29.0 (Sales and Service) and 29.6 (Art/Culture/Recreation/Sport). Years of full-time work experience also had a significant impact, with more years of experience leading to higher transferable skills use scores ( $p < 0.001$ ).

The final model, Model 4, accounts for 28% of the variance in skills use scores (Table 2.6), with the addition of the variable for whether respondents manage other employees at work. Overall, the results are very similar to Model 3, therefore I will only discuss the differences here.

The key difference in the occupation results is that with the addition of these management or supervisory roles, the Education/Law/Social/Community/Government category becomes the highest in terms of transferable skills use on the job. The Management field occupations category is now second highest, though not significantly different from the top category. These two top fields are still significantly different than all other occupational categories (Figure 2.3). The sex difference in transferable skills use on the job is no longer significant in this model, with the addition of the managing others variable<sup>7</sup>.

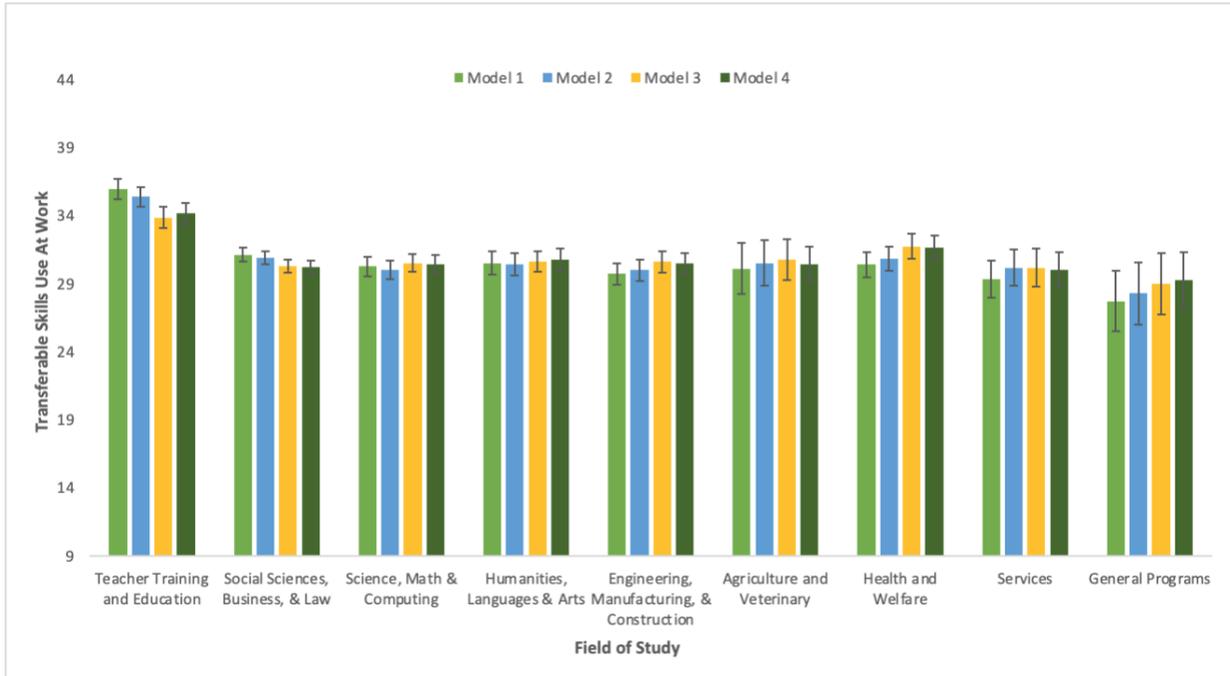
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<sup>7</sup> I also checked for an interaction between sex and the managing others variable, and found no significant interaction.

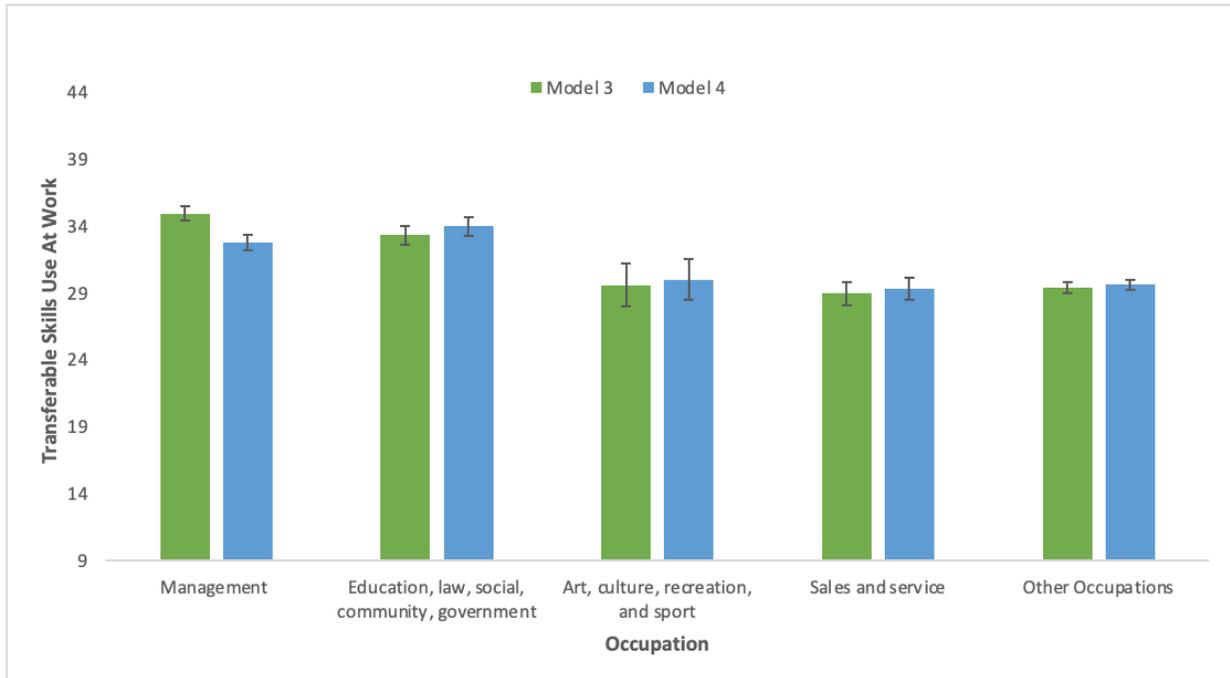
Whether respondents manage other employees on the job had a significant impact (Table 2.6), with those who hold these management responsibilities having significantly higher transferable skills use on the job, compared to those who do not manage others. The predicted skills use scores (Figure 2.4) are 34.2 for those with managerial type roles, and 29.2 for those who do not manage other employees.

**Table 2.6: Linear regression table showing the four models where variables were added in stages**

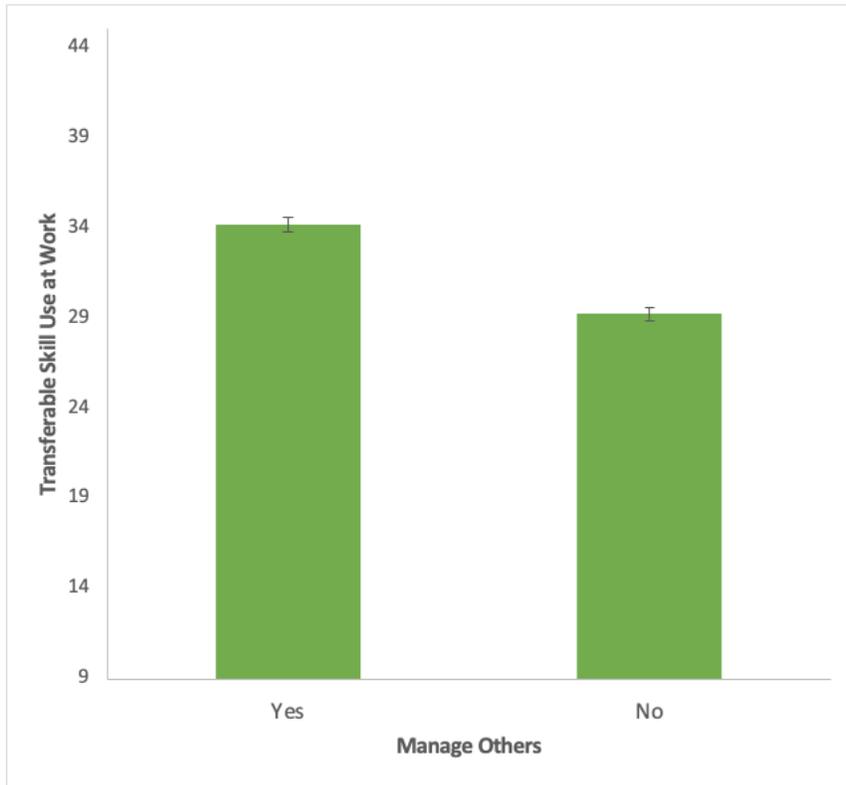
Transferable Skill Use Index	Model 1			Model 2			Model 3			Model 4		
	b	Std. Err.	Sig.									
<b>Field of Study - Highest Level Education (Tertiary)</b>												
Teacher Training and Education	-	-	-	-	-	-	-	-	-	-	-	-
Social Sciences, Business, & Law	-4.839	0.466	***	-4.465	0.438	***	-3.568	0.466	***	-3.912	0.458	***
Science, Math and Computing	-5.686	0.530	***	-5.356	0.514	***	-3.349	0.541	***	-3.706	0.531	***
Humanities, Languages and Arts	-5.445	0.580	***	-4.953	0.536	***	-3.238	0.544	***	-3.361	0.547	***
Engineering, Manufacturing, and Construction	-6.253	0.547	***	-5.384	0.566	***	-3.265	0.604	***	-3.645	0.583	***
Agriculture and Veterinary	-5.857	1.028	***	-4.864	0.939	***	-3.112	0.876	***	-3.712	0.773	***
Health and Welfare	-5.566	0.608	***	-4.536	0.575	***	-2.117	0.618	**	-2.472	0.603	***
Services	-6.650	0.793	***	-5.207	0.778	***	-3.696	0.839	***	-4.121	0.787	***
General Programs	-8.259	1.194	***	-7.088	1.221	***	-4.849	1.208	***	-4.896	1.109	***
<b>Sex</b>												
Male	-	-	-	-	-	-	-	-	-	-	-	-
Female	-	-	-	-1.134	0.308	***	-0.644	0.296	*	-0.495	0.283	n.s.
<b>Country of Birth</b>												
Born in Canada	-	-	-	-	-	-	-	-	-	-	-	-
Not Born in Canada	-	-	-	-1.189	0.447	**	-0.260	0.442	n.s.	-0.273	0.414	n.s.
<b>Location of Tertiary Education</b>												
Canada	-	-	-	-	-	-	-	-	-	-	-	-
N. America & Western Europe	-	-	-	-0.468	0.662	n.s.	-0.741	0.621	n.s.	-0.622	0.603	n.s.
All Other Regions	-	-	-	-4.027	0.541	***	-3.490	0.531	***	-3.117	0.502	***
<b>Indigenous</b>												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	-	-	-	0.305	0.604	n.s.	0.076	0.621	n.s.	0.124	0.596	n.s.
<b>Disability or Long-term Illness</b>												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	-	-	-	-0.066	0.333	n.s.	-0.122	0.317	n.s.	-0.161	0.305	n.s.
<b>Language of Survey</b>												
English	-	-	-	-	-	-	-	-	-	-	-	-
French	-	-	-	-1.443	0.283	***	-1.304	0.273	***	-1.188	0.268	***
<b>Years of Formal Education - Tertiary</b>												
	-	-	-	0.986	0.084	***	0.788	0.085	***	0.649	0.084	***
<b>Age</b>												
	-	-	-	0.147	0.071	n.s.	-0.554	0.129	***	-0.548	0.122	***
<b>Years of Fulltime Work in Lifetime</b>												
	-	-	-	-	-	-	0.151	0.026	***	0.134	0.025	***
<b>Occupation Category (NOC System)</b>												
Management	-	-	-	-	-	-	-	-	-	-	-	-
Education, law, social, community, government	-	-	-	-	-	-	-1.583	0.446	***	1.244	0.469	**
Art, culture, recreation, and sport	-	-	-	-	-	-	-5.333	0.856	***	-2.736	0.817	**
Sales and service	-	-	-	-	-	-	-5.974	0.512	***	-3.412	0.516	***
Other Occupations	-	-	-	-	-	-	-5.543	0.340	***	-3.143	0.358	***
<b>Manage Other Employees</b>												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	-	-	-	-	-	-	-	-	-	-4.960	0.291	***
Significance Levels: N = 7,374 Rsq = 0.0565    N = 7,374 Rsq = 0.1371    N = 7,374 Rsq = 0.2148    N = 7,374 Rsq = 0.2843												
* = p<0.05; ** = p<0.01; *** = p<0.001												



**Figure 2.2: Margins showing transferable skills use at work scores by field of study in post-secondary education, in Models 1-4. Error bars depict 95% confidence intervals.**



**Figure 2.3: Margins showing transferable skills use at work scores by occupation type in Models 3 and 4. Error bars depict 95% confidence intervals.**



**Figure 2.4: Margins showing transferable skills use at work scores by whether the respondent manages other employees, in Model 4. Error bars depict 95% confidence intervals.**

There is no significant difference in skills use at work between Indigenous and non-Indigenous respondents, or those with and without disabilities and long-term illnesses, when controlling for the other variables in the model (Table 2.6).

The language of the survey (which was chosen by the respondent, so therefore it is likely to be the official language that they are most comfortable speaking) did make a significant difference, with those completing the survey in French using fewer transferable skills at work than those who completed the survey in English (Table 2.6).

## 2.5 Discussion

The intention of this study was to add to the conversation around transferable skill development in tertiary education in Canada, specifically to give an indication of which types of existing programs lead to the most transferable skill development. The field of study which was linked to the highest score on the transferable skills index was Education and Teacher Training. This finding was consistent across all four models, even when occupation was included, which indicates that this higher score is not driven only by the working environment in the educational sector, and could indicate that there is something about the training received in this field of study. It is likely that the combination of coursework and practicum experiences that is common to all teacher education programs in Canada (Gambhir et al., 2008) provides a learning environment with the right conditions for this skill development, but more research will be needed to examine the aspects of curriculum and practice in teacher training and education programs that are most closely tied to developing these skills, and to test this finding more directly. Additionally, some of this difference between fields of study may also be attributable to the personalities and existing skill sets or predispositions of students who are attracted to these programs.

The number of years of tertiary education is tied to higher scores on the transferable skills index, across all three models where it was included. This could indicate that there is some impact of tertiary educational experiences on skills use later in life. This finding could be interpreted to partially refute claims that higher education institutions in Canada are simply “degree factories” (Royal Bank of Canada, 2018;

Weingarten et al., 2018) that don't teach these critical transferable skills. However, this finding does not provide any information on the consistency of transferable skills instruction, nor whether these skills are taught intentionally and explicitly, or if they are simply "learned along the way" either within the classroom, or through extracurricular experiences that students may participate in during their tertiary education journey (Bennett, 2002; DePaul University Career Centre, n.d.; Jacobs et al., 2021).

Additionally, on the job training and experience may also play a role; especially as many careers (including teaching and other professions) include professional development (Law Society of Ontario, n.d.; Ontario College of Teachers, n.d.) which may help to further develop these skills.

Those respondents who have the highest number of years of tertiary education are likely to be those who have completed multiple degrees/certificates, including graduate degrees (such as master's and PhDs) and professional degrees. The increase in transferable skill index score among this group suggests that graduate training may have a positive impact on transferable skill development, which would align with Sinche et al's (2017) finding that PhD graduates reported that they attained or further developed several transferable skills while in graduate school. Additionally, it supports suggestions that professional programs in general (and not just teacher education in particular) may play an important role in supporting transferable skill development.

To understand both the results of occupational category and of managing other employees, it's important to understand the difference between having an occupation in the management sector (captured under the occupational category variable here),

versus having a managerial or supervisory role at work (captured under the manage others variable here). There are many jobs within the management sector (such as management consultants, management strategists, human resources professionals, etc.) who may work alone, or as part of a team, but may not be the supervisor for any other employees – all of these are examples of individuals who would be in the management occupational sector, but not in the group that manages others, for the purpose of this study. On the flipside, virtually all occupational sectors have a variety of manager or supervisory roles within the workplace, which would fall into the manage others category.

Unsurprisingly, the type of occupation which respondents held, had a major impact on their scores on the transferable skills index. Management sector occupations and Education/Law/Social/Community/Government sector were consistently the highest in terms of the scores on the transferable skills index (Figure 2.3). While it is hard to make any specific claims about the very broad category of Education/Law/Social/Community/Government, these two occupational categories may have certain characteristics in common, such as having a lot of interpersonal interactions and working closely with teams, clients or with the public. These occupational sectors may therefore select for individuals with more transferable skills, as well as requiring the use of these skills on a regular basis.

Holding a management role at work had a major impact on the scores on the transferable skills index. The direction of causality for this finding is unknown – it could be that individuals who have stronger transferable skills are more likely to be hired and

promoted to these management roles (these skills are certainly common in job advertisements for these positions (Bennett, 2002)), or alternatively, people who take on management roles may be called on to use and develop transferable skills at a higher rate, regardless of their skill level prior to taking on this kind of role. Additionally, both processes may also be working at the same time and complimenting each other. Regardless, it is clear that transferable skills are important to these management type roles, across occupational sectors (Bennett, 2002; Hoffman & Shipper, 2012). These managerial roles seemed to account for much of the differences in transferable skills use in the Management occupation category, compared to other occupational categories. This suggests that transferable skill use is particularly important and useful when employees are promoted to more senior, management roles within their workplaces. This creates an even stronger incentive for students to develop transferable skills, as it may help them to rise within their organization, which is also typically connected to increased income.

The sex difference, which was found to be highly significant in Model 2, with males displaying a higher score on the transferable skills index than females, became non-significant in Model 4 when management roles were included. This suggests that most of this sex difference is due to sex differences in occupation and type of roles taken on at work. This finding indicates that there is no innate difference in score on the transferable skills index between males and females, but rather than the type of job, and whether the person is managing other employees or not, has a much greater influence on their score on the transferable skills index than their sex does.

Years of fulltime work experience is also tied to higher scores on the transferable skills index. This is to be expected, as it is likely that individuals learn and develop more transferable skills through experience on the job. Additionally, as people work in different kinds of roles at work (through changing jobs or through promotions and taking on new types of responsibilities and positions within the same workplace), they are likely to need to use different skills and therefore to develop these skills further.

The findings on age are interesting. In Model 2 I found a non-significant positive trend where older people scored higher on the transferable skills index, but in Models 3 and 4, when occupational factors were included, this trend reversed and there was a highly significant pattern of younger individuals showing higher rates of transferable skills use at work. This suggests that the original positive trend was due largely to the length of work experience (discussed above) which would generally correlate with age. Once years of work experience was included, I found that younger individuals have higher scores on the transferable skills index. This could be because younger generations such as Millennials (and presumably this trend will continue with Gen Z as they age into the workforce (Case, 2021), though they are not included in the sample for this study) tend to change jobs and careers much more frequently than older generations such as Gen X and Baby Boomers (Ertas, 2015; Schroth, 2019). This high rate of job change often requires reskilling or upskilling, as well as taking on new roles and tasks at work (Civic Action, 2018; RBC Thought Leadership, 2019; Royal Bank of Canada, 2018). This pattern of frequent job change and skill development would be likely to lead to the development and use of transferable skills to adapt to the new environments and responsibilities.

It is also possible that given the rise of discussions (both in the media, and in the educational sector) about the importance of transferable skills, younger workers may be more aware of these skills and therefore are better able to identify when they are using these skills. Hill et al (2020) discuss how many students struggled to find examples from their university experience to describe how they have used transferable skills, to discuss these skills effectively in job applications and interviews, but once the skills using during assignments and activities were made more explicit through the use of badges and consistent language, students were able to more clearly discuss their skills. This overall pattern may also be playing out generationally, with younger workers having overall a better awareness of their skills, and therefore report higher use of them on the job. Alternatively, there may have already been a shift occurring in how transferable skills were discussed and developed in higher education even at the time of this survey, and this shift may be showing up as this age effect in this dataset.

In Model 2 there was an impact of whether the respondent was born in Canada or outside of Canada, with those born in Canada showing higher rates of skill use at work. However, in Model 3, once the work-related variables are added, this effect disappears. This suggests that there may be differences in the types of occupations held by those born inside and outside of Canada that accounts for much of this initial difference (Alboim, 2005; Singer, 2021; Toronto Region Immigrant Employment Council, n.d.). Additionally, in an earlier version of this model that did not include the location of the respondent's tertiary education, the country of birth impact was present across all models, which suggests that much of the difference in transferable skills use at work for Canadian-born vs immigrant respondents, has to do with where they completed their

tertiary education. Tertiary education in other parts of North America, and in Western Europe, were both statistically indistinguishable from Canadian tertiary education on this dimension, but the respondents who completed their tertiary education in any other region of the world showed a lower use of transferable skills on the job. This suggests that the difference may be due largely to differences in higher education approaches and practices between North America/Western Europe, compared to other regions of the world (Carter et al., 2019; Jones, 2014). Additionally, there is likely to be an effect of the cultural differences between these regions, particularly in which skills are emphasized (Urban, 2017).

In contrast to some discriminatory assumptions about on-the-job performance and workplace skills of certain equity-deserving groups (such as Indigenous individuals, and people with disabilities), about skill levels in these groups, this study found no significant differences in transferable skill use on the job, between any of these groups and their majority or higher privilege counterparts when the other variables are included in the model. This finding does line up with another PIAAC analysis which found that “[postsecondary education] attainment may serve to mitigate or even eliminate these differences” in skill levels between these minority groups and the majority of respondents (Maggi, 2016). Since this current study focuses only on participants who completed some level of tertiary education, this may explain why no difference was found in this case.

However, it should be noted that sparsely populated regions of Canada, as well as First Nations reserve populations, were excluded from the PIAAC dataset (Statistics

Canada, 2012), so all of these findings on Indigenous participants may be more accurately interpreted as referring to indigenous individuals who live in towns and more urban areas and so may or may not apply as accurately to Indigenous peoples living on reserves or in very small communities in Canada such as those in the far North.

It is hard to interpret the finding that French respondents in this survey showed lower levels of use of transferable skills on the job than those who took the survey in English. Other reports on analyses of the PIAAC dataset in Canada have not noted any differences in the key skills measured by PIAAC (literacy, numeracy, or problem-solving in technology rich environments) between French and English respondents, so this difference in skills levels is unexpected. The only language related results noted in these other reports focused on Official Language Minorities<sup>8</sup>, which was found to have no significant impact on the three key PIAAC skills (Council of Ministers of Education (Canada) et al., 2013; Maggi, 2016). It is important to note however (as these other PIAAC reports have also done) that there are many immigrants and Indigenous participants for whom neither English or French is their first language, and so they are both working and completing this survey in a language other than their first language (Council of Ministers of Education (Canada) et al., 2013; Maggi, 2016), which may impact their transferable skills use on the job, particularly in the case of those skills related to both oral and written communication. It is possible that by chance a larger proportion of the sample of the current study who completed the survey in French were

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<sup>8</sup> Official Language minority status was not included in this study – all speakers of each official language were grouped together for the current study, without regard for their minority or majority language status

in this situation, compared to the group who completed the survey in English, which could explain the difference found here; but further analyses would need to be done to confirm if this was the case.

### **2.5.1 Limitations**

There are some key limitations to this study to consider, mostly to do with limitations in the fit between the questions asked in the PIAAC survey, and the questions investigated here. First, while the skills use at work variables use in this study touched on a several examples of transferable skills, they do not encompass the full range of transferable skills (for instance, the skills included in this study (Table 2.2) correspond to only 8 of the 11 transferable skills groups described by Hill et al (2020)). It would be ideal to repeat these analyses with a more complete list of these skills, and further research is needed on the connection between field of study and the skills groups not included here.

Overall, this study can only comment on the self-reported use of these transferable skills at work, not the total transferable skills that an individual has. Most people have skills which may not be required by or relevant to their current job. This study also cannot make claims related to how effective someone is in the use of these skills; for instance, a job may require daily oral communication, but not everyone in that job will be equally adept at those oral communication skills. Additionally, the transferable skills index used here is, by definition, an indirect measure of skills which may have been learned or further developed during tertiary education, and more direct

measures of transferable skills development during college and university in various fields of study will be needed in order to confirm these results.

The way that fields of study were grouped within this dataset were not ideal. Large field of study categories such as “social sciences, business and law”, or “engineering, manufacturing and construction”, combine a range of different kinds of programs, including professional and non-professional programs, and college and university programs. There may be some significant differences between the fields of study within these groups, which could be masked when considering them together. For example, by grouping Law, which is a professional field of study, but one where the degree is fundamentally theoretical, and all practical experience comes after graduation (in the form of the experiential training requirement (Law Society of Ontario, n.d.)), with Business, an applied field of study known for high levels of experiential, case & problem-based learning which are tied to positive outcomes in transferable skills learning (Carvalho, 2016), the true outcomes of each of these two fields of study on skill development are impossible to disentangle.

Similarly, it is hard to interpret large and diverse occupational categories such as education, law and social, community and government services. The nature of these large categories within the dataset limits our ability to accurately interpret and make claims about where the key differences among groups may lie.

Since age was reported in 5-year age groups, and the raw ages were not available in the dataset, it is possible that these groups may hide additional variation that might impact my results. Given the large sample size, I treated this variable as

conceptually continuous for this analysis (as is sometimes done in the literature, for example (Hughes & Lowe, n.d.; Jehn et al., 2021), but I recognize that this still may not be ideal.

In examining the data for the years of full-time work experience, I noticed that there were noticeably higher numbers of respondents at each of the 10 year points (10, 20, 30, and 40), as well as smaller jumps in responses at the 5 year points (5, 15, 25, 35); it is very possible that some respondents rounded (intentionally or unintentionally) to the nearest 5 or 10 year milestone in their work experience, instead of providing the exact number of years they had been working. This inconsistency in the data may have impacted my results, so to check this I tried grouping the years of full-time work experience into 5-year categories (similar to the age variable) instead and found that using this version of that variable had very minimal impact on the statistical output, and no impact on significance or directionality of any variables.

There were also no questions in the PIAAC questionnaire related to participation in co-operative education programs (which are found in a wide range of fields of study (Skrzypinski, 2017)), which have the most direct connection between tertiary education programs and the workforce (Darch, 1995; Wyonch, 2020), so it was not possible to examine the impact of those programs, or to compare their effectiveness with the other programs of interest. Similarly, it was not easy to determine if someone had multiple degrees or diplomas/certificates, or if anyone attended both college and university programs (which has been shown to impact labour market outcomes (Walters, 2008)), so it is not possible to tell if this had any impact on the results.

There were also some standard sociodemographic variables that were not available in the data set, such as race/ethnicity (beyond Indigenous identity) or minority status (being born or educated in Canada vs outside of Canada are each a weak/unreliable proxy for this), or an easy to apply measure of socioeconomic status. This meant that it was not possible to use these as control variables or to examine questions related to these dimensions. Finally, this data was collected in 2011 and 2012, so it is already somewhat out of date given the fast pace of change in the labour market, the educational sector, and in society at large. Further research will be required to see if these findings hold up in the next round of PIAAC data, which is currently being collected, and results will be available in 2024 (OECD, n.d.).

## **2.6 Conclusion**

This study provides a useful step in investigating the role of tertiary education field of study on the use of transferable skills in the workplace, and a jumping off point for more investigations using a similar scale which provides an indirect measure of both the breadth and frequency of use of transferable skills. This analysis provides important insight into some of the fields of study (education and teacher training, as well as professional and applied programs more generally) and other factors such as managerial roles, occupational sector, years of tertiary educational experience, and country of tertiary educational training, which impact transferable skills use levels, which are worth looking into further.

### **3 Chapter 3: Understanding the Factors that Impact Tool and Curriculum Use in Course Design at Canadian Universities**

#### **3.1 Abstract**

Given the dramatic changes taking place in the job market and society, it is important that university curricula keep up with the times, to both serve their students by providing them with the skills and knowledge they need to be successful and positive change makers in society, and for the universities to be able to prove their value to ensure continued government funding. However, universities still tend to prioritize discipline specific skills over transferable skills, leading to a gap between the skills that are taught and those needed after graduation. This is one way in which universities are falling behind. To enable this kind of change to curriculum, we must first understand how courses are designed and changed, including the tools and approaches which are used during course development, and what factors impact these course design decisions. In this study, I conducted a survey of 520 university instructors across Canada about their approaches to course design and updating. I identified patterns in tool and curriculum document use among this sample, and used linear and logistic regressions to determine the impact of various factors on measures of course design and updating. I found that instructors were more likely to use informal tools than formal curriculum documents; and with the exception of course learning outcomes, all other formal curriculum documents were used very infrequently. I found that cultural factors were important in course design decisions: having a community that supports teaching had the largest and most wide-ranging effect, but disciplinary differences, department

and university level support, and program type also had an impact on the tools and curriculum documents used for course design. Instructors who perceive themselves to be in rapidly changing fields update their courses more often than other fields, and this was the only factor that impacted course updating. This study identifies key influences on how instructors currently approach course curriculum development at universities in Canada which is a crucial first step for any process of curriculum renewal.

## 3.2 Introduction

A dramatic shift in the types of jobs available in the global and Canadian labour markets has been documented for years, with many concluding that we are already in the Fourth Industrial Revolution (RBC Thought Leadership, 2019; Royal Bank of Canada, 2018; Schwab, 2017; World Economic Forum, 2016). Employer surveys and research studies have predicted that 65% of today's elementary students will end up in new types of jobs that don't even exist today (Arntz et al., 2016; World Economic Forum, 2016), and by the end of this decade at least half of current jobs, and over 2.4 million new jobs will require a completely "new mix of skills" (Royal Bank of Canada, 2018). All of these trends were already in motion prior to the COVID-19 pandemic<sup>9</sup>, and the experiences during the pandemic have only sped up the rate of change that we will see in the labour market and in society (Centre for International Policy Studies & Munk School of Global Affairs, 2017; Express Employment Professionals, 2020a; Fyfe, 2021).

In contrast, universities have been very slow to react to these changes, and there have been numerous calls for a revolution in the higher education sector to catch up, or ideally lead the way (Brookes, n.d.; Centre for International Policy Studies & Munk School of Global Affairs, 2017; Express Employment Professionals, 2020a; Gertler, 2022; Royal Bank of Canada, 2018; Sharma, 2013). Canadian universities and colleges have remained largely stagnant since the last major upheaval following the Canadian Veteran's Charter (similar to the GI bill in the US) in the years after World War II when

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<sup>9</sup> Which was declared a global pandemic in March 2020

expansion of higher education became a priority both nationally, and within the provinces (Dea, 2021; Jones et al., 2014). Recent reports have called our universities “degree factories” (Royal Bank of Canada, 2018; Weingarten et al., 2018) and employers have complained that graduates are unprepared to be successful on the job, particularly due a lack of transferable skills which are needed in all workplaces (Express Employment Professionals, 2020a; Hill et al., 2020; Pellegrino & Hilton, 2012; Royal Bank of Canada, 2018; Weingarten et al., 2018).

Universities are also facing increasing financial strain, and multiple rounds of government cuts (Canadian Association of University Teachers, 2021; Harris, 2020) as well as new policies such as Performance Base Funding Models are being introduced (Dougherty & Natow, 2020; Spooner, 2019), and these factors are increasing the pressure for universities to do more with less funding. If universities are seen as continually falling behind and failing to prepare students for success after graduation, the funding situation may become more dire and they may not be able to survive long term (Sharma, 2013). As a result, every institution is trying to stand out from the competition and prove their value to students, governments, employers, and society at large. One way that institutions can do this is to ensure that they update their curriculum to address these increasing calls to adapt to the changing times.

Changing university curriculum is not as simple as flipping a switch, however. We must first understand how university curricula are developed before we can know which levers can be pulled to effect change in this system. I will begin by describing some overall patterns of the processes and factors that go into developing (particularly

undergraduate) courses at universities in Canada, along with questions to highlight unknowns and possible points of disconnect in the system.

### **3.2.1 Background Context**

The creation of new courses and programs involves many different levels of governance within the university, including committees at the level of the major, department, degree or program, and university, and may also involve review by external quality assurance bodies and/or disciplinary experts, depending on the type of proposed change (H. Pollock, personal communication, July 14, 2022). For this paper I will refer to the process undertaken at the University of Guelph as an example of the general process, but it is important to note that each university will have their own structure and systems that govern and support this process (Jones, 2014). Additionally, each province also has their quality assurance body that is responsible for the oversight of post-secondary education (for example (Ontario Universities Council on Quality Assurance, 2022)) to review programs “to ensure the quality of degrees offered, monitor the frequency and efficacy of institutional reviews, and/or set guidelines to audit existing programs” (Universities Canada, n.d.-b).

Courses may be created either as proposed additions or changes to existing programs, or as part of a proposed new program (degrees, majors, minors, areas of concentration, etc.) (Office of Quality Assurance, n.d.; H. Pollock, personal communication, July 14, 2022). Proposals for new courses or programs generally start with either a department (or interdisciplinary) curriculum committee, from individual faculty who recognize a gap in the current program offerings, or with a department

chair, curriculum committee, Associate Dean or Dean at the degree or diploma level. All proposals must include the development of course learning outcomes which are linked to degree/major learning outcomes and the university learning outcomes. These course outcomes become the basis on which all components of the course are built. A course description for the university course calendar also created, as well as a suggested course outline (Office of the Associate Vice-President (Academic), 2018; H. Pollock, personal communication, July 14, 2022). The proposal is reviewed by the Calendar Review Committee and the Board of Undergraduate Studies, and then the University Senate is either updated about small changes like new courses, or reviews and approves more substantial changes such as new programs (Office of Quality Assurance, n.d.; Office of the Associate Vice-President (Academic), 2018). Some new programs also require external review by experts in the field and the Ontario University's Council on Quality Assurance, and funding approval may also be required from the Ontario Ministry of Colleges and Universities. Once approved, course descriptions and details are added to the Academic Calendar (though this may take some time), and these as well as learning outcomes and any suggested course outlines, are made available to the relevant department(s) for use by instructors (Office of the Associate Vice-President (Academic), 2018).

Once the course names, descriptions, and learning outcomes, are finalized, the responsibility for the design and delivery of the courses themselves are generally left up to the individual instructor (H. Pollock, personal communication, July 14, 2022). In some cases where multiple sections of the same course are taught, or where multiple instructors rotate through teaching core courses, there may be some collaboration to

ensure a level of consistency across sections ('Kathy' 2021, 'Caroline' 2021, 'Anna', 2021<sup>10</sup>), but this is certainly not universal.

These higher level decisions which lead to course names, descriptions for the course calendar, and learning outcomes (Office of Quality Assurance, n.d.), are not the only factors that influence course design and development. To answer most of the questions posed here, we need to investigate the key actors in the course design process (the course instructors), and the tools and approaches that they use. There are also many other factors which must be investigated further if we are to understand the full picture of university course design.

In addition to the formal structures, processes, and factors listed above, there are several tools and resources that instructors at any level (whether they are sessional instructors, contract or term faculty, or tenure track faculty members such as assistant, associate, or full professors (Jones et al., 2014)) may use when designing and updating their courses. These include formal, directive curriculum documents such as program plans and curriculum maps, learning outcomes (at the university, program, or course level), and professional requirements or standards in the case of professional programs, which all provide higher-level guidance and structure to help ensure a level of consistency and cohesion across different course offerings, and programs. There are also a wide range of more informal tools available to help with course design, such as textbooks, course outlines from previous instructors, other readings for the course,

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<sup>10</sup> Each of these is the pseudonym for one of my follow-up interview participants

academic literature for the latest advances in the field, and course descriptions from the university course calendar<sup>11</sup>.

Several factors may impact how instructors approach designing their courses, and how often they update and change their courses. The first of these is the institution type. One major way that Canadian universities are frequently categorized in many comparisons, is into three broad institution types (a system used by both the Changing Academic Profession study (Jones et al., 2014) and that Macleans's magazine uses for their annual ranking of many universities across Canada (Dwyer, 2021)). The first of these types are Primarily Undergraduate universities; these institutions are typically smaller, focus most of their teaching and resources on undergraduate students, and have few graduate-level programs and students (Dwyer, 2021; Jones et al., 2014). The second type is a Comprehensive university, which tend to have more students than the first type, with significant research activity and a wide array of graduate programs, and more professional programs (Dwyer, 2021; Jones et al., 2014). The largest and most research-intensive universities in Canada are in the Medical-Doctoral category. These institutions all have medical schools, and they have the largest student enrollment and their research-focused faculty and graduate students (Dwyer, 2021; Jones et al., 2014) bring in most of the research dollars from the Tri-Council national funding agencies (Canadian Association of University Teachers, 2021). 14 members of the U15 (a group of the 15 most research-intensive universities in Canada) are in this Medical-Doctoral

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<sup>11</sup> This list was crowd-sourced via questions posed on Twitter, and through conversations with several instructors of my acquaintance

category (U15 Group of Canadian Research Universities, n.d.). Class sizes and student-to-faculty ratios for undergraduate students tend to be lowest at the primarily undergraduate institutions, and get larger across the three categories (Jones, 2014; Universities Canada, n.d.-a). Given the different priorities and undergraduate class sizes across these institution types, it's reasonable to suggest that teaching approaches are also likely to vary across these categories.

Differences between academic disciplines are well studied (Becher, 1994; Davies & Guppy, 1997; Frenette & Frank, 2016; Li et al., n.d.; Neumann, 2001; Ylonen et al., 2018), and there are certainly differences in general characteristics of courses in different fields, such as humanities and social sciences courses which have a stronger emphasis on writing (Neumann, 2001; Ylonen et al., 2018), whereas science courses frequently have lab components and a higher emphasis on testing (Neumann, 2001; Ylonen et al., 2018)), but how do these disciplinary differences impact the types of curriculum resources and other tools that are used to design the courses?

Programs in fields that are highly disrupted and rapidly changing, may use different tools and resources, and/or may update their courses more frequently, compared to fields with less disruption and change. One example of this which is particularly salient here at the University of Guelph (which is known as Canada's Food University (Arrell Food Institute, 2021)) is the agriculture and food sector (collectively known as agri-food), which has been recognized by the Canadian government as a sector which is among the highest "potential[s] for growth and job creation" compared to other sectors in Canada (Kurtz, 2017). Agriculture programs in Canada have undergone

significant changes over the last several years (Halliday, 2020), but more change is looming in the sector (RBC Thought Leadership, 2019), so more curriculum changes are likely needed to keep up. How are these changes reflected in the approaches of instructors in these fields, compared to others?

Other types of program differences may also influence how course curricula are created and changed. Professional programs such as education, law, engineering, nursing and medicine are regulated by outside professional organizations and standards (Accreditation Board for Engineering and Technology, n.d.; College of Registered Nurses of Alberta, 2021; Gambhir et al., 2008; Law Society of Ontario, n.d.; Ontario College of Teachers, n.d.), which likely leads to more consistency in content and skills included in these programs across the country. I have previously found that professional programs, particularly teaching training programs were connected to higher transferable skill use on the job, likely due to differences in the structure of their programs (see Chapter 2), so it is reasonable to assume that these programs may differ in the use of tools and curriculum documents and the rate of change of courses.

Lastly, the local workplace cultural contexts that instructors are embedded within, are likely to influence their course design decisions and approaches (Coman & Bonciu, 2016; Manley et al., 2011). This includes how much value and emphasis is placed on quality teaching by the university leadership, and the teaching supports provided at the institution level, as well as the same kinds of variables at the department level. If there is more talk about what high quality teaching looks like in one's department or institution, does that encourage different approaches to course design, or the use of

different tools and resources? It is also important to consider the value placed on teaching by an instructor's colleagues (within their own department, or those they interact with frequently across campus). Similarly, whether an instructor feels they are part of any community that values teaching (locally, or across institutions, or even online) may also have a strong impact on their own approaches to course design and change, as individuals are generally influenced by those they spend the most time around, workplace cultures have been shown to be quite influential, and positive social pressure can be very powerful in shaping behaviour (Hysa et al., 2021; Manley et al., 2011).

### **3.2.2 Question, Objectives and Hypotheses**

To understand how university course curricula are currently being created and updated in Canada, and which of the above factors impact these decisions, it is critical to ask those who do this course development and implementation: university instructors in a wide range of fields and programs across the country.

In this study I investigate the tools, resources and approaches used by university instructors in Canada to develop and update their course curricula (Figure 3.1). This includes the following four questions: a) Are instructors more likely to use formal curriculum documents, or informal resources and tools? b) Which tools and resources are most used by instructors? c) How much do instructors make use of existing curriculum documents (such as from the university level, or a department or program, or from a professional association) in their course design process? d) What other factors

influence the approaches taken by instructors, both to course development and course change?

This fourth question leads to four hypotheses which are all complementary, not competing. Hypothesis 1 is that instructor approaches to developing and updating courses vary by institution type. This will involve comparing instructors across the three institution types: Primarily Undergraduate, Comprehensive, and Medical-Doctoral. Hypothesis 2 is that instructor approaches to developing and updating course curricula vary by discipline. This will include looking at both broad STEM/BHASE (non-STEM) categories, as well as looking at five more specific disciplinary groups. Hypothesis 3 is that instructor approaches to developing and updating courses vary by program type. This will include investigation of the impact of self-reported perceptions of rapid change in their discipline, as well as comparing instructors who teach in professional and/or pre-professional programs to those with no professional connection. Hypothesis 4 is that instructor approaches to developing and updating course curricula will vary based on the levels of support for teaching in their local contexts. This will include looking at departmental and university level support for teaching, as well as the impact of having colleagues that value quality teaching, and of being part of a community that values teaching excellence. See Figure 3.1 for a summary of the objective, questions, and hypotheses for this study.

# How are university courses developed and updated in Canada?

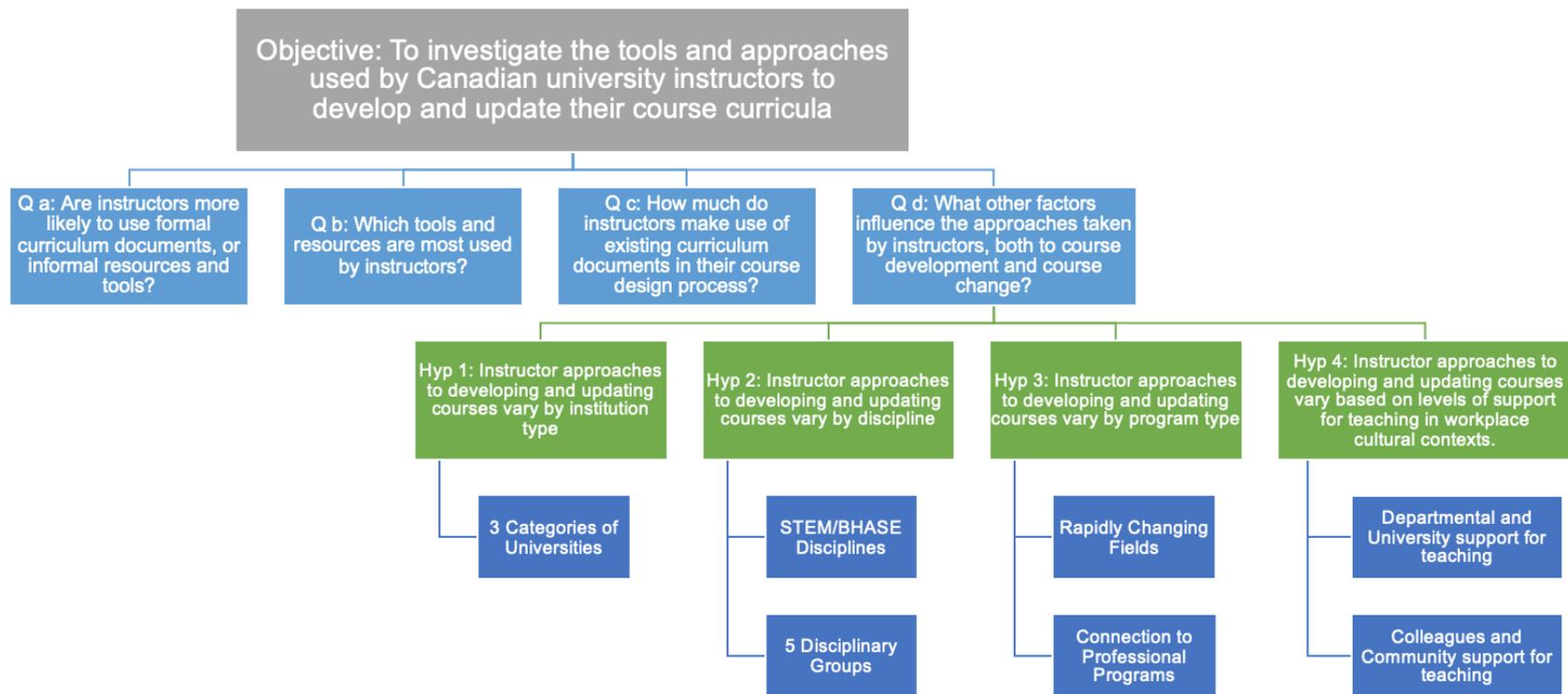


Figure 3.1: Summary of research question, objective, four focus questions, hypotheses, and variables for each hypothesis

## **3.3 Methods**

### **3.3.1 Study Design and Data Collection**

This study consisted of a large-scale survey of 520 university instructors from across Canada. I used an online Qualtrics survey tool designed with research-generated questions which took participants 15-25 minutes to complete (Appendix AAppendix F ). To address concerns of survey length discouraging participation, the survey was set up in two parts – part one covered all topics relatively briefly (approximately 15 min including demographics) and then participants had the choice to end the survey at that point, or to take the optional a second part of the survey where they could answer more detailed follow-up questions (5-10 min). Approximately 42% of participants completed the second part of the survey. The survey questions were of a mixed-methods design, including both quantitative and open-ended questions on participants' approaches to course design and change, which tools and resources they use, as well as how often and why they update their courses. I also collected data on discipline, descriptors of teaching experience, levels and types of courses taught, and attitudes toward teaching. Given the difficulty of getting survey responses from this population, this survey was designed to maximize usable data collection for multiple studies, so only a small portion of the questions and results will be discussed in this paper.

To address the questions about rate of change in various fields, I asked all participants to rate their perception of the relative rate of change in their field, compared

to other fields and I asked respondents whether they belonged to one of 3 pre-defined rapidly changing fields: agri-food, biotechnology, and information and computer technology (ICT). Participants in these three fields, and anyone who reported that their field was changing more rapidly than others, were given a set of questions about what aspects of their field was changing. I also specifically recruited a subsample of instructors from the agri-food fields, to be able to compare them to those in other fields. This agri-food sub-group analysis will be conducted later and will not be discussed here.

All survey participants were asked if they would like to be contacted for a follow up interview about their curriculum development experiences, and several interviews were conducted with randomly selected volunteers. Those interview transcripts, along with all short-answer questions from the survey, will be qualitatively analyzed for a later study.

All survey-based studies suffer from response-rate concerns (Krosnick, 1999). To address this concern, I offered a raffle incentive<sup>12</sup>, and I used multiple approaches to recruit participants (Das et al., 2010). The primary method of recruitment was through emails to various university departments and research services offices. Additional recruitment messages were sent via social media (Twitter, Facebook and LinkedIn), through emails to professional associations (such as the Canadian Association of University Teachers), newsletters and publications, as well as through personal and professional networks, to increase awareness of the project and to encourage

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<sup>12</sup> The raffle was for \$50 gift cards to a retailer of their choice, and I awarded one of these prizes for every 20 participants in the survey.

participation. To recruit the agri-food subsample, I met with several Deans of Agriculture and Veterinary programs across Canada, who shared my survey recruitment information with their programs and encouraged their instructors to participate.

In order to be eligible for the study, respondents must have taught (as the instructor or co-instructor of record) at least one university-level course in Canada in the past 5 years (2016-2020).

### **3.3.2 Method of Analysis**

A total of 560 survey responses were collected between June and December of 2020. 40 responses were removed due to incomplete data or not meeting eligibility requirements, leaving a total of 520 surveys to be included in the analyses. Of these, 218 participants (42%) completed both parts of the survey, and 302 participants (58%) completed only part 1. Data cleaning and analysis were performed using the Stata statistical software (StataCorp, 2021).

#### **3.3.2.1 Dependent Variables**

Five dependent variables were used in this study. Four were related to course design and development, and one was related to course change. Details of recoding decisions can be found in Appendix A Appendix G & H, but I will provide an overview of the variable creation here.

Two variables focused on the tools used during the course design process (Table 3.1). The *number of tools used* variable is a count of the total tools selected out of a list

of 6 options<sup>13</sup> provided on the first part of the survey. This variable is a conceptually continuous variable (similar to the approach used in the literature, such as Hughes & Lowe, n.d.; Jehn et al., 2021) with a range of 0 to 6 tools. The *degree of tool use* variable comes from the second part of the survey, where respondents selected how frequently they used each of 11 tools listed, on a 4-point Likert scale ranging from Never to Always. The scores for each of the 11 tools were added together to create the *degree of tool use* variable, so this “degree” term reflects that this variable includes both the number of tools used, as well as their frequency of use. This variable is conceptually continuous and has a possible range of 0-33, where 0 would indicate that the respondent never used any of the 11 listed tools, and 33 would indicate that the respondent always used all of the listed tools.

Another two variables focused on the formal curriculum documents used during the course design process (Table 3.1). The *number of curriculum documents used* variable is a count of the number of curriculum documents selected from the 3 options available in the same question about tool use from the first part of the survey. The *degree of curriculum use* variable was created using the same approach as the *degree of tool use* variable, but in this case only the three curriculum document options were included, which created a score that ranges from 0 to 12, where 12 would indicate that all of the curriculum documents were used “always” when designing courses.

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<sup>13</sup> Since the “requirements for a profession” option only applied to instructors with a connection to a professional program, for each of these variables, respondents were scored out of the total tools available to them, and then the scores were scaled so that both groups of respondents could be compared. See Appendix AAppendix G for more detail

When deciding which tools to categorize as curriculum documents, I was aiming to identify which tools were more directive, where a higher level, authority, or organization was providing guidance or structure to individual instructors on how and what to teach, and aiming to encourage consistency across different offerings of that course and more generally across a program or across campus. University level learning outcomes, and program level documents such as curriculum maps and program plans were clear examples of this, as were professional requirements (for those teaching in professional programs). Course learning objectives are also clearly an example of the most direct form of this (when available), however, it does not seem to be consistent that these are provided for all courses at all universities in Canada; in some cases instructors are left to write their own course learning outcomes (Berdahl, 2021c). Similarly, course outlines are another grey area because while a course outline might have been created as part of the new course creation process in some institutions (H. Pollock, personal communication, July 14, 2022) this is certainly not the case at every institution. Additionally, most of the course outlines that instructors have access to and use, are those instructor-created outlines used by previous instructors of the course, which may have been changed substantially since the course was originally added to the course calendar. I tried to strike a balance between the resources that most instructors would likely have access to at their institution, and would be most likely to be created as part of the original course creation and approval process, versus those that were more likely to be created by individual instructors as a more informal document. Therefore, I decided to include course learning outcomes as one of the

curriculum documents, and classify course outlines as a more informal tool. See Table 3.9 and Table 3.10 for a full list of the tools included in these variables.

The final dependent variable was a measure of how often the respondent indicated that they changed or updated their courses (Table 3.1). This *frequency of course updating* variable is a binary variable that indicates if the respondent changed their course every time they taught it, or less often than this.

**Table 3.1: Dependent variables for statistical analyses**

Variable Name	Type & Range	Description
<b>Number of tools used</b>	Continuous variable: Range 0-6	Number of tools used for course design
<b>Degree of tool use</b>	Continuous variable: Range 0-33	Amount (combining both number and frequency) of tools used for course design.
<b>Number of curriculum documents used</b>	Continuous variable: Range 0-3	Number of curriculum docs used for course design
<b>Degree of curriculum use</b>	Continuous variable: Range 0-12	Degree (combining both number and frequency) of curriculum documents used for course design.
<b>Frequency of course updating</b>	Indicator variable: 0 – No 1 – Yes	Did they change/update their course every time they taught it, or less often than every time?

### 3.3.2.2 Independent Variables

There were four categories of independent variables: institution type, discipline, program type, and workplace cultural context for teaching. These variables are summarized in Table 3.2, and details of variable recoding decisions can be found in Appendix AAppendix H , but I will provide an overview here.

The variable *university type* is a categorical variable with 3 categories which respondents self-selected based which description best described their institution.

For discipline, respondents wrote in their own discipline and then I created two derived variables from this information. First, all disciplines were categorized into either STEM (Science, Technology, Engineering and Mathematics) or BHASE (Business, Humanities & Health, Arts, Social Sciences, and Education) groupings, using the Statistics Canada STEM and BHASE groupings variant of the Classification of Instructional Programs (CIP) 2016 (Statistics Canada, n.d.), to create the *STEM/BHASE* variable. Second, all disciplines were grouped into five disciplinary groups to allow for more comparisons between fields, for the *5 disciplinary groups* variable (Appendix AAppendix I ).

There were two program type variables: *rapidly changing fields*, and *professional programs*. The *rapidly changing fields* variable denotes whether participants self-reported that they perceived their field as changing (by considering the knowledge and skills required for most common jobs in the field) more rapidly than other fields, or at the same or slower rate than other fields. The *professional programs* variable indicates whether the respondent teaches any courses connected to a professional program (even if it's only as part of a pre-professional program), or if they do not teach in a professional (or pre-professional) program at all.

The cultural context variables come in two types – there are two scores which are derived variables to indicate how supportive the respondent's department and

university are of quality teaching, and there are two binary indicator variables for whether a respondent has colleagues or a community that values quality teaching.

The *departmental support score* was created by adding together the responses to three different questions related to department statements and actions related to teaching, which were all scored on a 5-point Likert scale (Strongly Disagree to Strongly Agree). This created a conceptually continuous variable from 0 to 15 where 15 indicates the most supportive department. The *university support score* was created in the same way, from a set of 3 parallel questions relating to the university's statements and actions related to teaching, and the resulting variable has the same characteristics.

The *supportive colleagues* variable is a binary variable that indicates whether the respondent said that their colleagues value quality teaching or not. The *community support* variable is a binary variable that indicates whether the respondent feels themselves to be part of a community that values teaching excellence.

**Table 3.2: Independent variables for statistical analyses**

<b>Variable</b>	<b>Type and Range or Categories</b>	<b>Description</b>
<b>University type</b>	Categorical variable: Primarily Undergraduate Comprehensive Medical-Doctoral	Self-report type of university, using the descriptions from Maclean’s annual ranking methodology.
<b>STEM/BHASE</b>	Indicator variable: BHASE STEM	Self-report discipline, categorized into STEM/BHASE groupings
<b>5 disciplinary groups</b>	Categorical variable: Natural & Formal Sciences Humanities Social Sciences Professions Other	Self-report discipline, categorized into multiple categories.
<b>Rapidly changing fields</b>	Indicator variable: No Yes	Do they perceive their field as changing more rapidly than other fields?
<b>Professional programs</b>	Indicator variable: No Yes	Do they have any connection to a professional program (including pre-professional)?
<b>Departmental support score</b>	Continuous Variable Range 0-15	Score of how much their department values and supports teaching quality.
<b>University support score</b>	Continuous Variable Range 0-15	Score of how much their university values and supports teaching quality.
<b>Supportive colleagues</b>	Indicator variable: No Yes	Do their colleagues value teaching quality?
<b>Community support</b>	Indicator variable: No Yes	Are they part of a community that values teaching quality?

### 3.3.2.3 Ranking Most Used Tools

Two approaches were used to rank the 11 tools that were used for course design, by their frequency of use. First was by creating a weighted total score for each of the 11 tools, by multiplying the frequency of each response by a weighting constant. The “always” responses were multiplied by 3, the “most of the time” responses were multiplied by 2, “sometimes” responses were multiplied by 1, and “never” responses

were multiplied by -1. The highest score was given a rank of 1, and so on until the lowest score had a rank of 11 (These rankings are found in Table 3.8a in the results section). The second ranking approach used only the “always” responses as the basis for ranking. The tools with higher numbers of “always” responses received the highest rank, and vice versa (Table 3.8b).

#### **3.3.2.4 Statistical Approaches**

For each hypothesis, I ran four Ordinary Least Squares (OLS) linear regressions, one for each of the dependent variables for course design: number of tools used, degree of tool use, number of curriculum documents used, and degree of curriculum use (Table 3.3). For the course updating portion of each hypothesis, I used a Logistic Regression, since the frequency of course updating dependent variable was binary (Table 3.4). All statistical analyses were conducted using Stata statistical software (StataCorp, 2021).

**Table 3.3: List of variables used for the linear regressions to test the course design components of each of the hypotheses**

<b>Variables Used for Linear Regressions</b>		
<b>Hypotheses</b>	<b>Dependent variables</b>	<b>Independent variables</b>
1 Instructor approaches vary by institution type (3 university categories)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	Univeristy type
2a Instructor approaches vary by discipline (STEM/BHASE)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	STEM/BHASE
2b Instructor approaches vary by discipline (5 disciplinary groups)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	5 Disciplinary groups
3a Instructor approaches vary by program type (Programs in rapidly changing fields)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	Rapidly changing fields
3b Instructor approaches vary by program type (Professional programs)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	Professional Programs
4a Instructor approaches vary by workplace cultural contexts (Departmental support for teaching)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	Departmental support score
4b Instructor approaches vary by workplace cultural contexts (University support for teaching)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	Univeristy support score
4c Instructor approaches vary by workplace cultural contexts (Colleagues value teaching)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	Supportive colleagues
4d Instructor approaches vary by workplace cultural contexts (Community that values teaching)	Number of tools used Degree of tool use Number of curriculum documents used Degree of curriculum document use	Community support

**Table 3.4: List of variables used for the logistic regressions to test the course design components of each of the hypotheses**

<b>Variables Used for Logistic Regressions</b>		
<b>Hypotheses</b>	<b>Dependent variables</b>	<b>Independent variables</b>
1	Frequency of Course Updating	Univeristy type
2a	Frequency of Course Updating	STEM/BHASE
2b	Frequency of Course Updating	5 Disciplinary groups
3a	Frequency of Course Updating	Rapidly changing fields
3b	Frequency of Course Updating	Professional Programs
4a	Frequency of Course Updating	Departmental support score
4b	Frequency of Course Updating	Univeristy support score
4c	Frequency of Course Updating	Supportive colleagues
4d	Frequency of Course Updating	Community support

### **3.4 Results**

#### **3.4.1 Descriptive Findings**

##### **3.4.1.1 Characteristics of Respondents**

The 520 respondents came from all regions of Canada, with the most responses coming from Ontario (42%) and the Prairie Region (31%), and the fewest (2%) from Northern Canada (Table 3.5). British Columbia (11%), Atlantic Canada (8%) and Quebec (6%) had relatively lower proportion of responses, especially Quebec and BC when compared to their populations and number of universities. 93% of the respondents completed the survey in English (Table 3.5), and only 35 respondents (7%) took it in French, despite both the survey and the recruitment materials being available in both

official languages. Respondents came from at least 46<sup>14</sup> different universities (see Appendix A Appendix J ) across Canada including at least one institution from every province except PEI, as well as the Yukon, therefore my sample includes representation from 59% of the 78 public universities in Canada (Jones, 2014). When asked to label their university as one of three categories of institution, the largest group came from the Comprehensive category (60%), followed by the Primarily Undergraduate category (24%) and the fewest (16%) were from the Medical-Doctoral category (Table 3.11).

In terms of demographics, 58% of my respondents identified themselves as women, 39% as men, and 3% listed another gender identity or preferred not to respond<sup>15</sup> to this question (Table 3.5). This proportion of women higher than the overall ratio of women to men faculty in Canada, but Jones (2014) points out that men primarily mostly outnumber women in the higher end of the tenure-track positions, but women outnumber men in the non-tenure track teaching positions, which may explain part of this divergence. Additionally, women academics have been shown to take on higher levels of service responsibilities than men (Guarino & Borden, 2017), and some participants may have viewed responding to a graduate student's survey as falling broadly under service, and therefore women may have been more likely to respond than men. Respondents were asked to identify which age group they fell into (Table 3.5). The youngest participants in this study were in the 25-34-year-old group (16%), and the

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<sup>14</sup> This number is based on analysis of the email addresses provided for the raffle. Since many respondents did not choose to sign up for the raffle, this is likely an undercount of the total institutions included.

<sup>15</sup> Participants were able to write in their own specific identity label, but given the very small number of responses in each of these categories, I have combined these categories to protect the privacy of these respondents.

oldest participants in the 75-84 group (1%). The highest numbers of respondents reported being in the 35-44 group (31%) and the 45-54 group (29%).

Self-report stage of career was broken down into three categories (Table 3.5). Mid-career was the most common response (42%), followed by early career (35%) and late career (23%). When asked to identify their current (or most recent) employment position<sup>16</sup>, and similar types of positions were grouped, the largest groups of respondents were associate professors (23%), followed by full or emeritus professors (21%), and then sessional instructors (14%). There was also quite a high number of assistant professors (12%), and people who held non-faculty but continuing types of teaching roles such as instructor, lecturer, etc. (10%). The smallest groups included those in contract or term roles, as well as secondments and arrangements with industry or government organizations (9%), graduate students and postdoctoral fellows (5%), and other positions that did not fall into any of these categories (5%). When I grouped these various positions into broader categories by tenure category and permanence of the role (Table 3.5), almost half of the total respondents were in tenured positions (46%), non-tenure track and non-permanent types of positions made up approximately a quarter of responses (26%) and permanent positions and pre-tenure roles on the tenure track made up almost another quarter (24%), while other types of roles made up the remainder (4%).

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<sup>16</sup> When respondents selected more than one option, they were categorized as the option that was higher status and/or more permanent.

Table 3.5: Descriptive variables relating to the survey respondents

Descriptive Variables - Respondent	Frequencies	Percentages	Visual
<b>Regions of Canada</b>			
Northern Canada	10	1.99	
British Columbia	56	11.13	■
Prairies	157	31.21	■
Ontario	212	42.15	■
Quebec	29	5.77	
Atlantic Canada	39	7.75	■
<b>Survey Language</b>			
English	485	93.27	■
French	35	6.73	
<b>Gender</b>			
Man	192	38.63	■
Woman	290	58.35	■
Other Gender ID/No response	15	3.02	
<b>Age Groupings</b>			
25-34	80	16.13	■
35-44	153	30.85	■
45-54	143	28.83	■
55-64	91	18.35	■
65-74	24	4.84	
75-84	5	1.01	
<b>Self-Report Stage of Instructional Career</b>			
Early career	173	34.88	■
Mid Career	210	42.34	■
Late Career	113	22.78	■
<b>Current/Most-Recent Position</b>			
Graduate Student/Postdoctoral Fellow	22	4.82	
Sessional Instructor	65	14.25	■
Contract/Term/Secondment/Industry Connection	43	9.43	■
Non-Faculty Teaching Staff/Lecturer/Instructor	47	10.31	■
Assistant Professor	54	11.84	■
Associate Professor	106	23.25	■
Full/Emeritus Professor	98	21.49	■
Other	21	4.61	
<b>Type of Role</b>			
Non-tenure-track & non-permanent positions	129	25.65	■
Permanent positions & pre-tenure on tenure-track	123	24.45	■
Tenured positions	230	45.74	■
Other types of roles	21	4.17	

When respondents were asked how much they agreed with the statement “teaching is one of the most important parts of my job” (Table 3.6), there was a very high level of agreement overall; with 70% of respondents selecting strongly agree, and 22% somewhat agreeing. This variable had so little variation that it was not used for any statistical analyses.

**Table 3.6: Teaching attitudes of survey respondents**

Teaching Attitudes	Responses	Frequencies	Percentages	Visual
Teaching is one of the most important parts of my job	Strongly Disagree	4	0.81	
	Somewhat Disagree	7	1.42	
	Neither Agree Nor Disagree	30	6.09	
	Somewhat Agree	106	21.5	
	Strongly Agree	346	70.18	

There was a good balance of responses from instructors who taught different numbers of unique courses over the last 5 years; the largest group taught 3-4 different courses (28%), followed by 7 or more courses (28%), 5-6 courses (23%), and 1-2 courses (21%) (Appendix A Appendix K ). Almost all respondents (93%) had taught undergraduate courses, and more than half taught graduate courses (62%). A large majority of respondents (77%) said they were able to make substantial changes to their courses and these respondents then received questions relating to course updating and change.

### 3.4.1.2 Variables Used in Statistical Analyses

The mean number of tools used by all survey respondents was 4.17 with a standard deviation of 1.37, the median was 4 and the mode was 5, out of a possible score of 6, (Table 3.7). Of the 6 tools listed in this first part of the survey (Table 3.9), a

course outline for the same or similar course was selected most often (90%), followed closely by the course description and/or course learning outcomes (88%) and textbooks and other readings for the course (86%). Program level curriculum documents were selected by only 45% of the respondents, and requirements for relevant certifications or professional accreditation was selected by only 30% of respondents (though this option was only applicable to those respondents who taught in these types of programs). Lastly, 38% of respondents listed one or more other tools beyond these options.

The mean score on the *degree of tool use* measure from the respondents of the second part of the survey (Table 3.7), was 17.42 with a standard deviation of 5.41, and a median of 17 and modes of 15 and 17. This was on a scale from 0 to 33 where 33 indicated that the respondent “always” used all 11 tools when designing courses, and no one scored below a 6 on this measure.

**Table 3.7: Descriptive results of the continuous and quantitative variables from the survey that were used in the statistical analyses**

Quantitative Variables	Observations	Mean	Median	Mode	Std Dev.	Min	Max
<b>Dependent Variables</b>							
Number of Tools Used	520	<b>4.17</b>	<b>4</b>	<b>5</b>	1.37	0	6
Degree of Tool Use Score	211	<b>17.42</b>	<b>17</b>	<b>15, 17</b>	5.41	6	33
Number of Curriculum Documents Used	520	<b>2.05</b>	<b>2</b>	<b>2</b>	0.92	0	3
Degree of Curriculum Document Use Score	211	<b>4.68</b>	<b>4</b>	<b>4</b>	3.24	0	12
<b>Independent Variables</b>							
Departmental Teaching Support Score	198	<b>10.38</b>	<b>10.5</b>	<b>12</b>	3.01	3	15
University Teaching Support Score	212	<b>10.58</b>	<b>11</b>	<b>13</b>	2.42	3	15

Using two different approaches to rank these 11 tools by frequency of use for course design, the same top five tools emerged (these tools are shaded in Table 3.8), and the three least frequently used tools were also consistent. When ranking by the

frequency of tool use across all the (weighted<sup>17</sup>) responses to the Likert questions (Table 3.8a), the most frequently used tool for course design was non-textbook readings for the course, followed by the latest research in the field, the course description from the university's calendar, course outlines for that course from other instructors, and then the learning outcomes for the course. The tool with the highest number of "always" responses (Table 3.8b, Table 3.10) was the course description (48%), followed by non-textbook readings for the course (44%), learning outcomes for the course (40%), and the latest research in the field (38%) and course outlines for that course (38%).

Textbook(s) and course outlines for similar courses that were found online were used less frequently, with only 27% and 19% (respectively) of respondents reporting always using these tools, and 30% and 43% reporting using each of them "sometimes". Just 21% of respondents reported always using their own tools such as making mind maps or spreadsheets to plan their courses, while 34% reported never using these kinds of tools (Table 3.10).

The three least often used tools for course design were also consistent across both ranking approaches (Table 3.8). The least frequently used tools based on all frequency responses (Table 3.8a, Table 3.10) were the certification requirements for a profession (which only applied to those in professional programs), which only 11% of respondents reported using "always" and 67% responded "never or not available", followed by university-wide learning outcomes which were "never" used by 55%, and

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<sup>17</sup> In this weighted ranking, responses of "always" received 3 points, "most of the time" got 2 points, "sometimes" got 1 point, and "never or not applicable" got -0.5 points.

only 7% reported always using these when designing courses (Table 3.8b). Curriculum maps and program level curriculum documents were never used by 43% of respondents (Table 3.10), and only 13% reported always using these.

**Table 3.8: Rankings of most frequently used tools for course design. Table 8a shows the ranking of tools using all responses from the Likert question (weighted), and Table 8b ranks tools based on the "Always" responses only. The top five most used tools are shaded.**

a. Tools - All responses (weighted)	Rank	b. Tools - Responses of "Always"	Rank
Non-textbook readings for the course	1	Course description from course calendar	1
Latest research in the field	2	Non-textbook readings for the course	2
Course description from course calendar	3	Learning outcomes for the course	3
Course outlines for that course	4	Latest research in the field	4*
Learning outcomes for the course	5	Course outlines for that course	4*
Textbook(s) to be used in the course	6	Textbook(s) to be used in the course	6
Course outlines for similar courses	7	Create mind maps, spreadsheets etc	7
Create mind maps, spreadsheets etc	8	Course outlines for similar courses	8
Curriculum maps and program plans	9	Curriculum maps and program plans	9
University wide learning outcomes	10	Certification requirements for profession	10
Certification requirements for profession	11	University wide learning outcomes	11

**Table 3.9: List of tools that made up the number of tools used score, with percentages of respondents who selected each tool**

Tools Used When Designing Courses	Frequencies	Percentages	Visual
Course outlines for the same or similar courses	466	89.62	
Textbooks & other readings for the course	446	85.77	
Course description and/or course learning outcomes †	457	87.88	
Program-level curriculum docs/curr maps, program plans †	234	45.00	
Requirements expectations for relevant certifications, professional accreditation	157	30.19	
Other tools and resources beyond these	196	37.69	

The mean *number of curriculum documents used* by all survey respondents was 2.05 with a standard deviation of 0.92, and a median and mode of 2, out of a possible score of 3 (Table 3.7). The mean score on the *degree of curriculum document use* measure, from the respondents of the second part of the survey was 4.68 with a standard deviation of 3.24, and a median and mode of 4, on a scale from 0 to 12 where

12 indicates that all 4 tools were always used when designing courses (Table 3.10). Table 3.9 and Table 3.10 also contain the items that were used for these two scores, these items are marked with a ‘+’ symbol in those tables. In Table 3.9, 2 out of the 3 listed curriculum documents (program level documents and professional requirements) were among the least used tools overall on this measure, and 3 out of 4 of the curriculum document options (curriculum maps/program plans, university learning outcomes, and professional requirements) from Table 3.10 were also among the least frequently used tools on this measure. The exception in both cases related to learning outcomes for the course, the “course description and/or course learning outcomes” item was selected by 88% of respondents from the first part of the survey (Table 3.9). 40% of respondents from the second part of the survey reported always using course learning outcomes, and 27% reported using them most of the time (Table 3.10).

**Table 3.10: List of all the tool use questions and responses that were used to create the amount of tool use score, including percentages who selected each frequency level for each tool**

Tool Description	Responses	Frequencies	Percentages	Visual
Course outlines for that course, from other instructors	Never or not available	27	12.80	
	Sometimes	51	24.17	
	Most of the time	52	24.64	
	Always	81	38.39	
Course outlines for similar courses, found online	Never or not available	40	18.96	
	Sometimes	90	42.65	
	Most of the time	41	19.43	
	Always	40	18.96	
Description from the university's course calendar	Never or not available	35	16.59	
	Sometimes	37	17.54	
	Most of the time	38	18.01	
	Always	101	47.87	
Learning outcomes associated with the course description †	Never or not available	37	17.54	
	Sometimes	34	16.11	
	Most of the time	56	26.54	
	Always	84	39.81	
The textbook(s) to be used in the course	Never or not available	34	16.11	
	Sometimes	63	29.86	
	Most of the time	57	27.01	
	Always	57	27.01	
Other (non-textbook) readings, books, etc. to be used in the course	Never or not available	2	0.95	
	Sometimes	44	20.85	
	Most of the time	72	34.12	
	Always	93	44.08	
The latest research in the field to include new discoveries or practices	Never or not available	7	3.32	
	Sometimes	51	24.17	
	Most of the time	72	34.12	
	Always	81	38.39	
Curriculum-mapping or program-level curriculum documents †	Never or not available	91	43.13	
	Sometimes	67	31.75	
	Most of the time	25	11.85	
	Always	28	13.27	
University-wide learning outcomes †	Never or not available	116	54.98	
	Sometimes	57	27.01	
	Most of the time	23	10.90	
	Always	15	7.11	
Certification requirements for the regulated profession †	Never or not available	141	66.82	
	Sometimes	32	15.17	
	Most of the time	14	6.64	
	Always	24	11.37	
I create mind-maps, spreadsheets or other tools to brainstorm/view/plan out ideas	Never or not available	72	34.12	
	Sometimes	59	27.96	
	Most of the time	34	16.11	
	Always	46	21.80	

The mean departmental support for teaching score was 10.38 out of 15, for those who completed the second part of the survey (Table 3.7), and no one scored below a 3 on this measure. Three questions were combined to produce this score (Appendix AAppendix L ): 51% of respondents said they strongly agreed that their department or chair states that they value excellence in teaching, while only 19% strongly agreed (and 34% somewhat agreed) that their department backs up these statements with action, and 13% strongly disagreed. The final question was whether their department recognizes or compensates quality teaching, and this has the lowest agreement of the three; only 12% strongly agreed, and 26% somewhat agreed, while 22% strongly disagreed with this statement.

The mean university support for teaching score was 10.58 out of 15, for those who completed the second part of the survey (Table 3.7), and no one scored below a 3 on this measure. Three questions were combined to produce this score (Appendix AAppendix L ): 69% of respondents strongly agreed that their university states that they value excellence in teaching, while only 10% strongly agreed (and 40% somewhat agreed) that their university backs up these statements with action, and 10% strongly disagreed. The final statement had the lowest level of agreement: only 6% of respondents strongly agreed that their university recognizes or compensates quality teaching, 29% somewhat agreed, while 28% somewhat disagreed, and 17% strongly disagreed.

When asked how often they change or update their courses, 70% of respondents said they change the course every time they teach it, and 30% changed their courses less often than every time (Table 3.11).

Almost two thirds of respondents (65%) belonged to STEM disciplines, and 35% to BHASE<sup>18</sup> disciplines (Table 3.11). When broken down into five disciplinary categories, 25% of respondents were in Natural and Formal Sciences disciplines, 19% were in Professional disciplines, 16% in the Social Sciences, and 12% were in the Humanities. The largest group was the Other category, which made up 28% of the sample (Table 3.11).

When asked to identify how quickly their discipline was changing compared to other fields, 78% felt their field was changing at a similar rate or less rapid pace than others, and 21% felt they were in a more rapidly changing field (Table 3.11).

The respondents who taught within a professional program were categorized into two groups by whether they had any connection to a professional program (from teaching courses in a pre-professional program, up to teaching most or all their courses within a professional program), and this group made up 47% of the respondents, compared to 53% who had no connection to a professional program<sup>19</sup> (Table 3.11).

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<sup>18</sup> BHASE refers to non-STEM fields, the acronym comes from: Business, humanities and health, arts, social science, and education

<sup>19</sup> I also initially tried the analyses with a second professional variable that compared those who taught primarily in a professional program, versus those who taught most of their courses outside of a professional program. The same general trends were found when using this variable as with the one used here, but the results explained less of the variance and were significant less often, so this variable focusing on having any connection to a professional program was chosen as the more useful categorization method.

When asked whether their colleagues value quality teaching (Table 3.11), 67% answered yes, and 33% answered no. In terms of community membership, 70% of respondents said they were part of a community that valued teaching, compared to 30% who were not.

**Table 3.11: Descriptive categorical dependent and independent variables used in the statistical analyses**

<b>Categorical Dependent Variable</b>	<b>Frequencies</b>	<b>Percentages</b>	<b>Visual</b>
<b>Change Course Every Time It's Taught</b>			
No	143	30.43	
Yes	327	69.57	
<b>Categorical Independent Variables</b>			
<b>University Category</b>			
Primarily Undergraduate	120	24.05	
Comprehensive	300	60.12	
Medical-Doctoral	79	15.83	
<b>Discipline - STEM</b>			
BHASE	321	64.59	
STEM	176	35.41	
<b>Discipline - Five groups</b>			
Natural & Formal Sciences	122	24.55	
Humanities	58	11.67	
Social Sciences	81	16.30	
Professions	95	19.11	
Other	141	28.37	
<b>Rapidly Changing Field</b>			
Similar or less rapid than others	407	78.27	
More rapid than others	113	21.73	
<b>Any Connection to Professional Program</b>			
No professional connection	277	53.27	
Any professional connection	243	46.73	
<b>Colleagues Value Quality Teaching</b>			
No	71	33.49	
Yes	141	66.51	
<b>Part of a Community that Values Teaching*</b>			
No	65	29.82	
Yes	153	70.18	
*The subset of this variable that responded to the second part of the survey. The original percentages were 32.5% No, 67.50% Yes			

### **3.4.2 Statistical Analysis Results**

Detailed results from the linear and logistic regressions on hypotheses 1 through 4 are laid out in Table 3.12 and Figure 3.2 and Figure 3.3 below (and described in more detail in Appendix AAppendix M ), but I will summarize the key findings here.

#### **3.4.2.1 Course Design**

Instructors in STEM disciplines used a lower number of tools for course design, but used curriculum documents to a higher degree, compared to BHASE disciplines (Figure 3.2). Professional disciplines used curriculum documents to a significantly higher degree than social science disciplines (Figure 3.4).

Instructors who teach in programs connected to rapidly changing fields, and those who teach in professional (or pre-professional) programs both showed a higher degree of curriculum document use. However, those teaching in professional programs used a lower number of both tools and curriculum documents during course design, compared to those with no connection to a professional program (Figure 3.2).

To investigate this result further and see whether this difference is driven by high degree of use of professional requirements in particular, or differences across all types of curriculum documents, I broke down the percentages of instructors using each type of curriculum document, by whether they taught within a professional (or pre-professional) program or not, and this is summarized in Table 3.13. From the first part of the survey there was a similar level of use of course descriptions and learning outcomes between groups, but the program curriculum documents were used substantially more

by those who teach in professional programs. Approximately 50% of those in professional programs stated that they used their professional requirements for course design.

From the second part of the survey (Table 3.13), the questions that had respondents state how often they used each type of curriculum document, and this does show some differences across all curriculum document types. The overall pattern of use for the course learning outcomes was the same across the two groups, but those in professional programs were more likely to use learning outcomes most of the time or all the time. For program level curriculum documents, the most common response from those with no professional connection was “never” whereas the most common response from the instructors in professional programs was “sometimes”, and the “most of the time” and “always” responses were more common for the professional group as well. Neither group used university level outcomes very often, but they were used slightly more often by the professional group. The requirements for a profession were used to various degrees by those in professional programs with 33% saying they always made use of these, and 18% using them most of the time, but only 18% of those who took the second part of the survey said that they never used these professional requirements for course design.

The departmental support score was associated with a higher number of both tools and curriculum documents used during course design (Figure 3.3). In contrast, the university support score was associated with a higher degree of both tools use and curriculum document use for course design. Having colleagues who value teaching was

associated with both a higher number of tools used, and a higher degree of curriculum document use for course design (Figure 3.3). The final cultural context variable, being part of a community that values teaching, had a significant impact on all four of the course design variables – both a higher number and degree of tool use, as well as a higher number and degree of curriculum documents used. This community variable also explained the most variance of any variable, for all of these four course design measures (Figure 3.3).

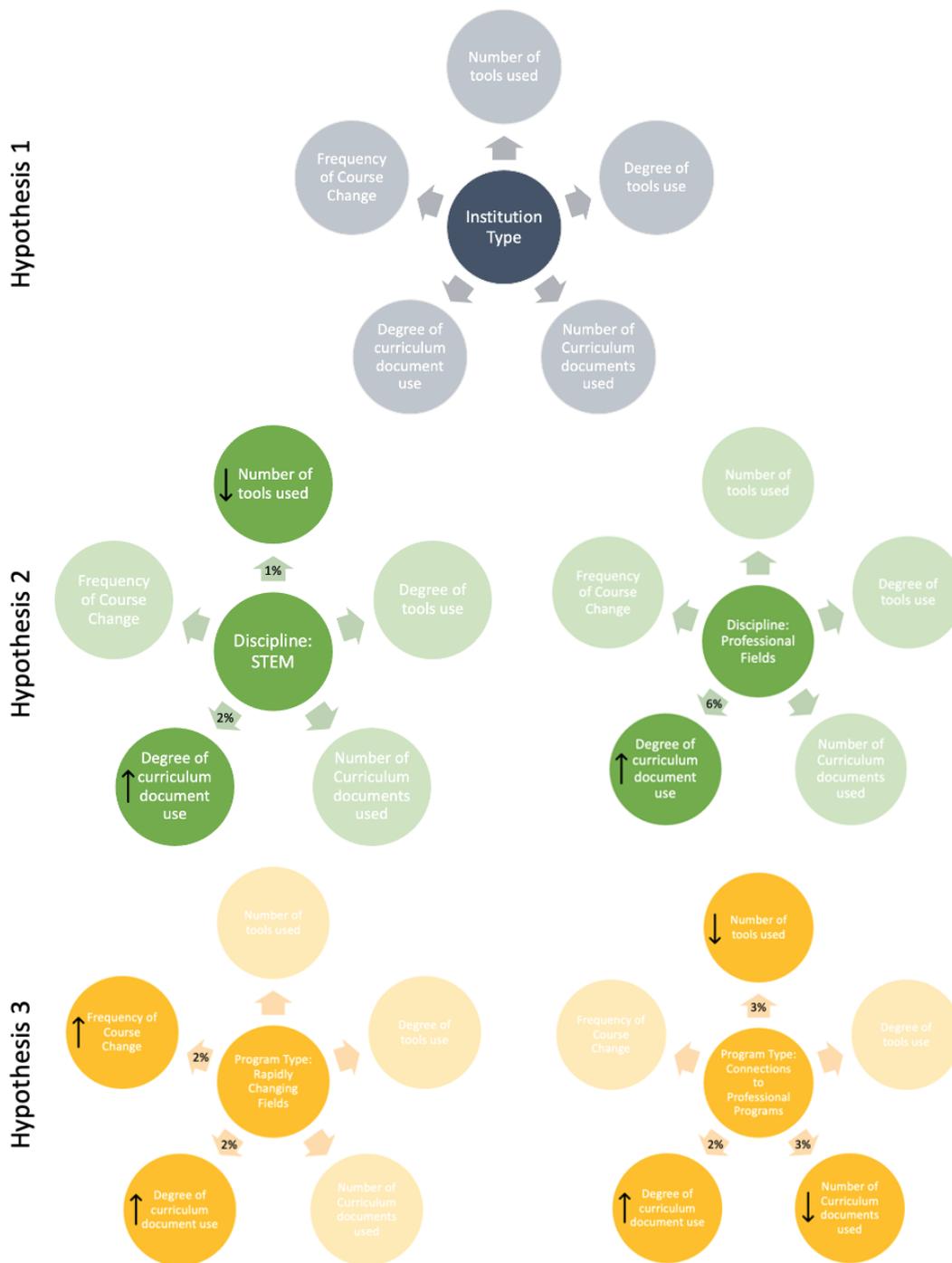
Institution type had no significant impact on any measure of course design or updating (Figure 3.2).

#### **3.4.2.2 Course Updating**

Most of the variables tested had no significant impact on frequency of course updating. However, the respondents in rapidly changing fields were significantly more likely to change their course every time they taught it, compared to all other fields (Figure 3.2).

**Table 3.12: Summary of statistical hypotheses and results. R-Squared and interpretations are given only if the regression was significant**

Stated Hypotheses	Dependent Measures D = Design, U = Updating	Regression Type	Overall Statistic	P value	Results	R Squared (if significant)	Interpretation
1 Instructor approaches to designing and updating courses vary by institution type (3 university categories)	D - Number of tools used	Linear	$F_{(2,496)} = 1.60$	0.20	Not Supported		No impact of institution type on any course design measure
	D - Frequency of tool use	Linear	$F_{(2,208)} = 1.40$	0.25	Not Supported		
	D - Number of curriculum documents used	Linear	$F_{(2,496)} = 0.59$	0.56	Not Supported		
	D - Freq of curriculum document use	Linear	$F_{(2,208)} = 2.34$	0.10	Not Supported		
	U - Frequency of course updating	Logistic	$LR C^2_{(1)} = 2.19$	0.33	Not Supported		
2a Instructor approaches to designing and updating courses vary by discipline (STEM/BHASE)	D - Number of tools used	Linear	$F_{(1,495)} = 4.13$	0.04	Supported	0.01	Those in STEM fields use fewer tools than in BHASE
	D - Frequency of tool use	Linear	$F_{(1,208)} = 0.00$	0.96	Not Supported		
	D - Number of curriculum documents used	Linear	$F_{(1,495)} = 0.29$	0.59	Not Supported		
	D - Freq of curriculum document use	Linear	$F_{(1,208)} = 5.15$	0.02	Supported	0.02	Those in STEM fields used curriculum documents at a higher rate
	U - Frequency of course updating	Logistic	$LR C^2_{(1)} = 1.61$	0.20	Not Supported		
2b Instructor approaches to designing and updating courses vary by discipline (5 disciplinary groups)	D - Number of tools used	Linear	$F_{(4,492)} = 0.51$	0.73	Not Supported		
	D - Frequency of tool use	Linear	$F_{(4,204)} = 1.32$	0.26	Not Supported		
	D - Number of curriculum documents used	Linear	$F_{(4,492)} = 0.39$	0.81	Not Supported		
	D - Freq of curriculum document use	Linear	$F_{(4,204)} = 3.05$	0.02	Supported	0.06	Professional disciplines had highest rate of curriculum document use, significantly higher than Social Sciences
	U - Frequency of course updating	Logistic	$LR C^2_{(4)} = 6.19$	0.19	Not Supported		
3a Instructor approaches to designing and updating courses vary by program type (Programs in rapidly changing fields)	D - Number of tools used	Linear	$F_{(1,518)} = 0.46$	0.50	Not Supported		
	D - Frequency of tool use	Linear	$F_{(1,209)} = 3.03$	0.08	Not Supported		
	D - Number of curriculum documents used	Linear	$F_{(1,518)} = 0.05$	0.83	Not Supported		
	D - Freq of curriculum document use	Linear	$F_{(1,209)} = 5.20$	0.02	Supported	0.02	Those in rapidly changing fields used curriculum documents more often than other fields
	U - Frequency of course updating	Logistic	$LR C^2_{(1)} = 10.88$	<0.01	Supported	0.02	Those in rapidly changing fields were more likely to change their course every time they taught it
3b Instructor approaches to designing and updating courses vary by program type (Professional programs)	D - Number of tools used	Linear	$F_{(1,518)} = 13.89$	<0.001	Supported	0.03	Those who taught in professional programs used fewer tools than those who did not teach in these programs
	D - Frequency of tool use	Linear	$F_{(1,209)} = 2.61$	0.11	Not Supported		
	D - Number of curriculum documents used	Linear	$F_{(1,518)} = 14.19$	<0.001	Supported	0.03	Those who taught in professional programs used fewer curriculum documents
	D - Freq of curriculum document use	Linear	$F_{(1,209)} = 6.40$	0.01	Supported	0.03	Those who taught in professional programs used curriculum documents more often
	U - Frequency of course updating	Logistic	$LR X^2_{(1)} = 0.12$	0.72	Not Supported		
4a Instructor approaches to designing and updating courses vary by workplace cultural contexts (Departmental support for teaching)	D - Number of tools used	Linear	$F_{(1,196)} = 11.31$	<0.001	Supported	0.05	Higher departmental support score used more tools for course design
	D - Frequency of tool use	Linear	$F_{(1,192)} = 3.10$	0.08	Not Supported		
	D - Number of curriculum documents used	Linear	$F_{(1,196)} = 5.34$	0.02	Supported	0.03	Higher departmental support score used more curriculum documents
	D - Freq of curriculum document use	Linear	$F_{(1,192)} = 2.16$	0.14	Not Supported		
	U - Frequency of course updating	Logistic	$LR X^2_{(1)} = 0.12$	0.73	Not Supported		
4b Instructor approaches to designing and updating courses vary by workplace cultural contexts (University support for teaching)	D - Number of tools used	Linear	$F_{(1,210)} = 3.19$	0.08	Not Supported		
	D - Frequency of tool use	Linear	$F_{(1,206)} = 6.54$	0.01	Supported	0.03	Higher university support score used tools more frequently for course design
	D - Number of curriculum documents used	Linear	$F_{(1,210)} = 0.60$	0.44	Not Supported		
	D - Freq of curriculum document use	Linear	$F_{(1,206)} = 6.68$	0.01	Supported	0.03	Higher university support score used curriculum documents more frequently
	U - Frequency of course updating	Logistic	$LR X^2_{(1)} = 0.16$	0.69	Not Supported		
4c Instructor approaches to designing and updating courses vary by workplace cultural contexts (Colleagues value teaching)	D - Number of tools used	Linear	$F_{(1,210)} = 4.07$	0.04	Supported	0.02	Those with supportive colleagues used more tools for course design
	D - Frequency of tool use	Linear	$F_{(1,206)} = 3.40$	0.07	Not Supported		
	D - Number of curriculum documents used	Linear	$F_{(1,210)} = 3.81$	0.05	Not Supported		
	D - Freq of curriculum document use	Linear	$F_{(1,206)} = 6.32$	0.01	Supported	0.03	Those with supportive colleagues used curriculum documents more frequently for course design
	U - Frequency of course updating	Logistic	$LR X^2_{(1)} = 0.00$	0.95	Not Supported		
4d Instructor approaches to designing and updating courses vary by workplace cultural contexts (Community that values teaching)	D - Number of tools used	Linear	$F_{(1,216)} = 13.28$	<0.001	Supported	0.06	Those with a community that values teaching used more tools
	D - Frequency of tool use	Linear	$F_{(1,209)} = 15.81$	<0.001	Supported	0.07	Those with a community that values teaching used tools more frequently
	D - Number of curriculum documents used	Linear	$F_{(1,216)} = 10.29$	<0.01	Supported	0.05	Those with a community that values teaching used more curriculum documents
	D - Freq of curriculum document use	Linear	$F_{(1,209)} = 16.76$	<0.001	Supported	0.07	Those with a community that values teaching used curriculum documents more often
	U - Frequency of course updating	Logistic	$LR X^2_{(1)} = 2.20$	0.14	Not Supported		

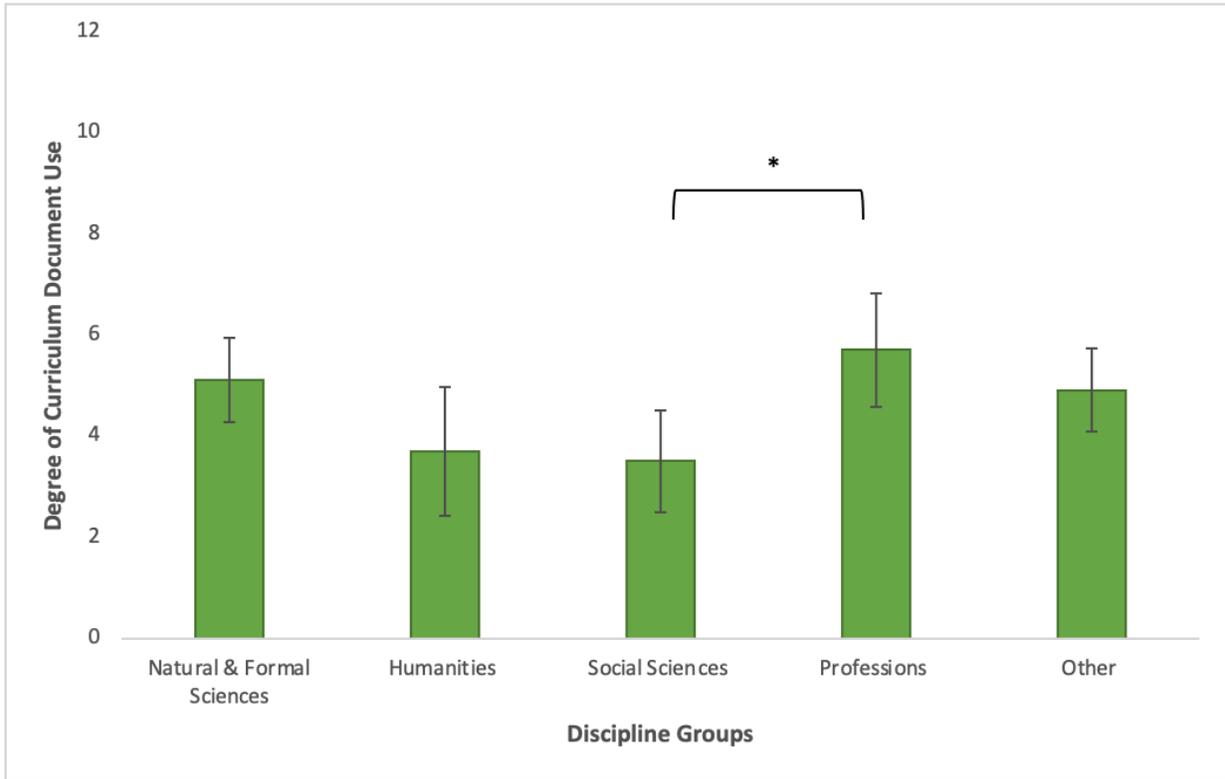


**Figure 3.2: Impacts of each independent variable from hypotheses 1-3 on all five dependent variables. Any significant impacts on dependent variables are shown in full colour with the percentage variance explained listed on the arrow. Greyed out variables were non-significant.**

Hypothesis 4



Figure 3.3: Impacts of each independent variable from hypothesis 4 on all five dependent variables. Any significant impacts on dependent variables are shown in full colour with the percentage variance explained listed on the arrow. Greyed out variables were non-significant.



**Figure 3.4: Margins for frequency of curriculum use by disciplinary group. Error bars represent 95% confidence intervals.**

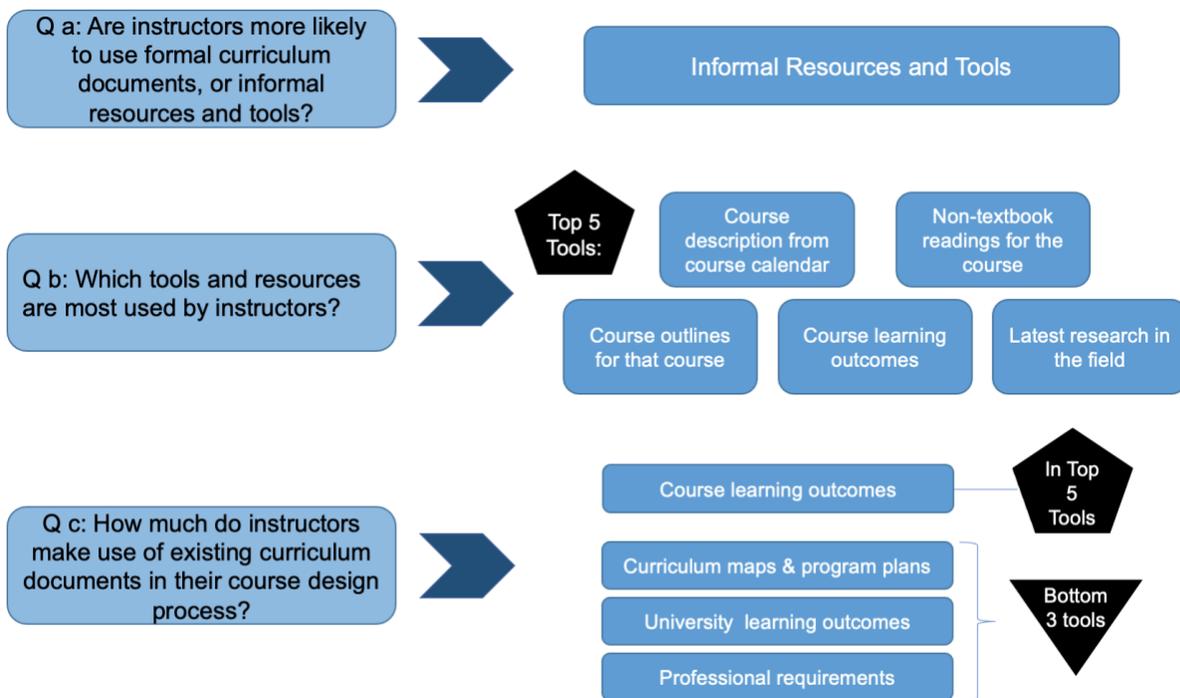
**Table 3.13: Percentages of instructors using each type of curriculum document (and at each level of frequency), broken out by connection to a professional program**

Type of Curriculum Document	No Professional Connection	Any Professional Connection		
<b>First Part of Survey - Any level of use</b>	<b>Percentage</b>	<b>Percentage</b>		
Course Descriptions and Learning Outcomes	90.3	85.2		
Program Curriculum Documents	37.6	53.5		
Professional Requirements (if applicable)	n/a	50.6		
<b>Second Part of Survey - Frequency of use</b>	<b>Percentage</b>	<b>Visual</b>	<b>Percentage</b>	<b>Visual</b>
<b>Learning outcomes associated with the course description</b>				
Never or not available	9.28		3.37	
Sometimes	19.59		16.85	
Most of the time	27.84		32.58	
Always	43.30		47.19	
<b>Curriculum-mapping or program-level curriculum documents</b>				
Never or not available	45.10		26.44	
Sometimes	30.39		41.38	
Most of the time	12.75		13.79	
Always	11.76		18.39	
<b>University-wide learning outcomes</b>				
Never or not available	55.00		43.82	
Sometimes	29.00		31.46	
Most of the time	9.00		15.73	
Always	7.00		8.99	
<b>Certification requirements for the regulated profession</b>				
Never or not available	n/a		17.81	
Sometimes	n/a		31.51	
Most of the time	n/a		17.81	
Always	n/a		32.88	

### **3.5 Discussion**

In this study I set out to understand how university courses are developed and updated in Canada, including the tools, resources and approaches used by university instructors.

I found that instructors use more informal tools and resources than formal curriculum documents. The five most frequently used tools for course design by instructors in this study are course descriptions, non-textbook readings for the course, course learning outcomes, course outlines, and the latest research in the field. Among the curriculum documents measured, I found that there was a split in frequency of use, by type of curriculum document. The most frequently used were the course learning outcomes, which were within the top five overall tools used, while the other three types of curriculum documents (program level documents, university-wide learning outcomes, and professional requirements) were ranked last, as the three least frequently used tools out of the 11 tool categories included in this study. See Figure 3.5 for a summary of these findings.



**Figure 3.5: Summary of results for questions a, b and c, regarding the types of tools and resources most used for course design.**

The final question I set out to answer was about the other factors that influence instructors' approaches to course development and change, and this question was addressed by investigating 4 complementary hypotheses. See Figure 3.6 for a summary of these findings.

I found that Hypothesis 1 was not supported; instructor approaches to developing and updating courses did not vary among the three types of institutions (primarily undergraduate, comprehensive, and medical-doctoral), on any of the measures of course design or change included in this study.

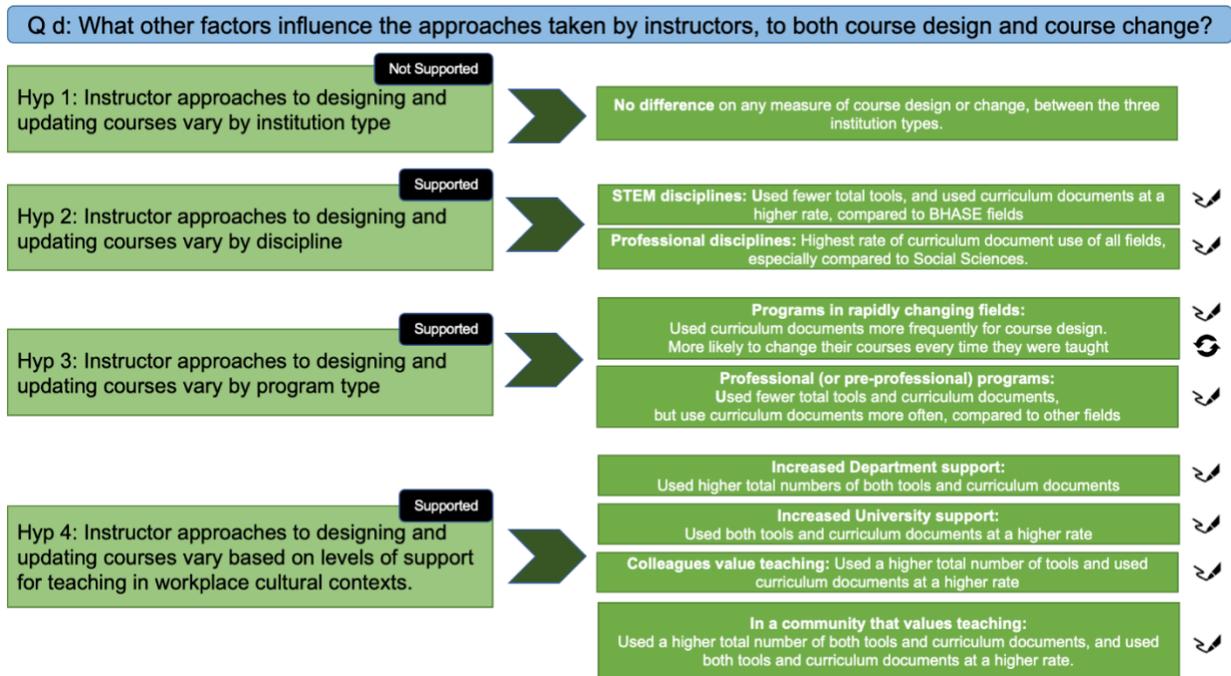
Instructor approaches did vary by discipline, which supports hypothesis 2. Instructors in BHASE disciplines used more tools for course design than instructors in

STEM fields did, and STEM fields used curriculum documents to a higher degree than BHASE fields. Instructors in professional disciplines had the highest degree of curriculum document use among all fields, and this was significantly higher than instructors in the social sciences.

I also found support for hypothesis 3, which focused on the impact of program type on course design and change. Instructors in rapidly changing fields were more likely to change their courses every time they taught them, than all other types of program. This rapidly changing fields variable was the only factor which impacted the frequency of course change. Curriculum documents were used at a higher degree by both instructors in rapidly changing fields, and by instructors who taught courses in a professional or pre-professional program. These instructors with a connection to a professional program also used fewer total tools and fewer curriculum documents, than those with no connection to a professional program.

The results of this study also support hypothesis 4: the levels of support for teaching within local workplace cultural contexts did impact the teaching approaches of instructors. Instructors within departments which show higher levels of support for quality teaching, were found to use higher total numbers of both tools and curriculum documents, and instructors within universities which are more supportive of teaching, use both tools and curriculum documents to a higher degree. Instructors with colleagues who value quality teaching use a higher number of tools and use curriculum documents to a higher degree, than instructors without these supportive colleagues. The factor that was the most impactful on all the measures of course design, was being part of a

community which values teaching. This community support impacted (and explained the most variance in) the number and degree of tools used for course design, as well as the number of curriculum documents used and the degree to which they were used. Figure 3.6 summarizes these findings.



**Figure 3.6: Summary of findings for Question d, arranged by hypothesis. Icons on the far right indicate if the significant findings relate to course design (writing icon) or course change (arrows) or both. No icons indicate no significant findings.**

The only variable which had any impact on the rate of course change, was whether the respondent felt that they were part of a rapidly changing field. It is unsurprising that these instructors would be most likely to change their courses more often, as instructors in these fields are likely to have more new advances in the field, and new real-world examples and applications to refer to in their courses as well. At first glance the higher degree of curriculum document use seems counterintuitive as formal

curriculum is often thought of as something more static, but there are two possible explanations here - programs in these rapidly changing fields may be updating their formal curriculum documents more often to keep up with the external changes, and so instructors may have changes in the curriculum to refer to more often, or the higher level curriculum may have been designed to be relatively flexible and 'evergreen' to changes in the field, in which case instructors may just be checking to make sure their course changes are still in line with these overall expectations. For instance, agriculture programs across Canada (21% of the rapidly changing group in my sample also identified themselves as being from agri-food fields) have gone through some major changes in recent decades to keep up with changes in the field, including becoming more interdisciplinary, and some programs were completely reinvented (Halliday, 2020). More research needs to be done on which specific aspects of these fields are changing, and how these differences impact course design decisions – there are additional questions from this survey which could help to address these questions, and I will analyze these for a future study.

Among all the workplace cultural context factors considered, being part of a community that values teaching had the largest impact on all four measures of course design studied here. In fact, being part of a community like this had the largest impact (explained the most variance) of all factors tested in this study, on each of these outcome measures. This shows that while both department and university levels of support for teaching impacted the course design approaches, and having colleagues that value teaching quality also had a positive impact (and therefore these are structural

and cultural factors that could be targeted for change (Kálmán et al., 2020)), this community factor should be the focus of future research. For example, there is no way to tell the direction of causality from this data whether people sought out these communities because they already valued teaching, or whether they found themselves surrounded by others who value teaching by chance and so changed their behaviour due to the influence of this community. Of course, there is also likely to be a positive feedback loop to being part of such a community that would reinforce any teaching-related values (Wenger, 2011).

It is important for both universities and departments to take note of the findings from this study related to their statements and actions. First, it's important to note the disconnect between the relatively high levels of university & department statements in support of quality teaching, and the much lower levels at which they are seen to be backing up these statements with action or recognizing teaching excellence. This finding suggests that many instructors view these supportive statements as simply 'lip service' instead of genuine commitments to supporting teaching, which is harmful to motivation and the credibility of leadership (Cha & Edmondson, 2006; Efron et al., 2018). Additionally, I found that in those departments and universities that have done a better job of aligning their words and actions, this is tied to improvements in the number and degree of tool and curriculum use. Therefore, this could provide an incentive for institutions and departments to work on addressing this lack of action, as it does seem to make a difference to instructor behaviour.

There are two groups (instructors who teach in STEM fields and those who teach in professional programs) which each demonstrated an interesting tension between the total number of resources used, compared to the degree to which that the same type of resources are used. While these two types of measures (number and degree) are not directly comparable (since the number of tools/curriculum documents question comes from part 1 of the survey so had a larger sample size, and also is a shorter and more general list of tools/curriculum documents than the degree of use measure which comes from part 2 and had a longer, more specific list of tools/ curriculum documents), the fact that there are these two cases where the number and frequency findings are in opposite directions is worthy of further consideration.

There are a couple of possible explanations for the finding that STEM fields use fewer tools overall, but had a higher degree of curriculum document use than BHASE fields. Many STEM fields, such as Math, Physics or Chemistry have a clear set of foundational knowledge that must be mastered before the next level of complexity can be learned, and the progression through this complexity is remarkably consistent across different courses and programs at different institutions, particularly for introductory and even intermediate courses, and could even be described as a “de facto curriculum” (‘Kathy’, 2021<sup>20</sup>). This established content and progression of concepts is reflected in the content found in most textbooks in these fields as well. This may explain why many instructors in STEM fields may focus on fewer key tools but use these tools more often,

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<sup>20</sup> The pseudonym of one of my interview participants from the follow up interviews with instructors from the survey

because this is likely where a majority of the core information they need for their course design process is found. In contrast, many BHASE fields such as social sciences and humanities may be less likely to have this kind of de facto curriculum or to have these common key resources that align with it, and so may need to consult a wider range of resources and tools when deciding what content to include and how to develop their courses.

Given the increased level of consistency across the same professional program at various institutions and the need to ensure all professional programs meet the same requirements from their professional organizations (Accreditation Board for Engineering and Technology, n.d.; Law Society of Ontario, n.d.; Ontario College of Teachers, n.d.), the higher level of curriculum use found here is to be expected as a way to maintain this consistency and ensure compliance with professional standards. I initially thought the reduced overall number of tools and curriculum documents used in these programs might be due to an increased focus on their professional requirements, over other types of curriculum documents, but this does not seem to be the case, according to Table 3.13. Instead, this may be due to the nature of professional programs and how their programs are fundamentally based on professional requirements from the start – therefore, the higher degree of use of both course learning outcomes and program-level curriculum documents makes sense if they were based on the professional requirements to begin with, so instructors can use these instead of needing to refer to the professional requirements directly.

The common thread that ties most of these major results together, is the critical role of culture – specifically a culture of teaching excellence and innovation. This was clearest with the respondents who had a community that valued teaching, who were the most likely of any group to use more tools and more curriculum documents (and both to a higher degree), but the same overall pattern is found throughout these results. A departmental or university wide culture that supports teaching has similar effects, as does being part of a professional program or teaching within a professional discipline which provides instructors with a common vision or end goal for what the graduates should know and be able to do, and so curriculum is used more often to ensure that this goal is reached (Edmundson, 1990; Loon Hoe, 2007). Being part of a rapidly changing discipline likely leads to a culture of innovation and therefore to updating courses more regularly (Büschgens et al., 2013; Serdyukov, 2017).

When we hear calls for universities to change with the times and to keep up with changes in society and in the labour market, it seems that the key change that we need to look for is within this culture of teaching excellence and innovation. I have shown that university level learning outcomes and priorities have very little impact on the on-the-ground design of courses, so it is not more administrative ‘bloat’ and extensive documentation that is needed (Gross, 2020; Tomar, 2021). Instead, my results show that a university that not only makes proclamations about the importance of teaching, but also backs up these proclamations with action, and which recognizes, rewards, and compensates quality teaching has the most impact. The same goes for departments – words but more importantly action to support teaching do make a difference in how

courses are designed. This is supported by a recent study in Europe which found that instructor's teaching approaches were interconnected with their professional development, and the "perceived departmental cultures" (Kálmán et al., 2020). More research is needed to drill down and find out what types of support and what aspects of culture are most vital especially in the Canadian context, and where best to direct efforts and increasingly limited funds, but it seems safe to assume that any action that builds toward a culture of teaching excellence is a good place to start. The impact of this culture on other variables (beyond those included here) related to teaching should also be investigated, to further understand the impact of this cultural factor.

There are more questions from this survey that may help to tease apart the layers of interactions and impact here – such as the barriers and challenges instructors face during course design and updating, and the types of teaching training and experience (both earlier in their education and careers, and ongoing) are most influential to these course design behaviours, and how the specific roles and positions held by respondents impact their actions – which will be analyzed for a follow up study. Additionally, qualitative analysis of the follow up interviews which were conducted with several survey participants, and a series of interviews with Educational Developers on these same topics (which were conducted to get their perspectives and a more institution-wide view of instructor approaches), will also provide rich narrative evidence that can help to explore these questions further, to complement this quantitative analysis.

Future research should also focus on investigating the effectiveness of various ways to encourage a culture of teaching excellence. Some examples might include department discussion groups (similar to journal clubs) that focus on articles related to teaching practices and incorporating new teaching approaches, providing mentoring programs (Jackevicius et al., 2014; Savage et al., 2004) and teaching workshops, or simply increasing awareness of the existing resources and learning opportunities available from institutional teaching and learning centres, and the ability to get additional support from educational development staff (Forgie et al., 2018). It is important to also consider how to foster authentic communities of practice, and not fall into the trap of creating a “compliance culture” (Kálmán et al., 2020) where department-directed activities are imposed but not embraced by instructors, so any changes are surface level instead of transformational (Kálmán et al., 2020).

The lack of support found in this study for differences in levels of tool use and curriculum use between the three types of institution, is surprising given how often arguments are made about the differences among institution types. Smaller, primarily undergraduate institutions are often promoted to students and their parents as being more focused on teaching particularly due to smaller class sizes and more access to faculty (Broekemier & Seshadri, 2000; Hart, 2016), whereas larger medical doctoral schools are more focused on research, and instructor priorities have been found to differ between the categories (Canadian Association of University Teachers, 2021; Dwyer, 2021; Jones, 2014; Stephenson et al., 2020). Therefore, I would have expected that these differences in institutional focus would have impacted the cultural factors that

have been found to be so powerful here. This finding may call into question how different these institutional categories really are, and whether the diversity within these categories is similarly important to differences between them. For example, there may be differences among even the largest institutions when it comes to university and departmental decisions about characteristics such as class sizes, and use of pedagogical techniques to make large classes “feel” small and address some of the major concerns related to with large class sizes (Cooper & Robinson, 2000; Mulryan-Kyne, 2010). Or they may differ in levels of support for teaching within departments and institutions. Another interpretation may be that institutional differences may be found among the general instructor populations at these different institution types, but that they do not show up in this particular sample of instructors; or that the differences impact other variables beyond those measured here.

As with many survey research projects which use a convenience sampling approach (Edgar & Manz, 2017), this sample cannot be considered to be representative of the population of university instructors in Canada. For example, my respondents volunteered to take a survey about university teaching, so it is unsurprising that such a high proportion of them (92%) reported that teaching was one of the most important parts of their job. This result may be a sign of a biased sample as people who care more about teaching are more likely to take a voluntary survey about their teaching behaviours. Additionally, I had considerably different levels of receptiveness from different institutions— some were willing to send my recruitment information to all of their instructors in the whole department or university, while others did not respond to my

requests, and I had to rely on social media and personal and professional connections to reach anyone at those institutions. While this study cannot be considered representative, I was able to get participation from a wide range of academic disciplines, regions of Canada, stages of career, and types of teaching positions, among other characteristics, so this data is still very useful for an exploratory project like this.

The high level of support for “teaching is one of the most important parts of my job” could also be interpreted in other ways. It could indicate a level of socially desirable responding (Paulhus, 1984), or it could indicate that they interpreted the question as referring to the distribution of effort in their contract (i.e. “it takes up 40% of my job description, so it is by definition one of the most important parts”) regardless of their own personal feelings toward the value and importance of teaching. Alternatively, it could simply indicate that they liked having the variety in their work. In fact, the 2018 Changing Academic Profession Survey found that the majority (73%) of full-time faculty in Canada prefer some combination of teaching and research in their work, even if they ‘leaned’ toward one or the other of these priorities (Stephenson et al., 2020). Future research should examine this topic more thoroughly, both to disentangle these possible interpretations, and to obtain a more representative sample of the range of perspectives on university teaching.

The approach of having a two-part survey was likely helpful increasing my total response rate (as the advertised survey length of 10-15 min was the length of the first part only). However, some of the most interesting and detailed questions for this study were found in the second part of the survey, which lead to a lower response rate and

sample size for those questions. This made interpretation of the data for these questions, and particularly comparison across questions from the first and second parts, more challenging.

### **3.6 Conclusion**

This study provides a clearer picture of which tools and curriculum documents are used by university instructors in Canada to build their courses, and which factors impact the approaches they take to course design and updating. The importance of fostering a culture of teaching excellence on campus has emerged as one of the key themes that can have a substantial impact on course design and change. Together, these findings provide some of the necessary background context and insight into possible avenues for further research which will be required to improve the effectiveness of university curriculum change initiatives. As a result, we can begin to address the growing calls for change in higher education which will allow our students to meet the demands of the labour market changes and complex global challenges facing our world.

## **4 Chapter 4: Integrative Discussion**

The previous two chapters detailed the results and discussion of data from two separate studies. This chapter contains a summary, key findings, limitations and suggestions for future research, and implications.

### **4.1 Summary**

Given the rapidly changing labour market, globally and within Canada (Miner, 2010; OECD, 2019; Royal Bank of Canada, 2018; World Economic Forum, 2016), as well as increasingly complex challenges facing humanity, there is a need to ensure that our young people are gaining the necessary skills to face these global challenges and to be successful in the world of work (Chamberlain & Mendoza, 2017; Kovacs & Vamosi Zarandne, 2022; Moro, 2018; Pellegrino & Hilton, 2012). Multiple reports have claimed that our colleges and universities in Canada do not currently teach these necessary skills, (Express Employment Professionals, 2020a; Royal Bank of Canada, 2018; Weingarten et al., 2018) and are calling for a re-examination of higher education to help address this skills gap.

The type of skills most needed for addressing global challenges, and which are also sought after by employers, are transferable skills. These transferable skills (also known as foundational, durable, key, core, and generic skills (Billing, 2007; Liddle, 2021; RBC, 2018; Venkatraman & Wahr, 2017)) are not specific to any one workplace or context, and they include skills such as critical and creative thinking, independence

and initiative, problem solving, time management and organization, communication and teamwork or interpersonal skills (Civic Action, 2018; Hill et al., 2020).

The general process of course development at universities is known. Programs are developed at a high level by university-wide and departmental bodies, and lists of course names and descriptions for these programs are developed at the department level (Office of the Associate Vice-President (Academic), 2018); and then instructors take these materials and then design their course content, skills, activities and assessments from there (H. Pollock, personal communication, July 14, 2022). However, little is known about the approaches that individual course instructors take while designing and implementing their courses, or the factors that impact these decisions. Understanding these key actors, and this critical step in the course design process, is critical if any large-scale changes are to be made to the skills and content included in our university programs.

In Chapter 2 I sought to understand the connection between field of study in tertiary education (i.e. college and university) and an index of transferable skills use at work, by analyzing publicly available data from the Programme for the International Assessment of Adult Competencies (PIAAC) project, a representative survey of Canadians from 2012 (CMEC, n.d.). This dataset allowed me to indirectly investigate whether some fields of study lead to higher use of transferable skills later in life. A linear regression model was constructed where variables were added in four stages, to determine what impact each group of variables had on the dependent measure. The purpose was to determine whether certain fields of study may be more effective in

teaching transferable skills, so that future investigations could target those programs in particular.

In Chapter 3 I sought to understand the tools, curriculum documents, and approaches that university instructors in Canada use when designing their courses, by conducting a large-scale survey of 520 university instructors from across Canada. This dataset allowed descriptive analyses of the responses, as well as both linear and logistic regressions to determine the impact of certain factors (such as institution type, discipline, type of program, and workplace cultural contexts) on dependent measures of both course design and course change behaviour. The purpose was to get a baseline understanding of the tools and curriculum resources that are used during course design, and what factors impact the use of these resources; so that future curriculum change initiatives can more effectively focus their efforts.

## **4.2 Key Findings**

### **4.2.1 Transferable Skills in Education & Other Professions**

Education and teacher training programs were found to be associated with the highest scores on the transferable skills index (Chapter 2). This held true even when other workplace factors were included in the model such as occupation sector, years of fulltime work experience, and managerial or supervisory positions. This may be due to the nature of teacher training programs in Canada, which include both theoretical and applied coursework, as well as practical placements in classrooms where student teachers can practice the skills they have been learning (Gambhir et al., 2008). Since

many other professional and applied programs have similar program structures (such as medicine, nursing, social work, etc. (Canadian Association for Social Work Education, 2022; College of Registered Nurses of Alberta, 2021; Medical Council of Canada, n.d.)), it is logical to predict that those programs would show similar patterns, however the way fields of study were grouped in this dataset made it impossible to look at these other programs specifically.

The findings of Chapter 3 also highlight that there is something unique going on with course design approaches among instructors in professional disciplines and programs. Professional disciplines had a higher degree of curriculum document use than other disciplines, particularly social sciences; and those who taught in professional or pre-professional programs had a higher degree of curriculum document use, but they used fewer total tools and curriculum resources than those with no professional connection. It's clear that professional program curricula have a higher impact on the course design process than the curricula in other programs.

Both studies, therefore, indicate that there is a need for further research into professional programs and disciplines, to understand the connection between the professional program structure, curriculum, and standards, on the development and use of transferable skills in their graduates.

#### **4.2.2 Managerial Roles and Transferable Skills**

Holding a managerial or supervisory position also had a significant impact on the transferable skills index (Chapter 2). This suggests that these positions make use of the measured transferable skills at a higher rate than other types of roles (Bennett, 2002). Since management positions are frequently higher paid than other positions within the same organization (Hoffman & Shipper, 2012), this finding provides an additional incentive for students to prioritize the development of these skills, as they may provide a boost when it comes to promotions to management roles. Also, since the highest scoring occupational sector was the management sector, this finding also suggests that business schools and management programs are likely to focus on transferable skill development as well (AACSB International, 2021), and so those programs are also good targets to investigate further regarding their approach to teaching transferable skills.

#### **4.2.3 Informal Tools for Course Design over Curriculum Documents**

Informal tools and resources were used much more often than formal curriculum documents were for course design (Chapter 3). Out of the 11 tools studied, the top five most used tools were course descriptions from the university calendar, non-textbook readings for the course, course learning outcomes, the latest research in the field, and course outlines for that course, and four out of five of these were classified as informal tools.

Only one of these top resources (course learning outcomes) was classified as a curriculum document, and the other three curriculum documents included in the study

were ranked as the three least-used tools: curriculum maps and program plans, university wide learning outcomes, and requirements for a profession (if applicable). This suggests that the primary way that higher level priorities and influence on curriculum is impacting course development, is through course descriptions and course learning outcomes, so these are likely the most direct and effective ways to influence change in the content and delivery of courses.

#### **4.2.4 Rapidly Changing Fields**

Instructors who taught in rapidly changing fields (Chapter 3) were the only group to be significantly more likely to change their courses every time they taught them. Given how quickly everything in these fields is changing (Halliday, 2020; RBC Thought Leadership, 2019), it is unsurprising that instructors would want to update their courses more frequently to incorporate some of these changes. This finding suggests that universities are not resistant to change across the board, and that instructors do respond to external factors from the fields in which they teach and research, to make sure their courses stay up to date, at least when they perceive their field to be rapidly changing.

I asked some additional survey questions of my respondents from rapidly changing fields, regarding the specific aspects of their field that they felt were changing, and an open-ended question about anything additional they would like to add about the changes in their field. These questions were not analyzed for this study, but a further study will dig more deeply into these questions, as well as other aspects of course design and change.

#### **4.2.5 The Role of Culture**

One of the most striking findings in Chapter 3 was the impact of a culture of teaching excellence on course design decisions. The factor that had the strongest impact on all course design variables in this study was being part of a community that values teaching. Having supportive colleagues, departmental and university leadership that value teaching also had similar, though less powerful effects. The role of this teaching excellence culture went beyond the specifically cultural factors studied, however, and can also be found in the higher frequency of course change in fields with a culture that is focused on innovation, and in the impacts of being part of a professional program or discipline.

These findings are important for directing the next steps for both research and interventions: a focus on anything that can help to promote communities of practice (Wenger, 2011) and cultures of teaching excellence. Instead of focusing on increasing administrative bloat (Gross, 2020; Tomar, 2021) or extensive statements and documents about teaching and the importance of skills, universities and departments should focus their limited funds on providing real, tangible supports for teaching, supporting a culture of teaching excellence, fully resourcing existing supports such as educational development staff, and recognizing and rewarding quality teaching. More research is needed to better understand which of these changes are most impactful.

#### **4.3 Limitations and Suggestions for Future Research**

Since Chapter 2 used an indirect measure of the impact of field of study on transferable skill use on the job, future research should dig deeper into the differences

between various fields of study, particularly within professional and applied programs, and compare these to more traditional or theory-based programs. These two studies are also not able to distinguish between transferable skills which are explicitly and intentionally taught, versus skills which students learn “along the way” in their courses and extracurricular activities, or in their part time jobs while attending school. Therefore, more direct measures are needed. One way to determine which programs lead to the most transferable skill development would be to conduct skills assessments before and after courses (Coulter, 2012; Lamb, 2005) in a range of programs including professional and applied programs, other fields of study in university, and college programs.

One key difference between professional programs and non-professional programs, is that professional programs have a consistent set of standards that must be met for these professional programs to be recognized in that field. My findings here suggest that instructors in professional programs use curriculum documents to a higher degree than other fields, so further investigation of these standards and how closely they are tied to other curriculum resources would provide important insight into these programs, and particularly how they incorporate transferable skills. A qualitative and quantitative content analysis (Webb et al., 2000) of standards from the spectrum of higher education programs could be used to identify the learning outcomes and professional standards language that relate to transferable skills, and to quantify the differences in frequency of transferable skills-related standards across these different programs.

To look at how and when transferable skills are taught intentionally and explicitly, future research should include interviews and surveys with instructors in a range of program types, to determine their attitudes toward teaching transferable skills (Schipper & van der Stappen, 2018), and whether and how they explicitly teach skills. There has recently been a growing conversation in Canada about more intentionally including skills instruction in university courses – for example Canada’s University Affairs magazine has hosted an ongoing series of articles on ‘The Skills Agenda’ which discuss not only the importance of incorporating skills into university courses (Berdahl, 2021b, 2022b), but also practical and realistic advice and suggestions of straight forward ways to do so, from syllabus design to end of term reviews, and the kinds of supports instructors need to be able to easily make these changes (Berdahl, 2021a, 2021c, 2022a, 2022c). Another future study could look at instructor attitudes and behaviours before and after participating in a departmental discussion group like a journal club, which discusses articles such as those in The Skills Agenda series and how to incorporate the ideas and suggestions into their own course design. This could be in effect a way to manipulate and stimulate this culture of teaching excellence. Mentorship programs (Jackevicius et al., 2014; Savage et al., 2004) and other similar approaches to supporting new instructors and promoting a culture that values teaching should also be studied to determine how effective these interventions and programs are.

One important aspect of any organizational culture is the personalities of the people involved, and how they can either support or work against a group culture (Lee et al., 2005). One limitation of the research discussed in this thesis is that it has not

taken personalities into account. Future research on instructor behaviour should include a well validated personality measure such as the HEXACO (de Vries, 2013) in the survey to see how individual differences impact these course design decisions.

The studies described here do not investigate the role of input or feedback from other individuals and resource people such as Centres for Teaching and Learning, educational development staff, or even discussing course design with colleagues and mentors. I did ask questions about this kind of input from other people in my survey, and those responses will be analyzed for a future study. Similarly, the current studies do not analyze any other possible influences or considerations that might impact course design or change, such as current events, trying to prevent or address academic dishonesty issues, or trying to make courses more inclusive or accessible to students. I also collected data on these kinds of questions in this survey, and will follow up with future studies on these topics.

## **4.4 Implications**

The implications from this study can be broken down into three major sections; implications for theory, implications for practice, and implications for policy, both at the university and government levels.

### **4.4.1 Implications for Theory**

Previous research has put forward two conflicting ideas about the best way to approach teaching transferable skills: either that these skills must be taught within a disciplinary context (Clanchy & Ballard, 1995), or that it's better to teach these skills in a

skills-focused course and provide opportunities to practice them in relevant context (Billing, 2007). The findings from Chapter 2 suggests that perhaps these two approaches from the literature should not be viewed as opposing prescriptions, but instead they could be seen as ingredients or conditions for success. As a result, programs which combine these conditions (such as professional and applied programs like Education, which have key professional skills content, and practical experiences to put the skills into action (Gambhir et al., 2008)) might offer the best conditions for transferable skill development. Future research should consider looking at various programs that offer substantial skills content within disciplinary courses and which also offer authentic and relevant ways to practice these skills. Professional and applied programs seem most likely to be good candidates for this type of research (Astle et al., 2020; Carvalho, 2016; Christian et al., 2020; Elliott, 2013; Schipper & van der Stappen, 2018), but cooperative education programs are another place to dig into this further (Skrzypinski, 2017; Wyonch, 2020).

Since transferable skills (and skill development more generally) are seen as a key part of most professional and applied programs, it may be that both students and instructors are more open to seeing skills as a core part of the curriculum, and not as an “add on” to the content knowledge which is often seen as the “real” content of a degree (Walker, 2008). Therefore, it is important to also consider how both students and instructors view the value, relevance, and importance of these skills. This ties to existing literature on student and instructor perception, attitudes, and motivations relating to learning transferable skills (Schipper & van der Stappen, 2018). Future research should

examine how these attitudes and motivations vary between students and instructors in professional and applied programs, compared to more traditional programs which focus more on theory and content-knowledge.

This research also adds to existing research on the interconnectedness of departmental cultures, professional development, and the teaching approaches of individual instructors (Hicks et al., 2010); as well as to the literature on professional communities of practice and their impacts on organizational and professional culture, and teaching practice (Wenger, 2011).

#### **4.4.2 Implications for Practice**

As the higher sector grapples with how to move forward in a post-COVID world, there are many discussions going on about the need to embrace this disruption as an opportunity to change systems that have been fairly stagnant for decades (Champagne & Ganja, 2021; Dea, 2021; Jones, 2014; Southworth, 2022). Between the discussions of how to keep the best aspects of remote and hybrid education to increase accessibility and inclusion, while addressing issues of instructor burnout (Champagne & Ganja, 2021; Southworth, 2022), there is also room for other conversations about changes in the way university teaching is valued and supported. This is an opportunity for departments to look for ways to foster a culture of teaching excellence, and to look for ways to make teaching innovation simple and easy to implement. The Envision YU collaborative program at York University is an example of one such program, which is providing easy-to incorporate resources for instructors to customize and slot into their classes to add new elements such as reflection, experiential learning, applied projects

and more to help build student skills with minimal additional work on the part of the instructor (Berdahl, 2022a; “Envision YU,” n.d.).

Most college and university campuses in Canada have some type of Centre for Teaching and Learning where Educational Development staff provide support, resources, workshops and consultations to help instructors with their course design and updating processes (Forgie et al., 2018). These Centres and their knowledgeable staff could be an excellent place to start in any efforts to increase conversations and support around building a culture of teaching excellence. Departments who want to promote this positive culture and support their instructors would be wise to promote and take full advantage of these Centres (and to pressure the university to support them financially to make sure they can be as effective as possible), so that their instructors are aware of their services and resources. Future research on Educational Development staff and their role in course design (some of which will come out of additional analyses from my survey and interviews with both instructors and Educational Developers) can also help to provide insights that could be used to indicate how their expertise could be better utilized by departments to support teaching and cultures of teaching excellence.

Two additional ways that departments can support this culture of teaching excellence would be through departmental mentorship programs, and journal clubs or discussion groups related to teaching approaches and resources. While mentorship programs can certainly be found in many academic units across Canada, and have been shown to be quite effective for a range of outcomes (Bates & Borland, 2014; Jackevicius et al., 2014; Kay et al., 2009; Savage et al., 2004), they could be more

widely adopted, and could include an intentional component related to discussing teaching and supporting innovation and the use of new and different resources, while also building stronger bonds within departments and helping to promote cultural change. Additionally, departments could establish journal clubs or discussion groups which focus on teaching-related articles and resources, to encourage instructors to connect with each other through these conversations and further build on this community and culture that supports teaching.

### **4.4.3 Implications for Policy**

#### **4.4.3.1 University Policy**

The findings on the importance of both departmental and university-level support for teaching excellence in Chapter 3 are important for universities to take note of. There was a large discrepancy between the ratings of a university's (and departments', to a lesser extent) statements about the importance of teaching (descriptors of teaching quality are often listed as a priority within strategic plans, for instance (University of Guelph, 2016)), and their actions and recognition to back up these statements, and this disconnect had an impact on course design behaviours of the instructors. When these statements were backed up with action, and there was recognition or compensation of teaching excellence, this was when there was the highest positive impact on course design measures. Therefore, institutions would be wise to consider how they can follow through on those statements of support, because simply talking about valuing teaching is not sufficient to impact course design decisions and approaches. The development of

policies and programs which demonstrate clear support for quality teaching is an important part of this process.

One place that university policy can have a real impact is during the hiring and on-boarding process for new instructors. First, they can address disparities in the incentive systems that bias instructors to focus more of their efforts onto research over teaching. For example, a 2018 survey of full-time faculty in Canada found that most faculty report that their university places more emphasis on research than teaching in hiring and promotion decisions (Stephenson et al., 2020). It is understandable that faculty would generally allocate their effort to match these incentives. If universities want to truly support high quality teaching, then they need to examine the policies and procedures at all levels which relate to both hiring and promotion, to look for ways to add real incentives to teaching to balance out these two key priorities of universities in Canada (Jones et al., 2014). Additionally, Universities could also create or expand teaching excellence awards and similar programs to provide additional incentives (beyond those hiring and promotional policy changes) that would demonstrate an institution-wide commitment to teaching, and concrete recognition of those instructors who exemplify teaching excellence.

Next, it is common for new faculty to have lowered teaching loads (i.e. teach fewer courses or sections) during their first year as they get settled into their new role as a professor (Jones, 2014; Stephenson et al., 2020). One possible policy change would be to strongly encourage new faculty to meet with an Educational Developer during that first year, and/or to attend a workshop or a short course on course design through the

Centre for Teaching and Learning. This would help to promote awareness of some of the key resources, curriculum documents, and tools that are available for course development (Jackie, 2021<sup>21</sup>), and could both demonstrate that the university takes teaching seriously, while also helping to ensure that new hires start off on the right foot with the resources and supports they need to be successful in their teaching career. This may also involve allocating more funding and staff to these key hubs for teaching support and culture on campus.

Another policy change which has already been occurring across Canada in recent years has been the establishment of “teaching stream” faculty positions at many institutions (Bowness, 2016; Gopaul et al., 2016; Jones et al., 2014; Stephenson et al., 2020), in addition to the more typical faculty roles which split their time and energy between both research and teaching. This model certainly has value and could be explored further and expanded, but it is important to work to ensure that teaching stream faculty are not seen as a lower prestige or lower quality role than the more traditional faculty role (Bowness, 2016).

#### **4.4.3.2 Government policy**

Given that provincial governments (particularly in Ontario and Alberta, and other provinces will likely follow) seem determined to move forward with Performance Based Funding Models for universities and colleges (Peters, 2021), these institutions will need to reckon with these changes. It is possible that one way to help mitigate the damage of

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<sup>21</sup> Pseudonym of one of my educational developer interview participants

these programs by advocating for a shift in the kinds of metrics that are used. For instance, instead of focusing on whether students gain employment in their field, or their post-graduation income levels (which can lead to schools preferentially admitting students they consider to be “most likely to succeed” on the job market which often leads to admission discrimination against equity seeking groups such as students of colour or students with disabilities (Dougherty & Natow, 2020; Spooner, 2022; Zerquera & Ziskin, 2020)) it might be more helpful to use metrics which focus on transferable skill development plans or outcomes, or related measures such as whether students have access to experiential learning opportunities within the curriculum.



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## APPENDICES

### Appendix A All of the Skill Use at Work Variables from the PIACC Data Set

Variable Name	Description
time_coop	Skill Use at Work – Time spent cooperating with others
share_info	Skill Use at Work – How often sharing work related info with co-workers
teaching	Skill Use at Work – How often teaching people (instructing, training)
presenting	Skill Use at Work – How often presentations/speeches to 5 or more people
selling	Skill Use at Work – How often selling a product or service
advising	Skill Use at Work – How often advising people
plan_own	Skill Use at Work – How often plan your own activities
plan_others	Skill Use at Work – How often plan the activities of others
org_time	Skill Use at Work – How often organize your own time
influencing	Skill Use at Work – How often influence or persuade people
negotiating	Skill Use at Work – How often negotiate with people in or out of your organization
simple_prob	Skill Use at Work – How often simple problem solving (less than 5 min to solve new or difficult situation)
complex_prob	Skill Use at Work – How often complex solving (takes more than 30 min to think of a solution)

### Appendix B Skill use at work variables used to create the transferable skills index, with corresponding skill groups from Hill et al (2020)

Variable	Description	Corresponding Skill group(s)
Teaching	Skill Use at Work – How often teaching people (instructing, training)	Oral communication, written communication, use of tools/technology and software, adaptability & flexibility, creativity
Presenting	Skill Use at Work – How often presentations/speeches to 5 or more people	Oral communication, use of tools/technology and software
Planning own activities	Skill Use at Work – How often plan your own activities	Organization & time management

Planning the activities of others	Skill Use at Work – How often plan the activities of others	Organization & time management, teamwork, oral communication, written communication
Organizing your time	Skill Use at Work – How often organize your own time	Organization & time management
Influencing	Skill Use at Work – How often influence or persuade people	Oral communication, teamwork, creativity
Negotiating	Skill Use at Work – How often negotiate with people in or out of your organization	Oral communication, teamwork, creativity
Simple problem solving	Skill Use at Work – How often simple problem solving (less than 5 min to solve new or difficult situation)	Thinking & problem solving
Complex problem solving	Skill Use at Work – How often complex solving (takes more than 30 min to think of a solution)	Thinking & problem solving

**Appendix C Description of Variables for Chapter 2 and Recoding Actions Taken for These Variables**

<b>Variables Used in Regressions</b>			
<b>Variable code</b>	<b>Description &amp; coding</b>	<b>Recoding/ Relabelling explanation</b>	<b>New Variable</b>
9 of the skills use variables from Appendix B	Variables used in the scale: teaching, presenting, plan_own, plan_others, org_time, influencing, negotiating, simple_prob, complex_prob	Created scale to combine the scores of these skills use variables into 1 scale of transferable skills use at work; measures both variety and frequency of skills use.	<b>transf_skills</b>  Scale from 9 (never use any of the 9 constituent skills at work) to 45 (use all 9 of these skills at work every day).  <b>Quantitative, dependent measure</b>
B_Q01B  Categorical, independent	1 General programs 2 Teacher training and education science 3 Humanities, languages and arts 4 Social sciences, business and law 5 Science, mathematics and computing 6 Engineering, manufacturing and construction 7 Agriculture and veterinary 8 Health and welfare 9 Services	Recoded to combine into fewer categories, shift category order, and rename the variable	<b>study_fields</b>  1 Education & Teacher Training 2 Social Sciences, Business & Law 3 Other Fields 4 General Programs  <b>Categorical, independent</b>
P_NOC_C  Alphanumeric Categorical, independent	What is the respondent's occupation category, using the NOC system?  No labels attached in the dataset. Labels from the documentation: 1 Management occupations 2 Business, finance, & administration occupations	Encoded into a numeric variable, recoded to remove invalid categories, used documentation to determine the corresponding category labels, combined into fewer categories and labelled	<b>occup</b>  1 Management 2 Education, law, social, community, government" 3 Art, culture, recreation and sport 4 Sales and service 5 Other Occupations 6 Not Stated  <b>Categorical, independent</b>

	<p>3 Natural &amp; applied Sciences, related occupations</p> <p>4 Health related occupations</p> <p>5 Education, law, social, community, government occupations</p> <p>6 Occupations in Art, culture, recreation, and sport</p> <p>7 Sales and service occupations</p> <p>8 Trades, transport, equip operators and related occupations</p> <p>9 Natural resources, agriculture and related production occupations</p> <p>10 Manufacturing and Utilities occupations</p> <p>11 Not stated</p>		
D_Q08A  Categorical, independent	<p>Does the respondent manage other employees</p> <p>1 Yes 2 No</p>	Recode to rename	<p><b>manage_others</b></p> <p>1 Yes 2 No <b>Categorical, independent</b></p>
GENDER_R  Categorical, independent	<p>The respondent's gender (though the options refer to sex)</p> <p>1 Male 2 Female</p>	Recode to rename	<p><b>sex</b></p> <p>1 Male 2 Female <b>Categorical, independent</b></p>
PCNTQUAL  Categorical, independent	<p>Country/region where the respondent did their highest level of education</p> <p>1 Canada 2 Arab States and Sub-Saharan Africa 3 Latin America and the Caribbean 4 Asia and the Pacific</p>	Recode to rename, combine categories for other regions	<p><b>he_region_3</b></p> <p>1 Canada 2 North America and Western Europe 3 Other Regions  <b>Categorical, independent</b></p>

	5 Central and Eastern Europe 6 North America and Western Europe		
A_Q02CA  Categorical, independent	Was the respondent born in Canada? 1 Yes 2 No	Recode to rename	<b>born_CA</b>  1 Yes 2 No <b>Categorical, independent</b>
JQ04FCA1  Categorical, independent	Does the respondent identify as First Nations, Metis or Inuit  1 Yes 2 No	Recode to rename	<b>indigenous</b>  1 Yes 2 No <b>Categorical, independent</b>
I_Q10ACA  Categorical, independent	Long-term illness or Disability  1 Yes 2 No	Recode to rename	<b>disability</b>  1 Yes 2 No <b>Categorical, independent</b>
LNG_BQ  Categorical, independent	Language that the respondent chose to take the survey in 1 English 2 French	Did not recode	<b>LNG_BQ</b>  1 English 2 French <b>Categorical, independent</b>
PCQ09CA1  Quantitative, independent	Years of full-time work experience (In Canada or elsewhere) Ranges from 0-40	Recode to rename	<b>FTwork_yrs</b>  <b>Quantitative, independent</b>
YRSQUAL  Quantitative, independent	Years of Formal Education Ranges from 6-22	Recode to rename	<b>educ_yrs</b>  <b>Quantitative, independent</b>
AGEG5LFS  Quantitative, conceptually continuous categorical	Age in 5-year groups  1 Aged 16-19 2 Aged 20-24 3 Aged 25-29 4 Aged 30-34 5 Aged 35-39 6 Aged 40-44 7 Aged 45-49	Recode to rename, and to remove <16 and >65 categories	<b>age_g5</b>  1 Aged 16-19 2 Aged 20-24 3 Aged 25-29 4 Aged 30-34 5 Aged 35-39 6 Aged 40-44 7 Aged 45-49

	8 Aged 50-54 9 Aged 55-59 10 Aged 60-65 93 <16 94 >65		8 Aged 50-54 9 Aged 55-59 10 Aged 60-65 <b>Quantitative, independent, also used to limit analysis to only those in age groups of interest</b>
EDCAT7 Categorical	Highest Level of Education Attained, in 7 categories, using ISCED system. 1 Primary or less (ISCED 1 or less) 2 Lower secondary (ISCED 2, ISCED 3C short) 3 Upper secondary (ISCED 3A-B, C long) 4 Post-secondary, non-tertiary (ISCED 4A-B-C) 5 Tertiary, professional degree (ISCED 5B) 6 Tertiary, bachelor degree (ISCED 5A) 7 Tertiary, master/research degree (ISCED 5A/6) 8 Tertiary, bachelor/master/research degree (ISCED 5A/6)	Recoded to remove invalid 8 <sup>th</sup> category and to rename/relabel. <i>Note: there is a discrepancy between the category label for 5, and documentation about ISCED level 5B, it's unclear whether in this data set this is just professional programs, or also includes college programs. For the purposes of this study, I have assumed that it includes college as well, and that I am looking at all Tertiary education (College and University).</i>	<b>edlvl</b>  1 Primary/less 2 LowerSecondary 3 UpperSecondary 4 Non-Tertiary 5 Professional/College 6 Bachelor 7 Master/Research  <b>Categorical, used only to limit analysis to those in with education levels of interest (Tertiary)</b>
C_D09 Categorical	Current status/work history – work experience (derived)  Current status/work history – work experience (derived) Recent work experience (last 12 months) Left paid work longer than 12 months ago No work experience Status Unknown	Recode to rename, limit to only first category, and rename/relabel	<b>working</b>  1 Currently working  <b>Categorical, used only to limit my sample to only those currently working</b>
D_Q04	Current work – employee or self-employed	Recode to rename	<b>Employee</b>

	1 Employee 2 Self-employed		1 Employee 2 Self-employed <b>Categorical, used only to limit my sample to only those who are an employee</b>
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**Appendix D Description of Skills Use at Work Variables and Recodes for Chapter 2**

<b>Skills Use at Work Variables</b>			
<b>Variable code</b>	<b>Description &amp; coding</b>	<b>Recoding/ Relabelling explanation</b>	<b>New Variable</b>
F_Q02B  Categorical	Skill Use work – how often teaching people (instructing training or teaching people, individually or in groups)  Never Less than once a month Less than once a week but at least once a month At least once a week but not every day Every day	Renamed & relabelled	teaching  Never Less than once a month Less than once a week At least once a week Every day  <b>Categorical, used in transf_skills var</b>
F_Q02C  Categorical	Skill Use work – how often Presentations (speeches or pres to 5 of more people)  Never Less than once a month Less than once a week but at least once a month At least once a week but not every day Every day	Renamed & relabelled	presenting  Never Less than once a month Less than once a week At least once a week Every day  <b>Categorical, used in transf_skills var</b>

F_Q03A Categorical	Skill Use work – how often Planning own activities  Never Less than once a month Less than once a week but at least once a month At least once a week but not every day Every day	Renamed & relabelled	plan_own  Never Less than once a month Less than once a week At least once a week Every day  <b>Categorical, used in transf_skills var</b>
F_Q03B Categorical	Skill Use work – how often Planning others' activities  Never Less than once a month Less than once a week but at least once a month At least once a week but not every day Every day	Renamed & relabelled	plan_others  Never Less than once a month Less than once a week At least once a week Every day  <b>Categorical, used in transf_skills var</b>
F_Q03C Categorical	Skill Use work – how often Organizing own time  Never Less than once a month Less than once a week but at least once a month At least once a week but not every day Every day	Renamed & relabelled	org_time  Never Less than once a month Less than once a week At least once a week Every day  <b>Categorical, used in transf_skills var</b>
F_Q04A Categorical	Skill Use work – how often Influencing people (persuading or influencing)  Never Less than once a month Less than once a week but at least once a month At least once a week but not every day Every day	Renamed & relabelled	influencing  Never Less than once a month Less than once a week At least once a week Every day  <b>Categorical, used in transf_skills var</b>
F_Q04B	Skill Use work – how often Negotiating with	Renamed & relabelled	negotiating

Categorical	<p>people (negotiating, ppl in or out of your organization)</p> <p>Never  Less than once a month  Less than once a week but at least once a month  At least once a week but not every day  Every day</p>		<p>Never  Less than once a month  Less than once a week  At least once a week  Every day</p> <p><b>Categorical, used in transf_skills var</b></p>
F_Q05A Categorical	<p>Skill Use work – how often Simple problem solving (new or difficult situation, less than 5 min to solve)</p> <p>Never  Less than once a month  Less than once a week but at least once a month  At least once a week but not every day  Every day</p>	Renamed & relabelled	<p>simple_prob</p> <p>Never  Less than once a month  Less than once a week  At least once a week  Every day</p> <p><b>Categorical, used in transf_skills var</b></p>
F_Q05B Categorical	<p>Skill Use work – how often Complex problem solving (complex problems, takes 30+min to think of a solution)</p> <p>Never  Less than once a month  Less than once a week but at least once a month  At least once a week but not every day  Every day</p>	Renamed & relabelled	<p>complex_prob</p> <p>Never  Less than once a month  Less than once a week  At least once a week  Every day</p> <p><b>Categorical, used in transf_skills var</b></p>

## Appendix E Stata Syntax for Chapter 2

```
///Recoding Skill Use Variables

//Time cooperating with others
tab F_Q01B
label list F_Q01B
recode F_Q01B (1=1)(2=2)(3=3)(4=4)(5=5)(.a=.)(.b=.)(.c=.), gen (time_coop)
tab time_coop
label define time1 1 "None of the time" 2 "Up to a quarter of the time" 3 "Up to half of the time" 4 "More than half of the time" 5 "All of the time"
label values time_coop time1
tab time_coop

//How often share work info with others
tab F_Q02A
recode F_Q02A (1=1)(2=2)(3=3)(4=4)(5=5), gen (share_info)
tab share_info
label define often1 1 "Never" 2 "Less than once a month" 3 "Less than once a week" 4 "At least once a week" 5 "Every day"
label values share_info often1
tab share_info

//How often teaching people
tab F_Q02B
recode F_Q02B (1=1)(2=2)(3=3)(4=4)(5=5), gen (teaching)
tab teaching
label values teaching often1
tab teaching

//How often presenting or giving speeches (5 or more people)
tab F_Q02C
recode F_Q02C (1=1)(2=2)(3=3)(4=4)(5=5), gen (presenting)
tab presenting
label values presenting often1
tab presenting

//How often selling to people
tab F_Q02D
recode F_Q02D (1=1)(2=2)(3=3)(4=4)(5=5), gen (selling)
tab selling
label values selling often1
tab selling

//How often advising people
tab F_Q02E
recode F_Q02E (1=1)(2=2)(3=3)(4=4)(5=5), gen (advising)
tab advising
label values advising often1
tab advising

//How often planning own activities
tab F_Q03A
recode F_Q03A (1=1)(2=2)(3=3)(4=4)(5=5), gen (plan_own)
tab plan_own
label values plan_own often1
tab plan_own

//How often planning others' activities
tab F_Q03B
recode F_Q03B (1=1)(2=2)(3=3)(4=4)(5=5), gen (plan_others)
tab plan_others
label values plan_others often1
tab plan_others

//How often organizing own time
tab F_Q03C
```

```
recode F_Q03C (1=1)(2=2)(3=3)(4=4)(5=5), gen (org_time)
tab org_time
label values org_time often1
tab org_time
```

```
//How often influencing or persuading people
tab F_Q04A
recode F_Q04A (1=1)(2=2)(3=3)(4=4)(5=5), gen (influencing)
tab influencing
label values influencing often1
tab influencing
```

```
//How often negotiating with people
tab F_Q04B
recode F_Q04B (1=1)(2=2)(3=3)(4=4)(5=5), gen (negotiating)
tab negotiating
label values negotiating often1
tab negotiating
```

```
//How often solving a new or difficult situation less than 5 min
tab F_Q05A
recode F_Q05A (1=1)(2=2)(3=3)(4=4)(5=5), gen (simple_prob)
tab simple_prob
label values simple_prob often1
tab simple_prob
```

```
//How often solving a complex problem, 30min+ to think of solution
tab F_Q05B
recode F_Q05B (1=1)(2=2)(3=3)(4=4)(5=5), gen (complex_prob)
tab complex_prob
label values complex_prob often1
tab complex_prob
```

```
///Recoding other variables
```

```
tab B_Q01B
label list B_Q01B
recode B_Q01B (2=1)(4=2)(3 5/9=3) (1=4), gen (study_fields)
label define study_field1 1 "Education & Teacher Training" 2 "Social Sciences, Business & Law" 3 "Other Fields" 4 "General Programs"
label values study_fields study_field1
tab study_fields
```

```
//Use this one:
tab B_Q01B
label list B_Q01B
recode B_Q01B (1=9)(2=1)(3=4)(4=2)(5=3)(6=5)(7=6)(8=7) (9=8), gen (fieldofstudy)
label define fieldofstudy2 1 "Teacher Training & Education" 2 "Social Sciences, Business & Law" 3 "Science, Math & Computing" 4 "Humanities, Languages & Arts" 5 "Engineering, Manufacturing & Construction" 6 "Agriculture & Veterinary" 7 "Health & Welfare" 8 "Services" 9 "General Programs"
label values fieldofstudy fieldofstudy2
tab fieldofstudy
```

```
//indigenous
tab JQ04FCA1
label list JQ04FCA1
recode JQ04FCA1 (1=1)(2=2), gen (indigenous)
label define yn1 1 "Yes" 2 "No"
label values indigenous yn1
tab indigenous
```

```
//years of education
```

```

gen educ_yrs = YRSQUAL
sum educ_yrs

tab PCQ09CA1 //Years of full time work experience (in Canada or elsewhere)
gen FTwrk_yrs = PCQ09CA1
sum FTwrk_yrs

//Language used for background questionnaire
tab LNG_BQ

tab A_Q02CA
recode A_Q02CA (1=1)(2=2), gen(born_CA)
tab born_CA
label define born1 1 "Born in Canada" 2 "Not Born in Canada"
label values born_CA born1
tab born_CA

label list GENDER_R
gen sex = GENDER_R
label define sex1 1 "Male" 2 "Female"
label values sex sex1
tab sex

label list AGE5LFS
recode AGE5LFS (1=1)(2=2)(3=3)(4=4)(5=5)(6=6)(7=7)(8=8)(9=9)(10=10)(93 =.)(94=.), gen (age_g5)
tab age_g5

tab EDCAT7
label list EDCAT7
recode EDCAT7 (1=1)(2=2)(3=3)(4=4)(5=5)(6=6)(7=7)(.d=.), gen (edlvl)
tab edlvl
label define edlvl1 1 "Primary/less" 2 "LowerSecondary" 3 "UpperSecondary" 4 "Non-Tertiary" 5 "Professional/College" 6 "Bachelor"
7 "Master/Research"
label values edlvl edlvl1
tab edlvl

tab D_Q08A
label list D_Q08A
recode D_Q08A (1=1)(2=2), gen(manage_others)
label values manage_others yn1
tab manage_others

tab P_NOC_C
encode P_NOC_C, gen(NOC)
tab NOC
recode NOC (0=0)(1=1)(2=2)(3=3)(4=4)(5=5)(6=6)(7=7)(8=8)(9=9)(99=.), gen (occupation_cat)
tab occupation_cat
recode occupation_cat (1=1)(2=2)(3=3)(4=4)(5=5)(6=6)(7=7)(8=8)(9=9)(10=10)(11=11), gen (occupations_all)
tab occupations_all
label define occu2 1 "Management" 2 "Business, finance, & administration" 3 "Natural & applied Sciences, related" 4 "Health
related" 5 "Education, law, social, community, government" 6 "Art, culture, recreation and sport" 7 "Sales and service" 8 "Trades,
transport, equip operators etc" 9 "Natural resources, agriculture and production" 10 "Manufacturing and Utilities" 11 "Not stated"
label values occupations_all occu2
tab occupations_all

tab occupations_all
recode occupations_all (1=1)(5=2)(6=3)(7=4)(2 3 4 8 9 10 = 5)(11=.), gen (occup)
label define occu5 1 "Management" 2 "Education, law, social, community, government" 3 "Art, culture, recreation and sport" 4 "Sales
and service" 5 "Other Occupations"
label values occup occu5
tab occup

```

```

tab C_D09
recode C_D09 (1=1)(2 3 4 5=.), gen (working)
label define work1 1 "Currently working"
label values working work1
tab working

tab D_Q04
recode D_Q04 (1=1)(2=2), gen(employee)
label define emp1 1 "Employee" 2 "Self-Employed"
label values employee emp1
tab employee

tab I_Q10ACA //longterm illness or disability
label list I_Q10ACA
recode I_Q10ACA (1=1)(2=2), gen (disability)
tab disability
label values disability yn1
tab disability

tab NATLNG //survey done in native language or not

tab PCNTQUAL //country/region where highest qualification completed

//version with Canada & NA/Western Europe together
recode PCNTQUAL (1 6 =1)(2=2)(3=3)(4=4)(5=5), gen(he_region_grp)
tab he_region_grp

//version with other regions grouped
recode PCNTQUAL (1 6 =1)(2/5=2), gen(he_region_bi)
tab he_region_bi

recode PCNTQUAL (1=1)(2/5=3)(6=2), gen(he_region_3)
tab he_region_3
label define region_he 1 "Canada" 2 "North Amer and West Europe" 3 "All other regions"
label values he_region_3 region_he
tab he_region_3

//Factor Analysis//

//first attempt - tried 3 factor solution
factor time_coop share_info teaching presenting selling advising plan_own plan_others org_time influencing negotiating
simple_prob complex_prob, ipf factor(3)
rotate, promax horst
rotate, varimax horst

//second attempt - 1 factor solution, using
factor teaching presenting plan_own plan_others org_time influencing negotiating simple_prob complex_prob, ipf factor(1)
rotate, varimax horst

//creating new variable based on this factor analysis, checking it's Cronbach's alpha score
gen transf_skills = teaching + presenting + plan_own + plan_others + org_time + influencing + negotiating + simple_prob +
complex_prob
alpha teaching presenting plan_own plan_others org_time influencing negotiating simple_prob complex_prob
sum transf_skills
tab transf_skills

//Creating a filter to resolve the observation number differences

reg transf_skills i.fieldofstudy i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ educ_yrs age_g5 FTwrk_yrs i.occup
i.manage_others [pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1

generate filter = e(sample)

```

```
///Regressions (with both types, VIF and testparm)
```

```
//Model 1
```

```
xi: reg transf_skills i.fieldofstudy [pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
testparm _lfieldofst_*
```

```
reg transf_skills i.fieldofstudy [pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
margins fieldofstudy  
marginsplot
```

```
//new MODEL 2
```

```
xi: reg transf_skills i.fieldofstudy i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ educ_yrs age_g5  
[pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
testparm _lfieldofst_*
```

```
reg transf_skills i.fieldofstudy i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ educ_yrs age_g5 [pweight=SPFWT0]  
if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
vif  
margins fieldofstudy  
marginsplot
```

```
//new MODEL 3 (workplace but without manage_others)
```

```
xi: reg transf_skills i.fieldofstudy i.occup i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ FTwrk_yrs educ_yrs  
age_g5 [pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
testparm _lfieldofst_*  
testparm _loccup_*
```

```
reg transf_skills i.fieldofstudy i.occup i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ FTwrk_yrs educ_yrs age_g5  
[pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
vif
```

```
margins fieldofstudy  
marginsplot  
margins occup  
marginsplot
```

```
reg transf_skills i.fieldofstudy i.occup i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ ft_work_5 educ_yrs age_g5  
[pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
vif
```

```
//new MODEL 4 (with manage_others)
```

```
xi: reg transf_skills i.fieldofstudy i.occup i.manage_others i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ  
FTwrk_yrs educ_yrs age_g5 [pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
testparm _lfieldofst_*  
testparm _loccup_*
```

```
reg transf_skills i.fieldofstudy i.occup i.manage_others i.sex i.born_CA i.he_region_3 i.indigenous i.disability i.LNG_BQ FTwrk_yrs  
educ_yrs age_g5 [pweight=SPFWT0] if age_g5>2 & age_g5<11 & edlvl>4 & working ==1 & employee ==1 & filter == 1  
vif
```

```
margins fieldofstudy  
marginsplot  
margins occup  
marginsplot  
margins manage_others  
marginsplot
```

///Descriptive Stats

tab fieldofstudy [aweight=SPFWT0] if filter ==1

tab occup [aweight=SPFWT0] if filter ==1

tab manage\_others [aweight=SPFWT0] if filter ==1

tab sex [aweight=SPFWT0] if filter ==1

tab born\_CA [aweight=SPFWT0] if filter ==1

tab he\_region\_3 [aweight=SPFWT0] if filter ==1

tab indigenous [aweight=SPFWT0] if filter ==1

tab disability [aweight=SPFWT0] if filter ==1

tab LNG\_BQ [aweight=SPFWT0] if filter ==1

sum FTwrk\_yrs [aweight=SPFWT0] if filter ==1

sum educ\_yrs [aweight=SPFWT0] if filter ==1

sum age\_g5 [aweight=SPFWT0] if filter ==1, detail

## Appendix F Instructor Survey Questions for Chapter 3

*Note: There was a substantial amount of survey flow logic built into this survey, which means that participants did not see the questions in this order, and many participants did not see all questions. I have left some of the display logic in this document for individual questions, but the logic for how whole sections were displayed is not shown here. The questions listed here before and after the question about taking the optional second part of the survey do not perfectly represent the first and second parts. To reduce length here, I also took out most of the additional instructions and reminders to answer based on experiences prior to the COVID-19 pandemic restrictions (which applied to most questions, unless the participant had only taught during pandemic restrictions, or for the question that were directly related to the pandemic experience).*

For the purposes of this survey, **teaching** refers to being the primary instructor (or co-instructor) responsible for a course.

This is distinct from either a Teaching Assistant or Course Coordinator role.

---

How many **different courses\*** have you taught at a Canadian university **in the past 5 years?**

\*not including multiple sections/cohorts of the same course

Please include all course types, including undergraduate and graduate, directed readings, independent study courses, practica, etc.

- 1-2
  - 3-4
  - 5-6
  - 7+
  - I have taught at a Canadian university, but **not during the last 5 years**
  - I have **never** taught any courses at a Canadian university
- 

**Prior to any COVID-19 pandemic restrictions**, which of the following teaching formats have you used?

Please select ALL that apply

- In Person/Face to Face Instruction
  - Online/Distance Education
  - Blended in person/online instruction within the same course
  - None, I have **ONLY** taught at a Canadian university **during the pandemic restrictions**
  - Other \_\_\_\_\_
- 

**If you have taught DURING the COVID-19 pandemic**, which of the following teaching formats have you used?

Please select ALL that apply

- In Person/Face to Face Instruction
  - Online/Remote/Distance Instruction
  - Blended in person/online instruction within the same course
  - None**, I have not taught during the COVID-19 pandemic
  - Other \_\_\_\_\_
- 

**Intro & Eligibility**

Do you have the freedom to make **course design decisions** (eg: content, skills, activities, assessments) for the courses you teach?

- Yes, I can make substantial changes
  - Yes, I can make some minor changes in my courses
  - Yes, some courses I have control and can make changes, others I cannot change
  - No, I cannot make changes to the courses that I teach
  - Other \_\_\_\_\_
- 

Please input the following information to create a **unique participant code**.

This information is used solely for the purposes of linking data between different parts of the study, and allowing for participant withdrawal.

First 3 letters of street name (or neighbourhood) \_\_\_\_\_

Last 3 digits of phone number \_\_\_\_\_

---

Please note: If you are not currently teaching or employed by a university, please answer this survey based on your **most recent** university teaching position(s) **in Canada**, even though they are phrased in present tense. Thanks!

---

### Teaching Experience

What academic discipline(s)/field(s) do you teach in?

If you teach in more than one, the primary discipline is the one you teach is **most often**.

Primary \_\_\_\_\_

Secondary (if applicable)  
\_\_\_\_\_

---

Do you teach course(s) with an **applied\* focus**?

\*in contrast to primarily conceptual/theoretical

- Yes most/all of my course(s) have an applied focus
  - Some of my courses are applied, others are not
  - No, I don't teach any courses with an applied focus
  - I'm not sure what you mean
- 

Do you teach in a **professional program**?

This could be either a registered/accredited program (eg: accounting, dentistry, engineering), or another program that trains students for a specific profession (eg: teacher, librarian)

- Yes, most/all of my courses are in a professional program
  - Some of my courses are in a professional program
  - I teach in a pre-professional program, so I know that many of my students are intending to pursue a particular profession (or related professions)
  - No, I do not teach in a professional program
- 

*Display This Question:*

*If Do you teach in a professional program? = Yes, most/all of my courses are in a professional program*

*Or Do you teach in a professional program? = Some of my courses are in a professional program*

*Or Do you teach in a professional program? = I teach in a pre-professional program*

## Teaching Experience - Professional Programs

Which professional program(s) are you associated with?

---

## Teaching Experience - Your Field

Please answer the following questions based on the courses that you taught prior to the COVID-19 pandemic restrictions.

---

Do you teach in any of the following discipline areas?

Please select ALL that apply

- Agri-Food
  - Biotechnology
  - Information and Computer Technology
  - None of these
- 

Overall, would you describe your primary discipline/field as **rapidly changing** (compared to other discipline/fields)?

Please consider the skills & knowledge required for the most common types of jobs in your discipline/field.

- My discipline/field changes **more rapidly** compared to others
  - My discipline/field changes **at about the same pace** as others
  - My discipline/field changes **less rapidly** compared to others
  - Not sure
-

## Teaching Context

---

Where is your University located within Canada?

(If you teach at more than one institution, please respond to both these questions based on the one you teach at most)

- Northern Canada (YT, NT, NU)
  - British Columbia
  - Prairies (AB, SK, MB)
  - Ontario
  - Quebec
  - Atlantic Canada (NS, NB, NL, PE)
- 

Type of university

- Primarily Undergraduate** - generally smaller student population (mostly undergrads), fewer graduate programs and students
  - Comprehensive** - a wide range of both undergraduate and graduate programs, including professional degrees, significant research activity
  - Medical/Doctoral** - offer a wide range of PhD programs & research; all have medical schools
  - Unsure
-

Which of the following describes your **current** employment situation?

Please select ALL that apply

- Graduate Student
  - Post-Doctoral Fellow
  - Sessional Instructor
  - Non-Faculty Teaching Staff
  - On Secondment
  - Contract/Term Faculty
  - Tenure-track but pre-tenure
  - Tenured
  - Assistant Professor
  - Associate Professor
  - Full Professor
  - Professor Emeritus
  - Other: \_\_\_\_\_
- 

## Teaching Context

*Display This Question:*  
 If Which of the following describes your current employment situation? Please select ALL that apply =  
 Contract/Term Faculty  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Tenure-track but pre-tenure  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Tenured  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Assistant Professor  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Associate Professor  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Full Professor  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Professor Emeritus

According to **your contract**, what is your distribution of effort to each of the following components of your job?

If any categories do not apply to you, just input 0 for those.

Please make sure it adds up to 100

<b>Component</b>	<b>Distribution of Effort</b>
Research	
Teaching	
Service	
Other	
<b>Total</b>	

*Display This Question:*  
 If Which of the following describes your current employment situation? Please select ALL that apply =  
 Contract/Term Faculty  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Tenure-track but pre-tenure  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Tenured  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Assistant Professor  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Associate Professor  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Full Professor  
 Or Which of the following describes your current employment situation? Please select ALL that apply  
 = Professor Emeritus

What would be your **IDEAL distribution of effort** to each of the following components of your job? If any categories do not apply to you, just input 0 for those.

Please make sure it adds up to 100

<b>Component</b>	<b>Distribution of Effort</b>
Research	
Teaching	
Service	
Other	
<b>Total</b>	

---

### **Teaching Experience**

Please answer the following questions based on the courses that you taught prior to the COVID-19 pandemic restrictions.

---

Have you taught any of the following types of **undergraduate-level courses**?

Please include **all of your university teaching experience** (as a primary/co-instructor) **in Canada**, even if you've held multiple positions/contracts

Please select ALL that apply

- Intro/First Year
  - Second Year
  - Third Year
  - Fourth Year
  - Core/required courses for the program
  - Restricted electives
  - Electives
  - Practicum or similar
  - Independent Study/Applied Study
  - Honours Thesis Supervision
  - Other \_\_\_\_\_
  - None of these
-

Display This Question:

If Which of the following describes your current employment situation? Please select ALL that apply =  
Non-Faculty Teaching Staff

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Contract/Term Faculty

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Tenure-track but pre-tenure

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Tenured

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Assistant Professor

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Associate Professor

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Full Professor

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Other:

Or Which of the following describes your current employment situation? Please select ALL that apply =  
On Secondment

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Sessional Instructor

Or Which of the following describes your current employment situation? Please select ALL that apply =  
Professor Emeritus

Have you taught any of the following types of **graduate-level courses**?

Please include all of your university teaching experience (as a primary/co-instructor) in Canada, even if you've held multiple positions/contracts

Please select ALL that apply

- Core/required graduate courses for the program
- Elective graduate level courses
- Directed Readings/Independent Study courses
- Practicum or similar
- Supervising or co-supervising graduate students
- Other \_\_\_\_\_
- None of these

---

**Your Teaching Approach**

To what extent do you **agree** with the following statements about **your approach to teaching**?

	Strongly Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly Disagree	Not Applicable
I think of teaching as something that gets in the way of my research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think of teaching as one of the most important parts of my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I consider myself to be innovative in my teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use experiential and/or active learning in my courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look for ways to teach transferable/"soft" skills in my classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look for ways to improve my teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following apply to you?

Please check ALL that apply

- I participate in discussions about teaching and learning
  - I am part of a community that values excellence in teaching and learning
  - I conduct research on teaching and learning in higher education
  - I use industry and/or community connections in my courses (guest speakers, partners)
  - None of the above
-

## Teaching Support Preferences

Please share the degree to which you agree with the following statements

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Not applicable
I would like more resources to support my teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like less interference in how I teach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like more guidance from administration on what/how I teach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not want any more teaching resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The learning outcomes provided for my course(s) are clear and helpful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like clearer expectations related to how my courses fit into the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have enough training/knowledge to <b>teach</b> my course(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have enough training/knowledge to <b>design</b> my course(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focus check: please select not applicable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The current level of resources/support for teaching is a source of stress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More support related to teaching would reduce the time required to design a course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know where to go when I need help with course design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Teaching Training

---

Which of the following describes your **training** related to teaching?

Please select ALL that apply

- Mentorship from my graduate advisor/other instructor(s)
- Trial and error while instructing
- Conversations about teaching with colleagues
- Workshops in graduate school
- Courses in graduate school
- Workshops in early career as an instructor
- Workshops offered by external organizations or programs
- Ongoing professional development in teaching
- Diploma or certificate in adult education or similar
- Reading about teaching - academic literature, books, articles, etc.
- My own experiences as a student
- My experiences as a teaching assistant
- Training outside academia
- Teaching experience outside academia
- Other 1 \_\_\_\_\_
- Other 2 \_\_\_\_\_

---

Carry Forward Selected Choices - Entered Text from "Which of the following describes your training related to teaching?Please select ALL that apply"



Which of the choices (which you just selected) have been the **most impactful** on your teaching practices & perspectives?

Please select the **top 3-5 most impactful**

- Mentorship from my graduate advisor/other instructor(s)
  - Trial and error while instructing
  - Conversations about teaching with colleagues
  - Workshops in graduate school
  - Courses in graduate school
  - Workshops in early career as an instructor
  - Workshops offered by external organizations or programs
  - Ongoing professional development in teaching
  - Diploma or certificate in adult education or similar
  - Reading about teaching - academic literature, books, articles, etc.
  - My own experiences as a student
  - My experiences as a teaching assistant
  - Training outside academia
  - Teaching experience outside academia
  - Other 1
  - Other 2
-

**Teaching During the COVID-19 Pandemic**

Have you taught during the COVID-19 pandemic restrictions?

Yes

No

Not sure what you mean

## Teaching During the COVID-19 Pandemic

---

Has the experience of teaching during the COVID-19 pandemic impacted anything about how you will run your classes in future?

- Yes
  - Maybe
  - No
  - Not Applicable
- 

*Display This Question:*

*If Prior to any COVID-19 pandemic restrictions, which of the following teaching formats have you use... = None, I have <b>ONLY</b> taught at a Canadian university <b>during the pandemic restrictions </b>*

*Or Have you taught during the COVID-19 pandemic restrictions? = Yes*

Is there anything you would like to share about the **impact of the pandemic teaching experience** on your plans for teaching moving forward?

---

---

## Demographics

Please provide your gender

- Man
  - Woman
  - My gender identity is not listed above
- 

- Choose not to respond
-

Please select your age

- 18 - 24
  - 25 - 34
  - 35 - 44
  - 45 - 54
  - 55 - 64
  - 65 - 74
  - 75 - 84
  - 85 or older
- 

What stage of career do you consider yourself to be in, as a university instructor?

- Early Career
  - Mid Career
  - Late Career
- 

**You've almost completed the primary survey, thank you for your time!**

Would you like to tell us more about your experiences as a university instructor?

We have an optional **5 min follow up survey**, which will help us to get a **much clearer picture of how instructors approach, design, and update their courses**, and the **levels of support you receive** from your institution.

We'd really appreciate any additional information you can provide!

Alternatively, if you'd prefer to discuss these topics with the researchers at another time, there is also an option for a follow up interview.

- I have more to say! Please take me to the follow up survey (raffle and/or interview sign up at the end)
- No thanks, take me to the raffle and/or interview sign up options now

---

---

**Additional Teaching Context**

---

Which of the following describes your current employment situation at the university?

Please select ALL that apply

- I feel stable in this position
  - I feel precarious about my current position
  - I have temporary and/or part-time contract(s)
  - I expect to continue at this institution for at least the next 5 years
  - I expect/intend to leave this institution within the next 5 years or so
  - Other \_\_\_\_\_
-

## Changing Fields

*Display This Question:*

*If Overall, would you describe your primary discipline/field as rapidly changing (compared to other...  
!= My discipline/field changes <b>less rapidly</b> compared to others*

*Or Do you teach in any of the following discipline areas? Please select ALL that apply = Agri-Food*

*Or Do you teach in any of the following discipline areas? Please select ALL that apply =  
Biotechnology*

*Or Do you teach in any of the following discipline areas? Please select ALL that apply = Information  
and Computer Technology*

What aspects of your primary discipline/field have **changed** over the past 5-10 years?

	Significant change	Moderate change	Minimal change	Rare/Not at all
<b>Skills</b> required for <b>jobs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Foundational knowledge</b> required for <b>jobs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The <b>qualifications/credentials</b> required for <b>jobs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The <b>content</b> taught in <b>introductory level courses</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The <b>skills</b> taught in <b>introductory level courses</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The <b>content</b> taught in <b>advanced courses</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The <b>skills</b> taught in <b>advanced courses</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Display This Question:*

*If Overall, would you describe your primary discipline/field as rapidly changing (compared to other...  
!= My discipline/field changes <b>less rapidly</b> compared to others*

*Or Do you teach in any of the following discipline areas? Please select ALL that apply = Agri-Food*

*Or Do you teach in any of the following discipline areas? Please select ALL that apply =  
Biotechnology*

*Or Do you teach in any of the following discipline areas? Please select ALL that apply = Information  
and Computer Technology*

Is there anything else you'd like to tell us about **how** your discipline/program has been changing? Please describe here

---

## More About Your Teaching Experience

To what extent do you **agree** with the following statements about your **teaching experiences & environment**?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Not Applicable
My <b>university</b> states that it values excellence in teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My <b>university's</b> teaching statements are backed up with resources or action	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My <b>university</b> recognizes/compensates quality teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Research</b> is valued more highly than teaching at my <b>university</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My <b>department</b> and/or chair states that they value excellence in teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My <b>department's</b> teaching statements are backed up with resources or action	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My <b>department</b> recognizes/compensates quality teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Research</b> is valued more highly than teaching in my <b>department</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel supported in trying new things in my course(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have access to resources and supports when I want to change my course(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My colleagues value teaching quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Course Design

When designing a course, which **tools and resources** do you use?

Please select ALL that apply

- Course outline(s) from previous version(s) of the course, and/or similar courses
  - Textbook(s) and/or readings to be used in the course
  - Course description and/or course learning outcomes
  - Program-level curriculum documents/curriculum maps, program plans, etc.
  - Requirements/expectations for relevant certification(s), professional accreditation(s), etc.
  - I use other tools & resources beyond these (please list briefly)
- 

Have you reached out to anyone for input/discussion/support when designing a course?

Please select ALL that apply

- My mentors
  - Colleague(s) within my department/program
  - Colleague(s) outside my department/program
  - Administrators in my department/program
  - Educational Developer(s) or similar experts at my university
  - I work alone to prepare my course designs
  - Other (please list briefly)
-

What else do you take into consideration when designing a course?

Please select ALL that apply

- Students' prior knowledge and skills
  - The skills/knowledge students will need in future courses
  - The skills/knowledge employers value
  - Student workload in the course
  - I consider other factors beyond these (please list briefly)
- 

---

### Barriers & Challenges

---

What **challenges** do you face when **designing or changing a course?**

	Impacts me a lot	Impacts me some	Does not impact me	Not Applicable
Finding enough time to design/change my course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of resources and/or support from my department and/or university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing where to start	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Balancing this with other responsibilities of my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work-life balance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing how my course fits in with other courses in the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

---

### Updating Courses

---

How often do you make changes to the courses that you have taught before?

Please check ALL that apply

- Every time I teach it/them
- The first few times I teach it/them
- Regularly but not every time
- Occasionally
- I change some courses more often than others
- Never or very rarely
- I have **never taught the same course more than once**
- Other \_\_\_\_\_

---

### Updating Courses

*Display This Question:*

*If How often do you make changes to the courses that you have taught before? Please check ALL that... = I change some courses more often than others*

*And How often do you make changes to the courses that you have taught before? Please check ALL that... != I have **never taught the same course more than once***

Thinking about the course(s) that you change **most often**, what types of course(s) are they?

Please select ALL that apply.

- Introductory Courses
- Advanced Courses
- Undergraduate Courses
- Graduate Courses
- Applied Courses
- Conceptual/Theoretical Courses
- Skills-Focused Courses
- Content-Focused Courses
- Other \_\_\_\_\_

---

### Most-Changed Course

---

Considering all of the courses you have taught more than once, which is **the course you have changed the MOST over time?**

Please provide a "**nickname**" for this course, to be used for the next few questions

\_\_\_\_\_

---

Is this course an undergraduate or graduate level course?

- Undergraduate
  - Graduate
  - Other \_\_\_\_\_
- 

### Most-Changed Course

*Display This Question:*

*If Is this course an undergraduate or graduate level course? = Undergraduate*

Which of the following **course types** describes [COURSE NICKNAME] ?

Please select ALL that apply

- Intro/First year
  - Second year
  - Third year
  - Fourth year
  - Core course for program
  - Restricted elective
  - Elective Course
  - Part of a professional program
  - Other type not listed \_\_\_\_\_
- 

*Display This Question:*

*If Is this course an undergraduate or graduate level course? = Graduate*

Which of the following **course types** describes [COURSE NICKNAME]?

Please select ALL that apply

- Intro graduate
  - Upper year graduate
  - Core/required for program
  - Restricted elective
  - Elective Course
  - Part of a professional program
  - Other type not listed \_\_\_\_\_
-

*Display This Question:*

*If Is this course an undergraduate or graduate level course? = Other*

Which of the following course types describes [COURSE NICKNAME]?

Please select ALL that apply

- Intro level
  - Upper year
  - Core/required for program
  - Restricted elective
  - Elective Course
  - Part of a professional program
  - Other type not listed \_\_\_\_\_
-

Which of the following describes the **format** of [COURSE NICKNAME]?

Please select ALL that apply

- Small class (by your institution's standards)
  - Medium class (by your institution's standards)
  - Large class (by your institution's standards)
  - Lecture based
  - Activity based
  - Discussion based
  - Project/problem based
  - Has a lab/tutorial/seminar component
  - Includes interactive/experiential learning components
  - Practicum or similar type of placement
  - In person instruction
  - Online/distance education
  - Blended in person/online instruction
  - Other format(s) not listed
- 

Has your approach to designing [COURSE NICKNAME] and **changing** [COURSE NICKNAME] been similar?

Think about the tools/resources, people you talk to, and other considerations.

- Yes, the approaches are overall similar
  - I did not design this course, I have only updated it
  - No, I use a somewhat different approach when updating compared to designing it (please list differences briefly)
-

---

## Wrap up of Course Design & Change Section

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Is there anything else you'd like to tell us about your experience of **designing and/or updating your courses**?

---

**Just a few more questions** about your teaching context/experience, and your demographic information!

---

## More Detail on Your Course Design Process

When designing a course, which **tools and resources** do you use?

	Always	Most of the time	Sometimes	Never	Not Applicable/Not Available
Course outlines for that course, from other instructors	<input type="radio"/>				
Course outlines for similar courses, found online	<input type="radio"/>				
Description from the university's course calendar	<input type="radio"/>				
Learning outcomes associated with the course description	<input type="radio"/>				
The textbook(s) to be used in the course	<input type="radio"/>				
Other (non-textbook) readings, books, etc. to be used in the course	<input type="radio"/>				
The latest research in the field to include new discoveries or practices	<input type="radio"/>				
Curriculum-mapping or program-level curriculum documents	<input type="radio"/>				
University-wide learning outcomes	<input type="radio"/>				
Certification requirements for the regulated profession	<input type="radio"/>				
I create mind-maps, spreadsheets or other tools to brainstorm/view/plan out ideas	<input type="radio"/>				
Other 1	<input type="radio"/>				
Other 2	<input type="radio"/>				

Who do you reach out to, for **input/discussion/support** when designing a course?

	Always	Most of the time	Sometimes	Never	Not Applicable/Not Available
Other instructors in the program	<input type="radio"/>				
Other instructors across campus	<input type="radio"/>				
The department chair	<input type="radio"/>				
A curriculum committee member	<input type="radio"/>				
An Educational Developer or someone in a similar role	<input type="radio"/>				
Instructors at other institutions	<input type="radio"/>				
Online communities/networks (e.g. Twitter) about the course content	<input type="radio"/>				
Other 1	<input type="radio"/>				
Other 2	<input type="radio"/>				

---

What else do you take into consideration when designing a course?

	Always	Most of the time	Sometimes	Never	Not Applicable/Not Available
Students' background knowledge/skills from <b>prerequisite</b> courses	<input type="radio"/>				
Students' knowledge needed for courses that <b>follow my course</b>	<input type="radio"/>				
Skills required for courses that <b>follow my course</b>	<input type="radio"/>				
<b>Educational frameworks</b> such as Bloom's taxonomy	<input type="radio"/>				
The <b>total workload for students</b> of readings and assignments, (eg: for year level and/or compared to other courses)	<input type="radio"/>				
The <b>skills employers are looking for</b> when hiring graduates from this program	<input type="radio"/>				
Other 1	<input type="radio"/>				
Other 2	<input type="radio"/>				

---

**More About Your Most-Changed Course**

---

---

Which types of input or feedback influenced your decisions about **when and how** to change or update [COURSE NICKNAME]?

Please check ALL that apply

- Input from instructors of **prerequisite** courses
- Input from instructors of **later/subsequent** courses in the program
- Input from **students** (incoming and/or outgoing)
- Conversations with **colleagues** about teaching practices and/or content
- Conversations on **social media** about teaching practices and/or content
- A **workshop or training** on teaching practices
- Industry reports/conversations about what **employers** are looking for
- Journal club** or other structured discussions about teaching
- Data showing that certain groups/demographics are **underperforming** in my course
- Other \_\_\_\_\_

---

Page Break

Which logistical factors influenced your decisions about **when and how** to change or update [COURSE NICKNAME] ?

Check ALL that apply

- Program redesign or restructuring
- To align the course with university or department priorities/initiatives
- Addressing/preventing academic misconduct
- Addressing a specific issue from previous semesters (other than academic misconduct)
- Respond to a major revision or change in textbook (or other core resource(s))
- To reduce costs of textbooks or other resources/materials
- To make the course more accessible in some way (not related to costs)
- To reduce TA/grading workload (or respond to reduced TA support)
- Other \_\_\_\_\_

What **other factors** influenced your decisions about **when and how** to change or update [COURSE NICKNAME]?

Please check ALL that apply

- Wanted to "switch things up"
- General desire for continuous improvement
- To respond to current/recent world events
- To incorporate new discoveries or advancements in the field
- To try out a new teaching method or activity
- To include new tools/software
- To include more/different **discipline-specific skills** that my students will need in the workplace
- To include **transferable/"soft" skills** that my students will need in the workplace
- To incorporate a successful approach from another course
- To increase student engagement
- Other \_\_\_\_\_

---

Is there anything else you would like to share about [\[COURSE NICKNAME\]](#)?

\_\_\_\_\_

---

Are the changes you have described above reflected in your **course outline** for [\[COURSE NICKNAME\]](#)?

That is, if someone looked at your course outlines before and after, would they be able to notice the changes you've described here?

- Yes they all are
- Most are
- Some are
- No

## Raffle Survey Consent

If you would like to do any of the following:

- a) enter the raffle for a \$50 gift card of your choice
- b) sign up for an optional follow-up interview about your course development experience
- b) sign up to receive a summary of the results of this research study

Then **please select "yes" below to be redirected to a separate survey** to sign up for any of these things.

*Your email address entered on that survey will not be connected in any way to your responses to this survey.*

Yes

No

## Appendix G Details of variable creation for Chapter 3

### Dependent Variables

Among the course development variables were two variables that concerned the tools used during course design. The variable *number of tools used* is a count of the number of tools that respondents selected from a list of common course design tools (Table 3.9). This question was from the first part of the survey and was a summary type question. One of the tools listed (certification requirements for a registered profession) only applied to respondents who taught in professional programs, so this variable was scaled to account for whether the respondents had a connection to a professional program or not (by taking a proportion of the tools selected out of the total applicable tools for that participant, and then multiplying by 6 and rounding to the nearest whole number of tools used). This variable is a conceptually continuous variable with a range of 0 to 6 tools.

The second tool use variable is *degree of tool use* which is a score which combines both the number of tools used and the frequency of each tool's use, and it comes from the second part of the survey, so it applies to just under half of the respondents. This variable was created by summation of the scores from 11 Likert scale questions (see Table 3.10) which each asked about how often the respondents use a particular type of tool for course design, on a 4-point scale of Never-Sometimes-Most of the Time-Always. There were 11 specific tools listed. Since one of these specified tools was only applicable to respondents who teach in professional programs, this variable was also scaled by creating proportions, multiplying by the total possible value (33) and

rounding to the nearest whole number. This variable is conceptually continuous and has a possible range of 0-33, where 0 would indicate that the respondent never used any of the listed tools, and 33 would indicate that the respondent always used all tools available to them.

Two variables concerned whether respondents made use of any of the formal curriculum tools that were listed (such as course learning outcomes, department curriculum maps or program plans, university level learning outcomes, or professional requirements if applicable). The first variable *number of curriculum documents used* is from a question from the first part of the survey and was created in the same manner as *number of tools used* (including scaling to account for professional connection or not), but in this case only included the three curriculum-related tools that were included in this question from the first survey (Table 3.9). This variable has a range of 0-3 for the total number of curriculum tools reported to be used. The last course design variable was *degree of curriculum use* and was created from a question on the second part of the survey (so it only applies to approximately half of the respondents) using the same approach as *degree of tool use* (including scaling), while including only the four curriculum related tools (Table 3.10). This resulted in a score that ranged from 0-12, with 0 indicating that none of these tools were ever used by the respondent, and 12 indicating that the respondent always used all the curriculum tools available to them.

The final dependent variable was a measure of how often the respondent indicated that they changed or updated their courses. While several descriptors were offered for frequency of course change, the responses were collapsed into a binary

variable due to low response totals to some of the less frequent options. The variable *frequency of course updating* indicates whether the respondent reported changing their courses every time they teach them, or less often than every time. This variable comes from the first part of the survey, so all respondents are included in this variable.

See Appendix H for more detail and recoding decisions for each variable choice.

### **Independent Variables**

The institution type variable is *university type*, which is the self-report categorization of a respondents' institution into the three major categories used in the annual Maclean's magazine ranking of universities (Primarily Undergraduate, Comprehensive, and Medical-Doctoral) (Dwyer, 2021). This variable comes from a question from the first part of the survey, so all respondents are included in this variable.

Discipline was analysed using two different variables: *STEM/BHASE* and *5 disciplinary groups*. Both were derived variables which were created by manually categorizing the discipline that was reported by the respondents at the start of the first survey, into larger categories for analysis. First all disciplines were sorted into STEM (Science, Technology, Engineering and Mathematics) vs BHASE (Business, Humanities & Health, Arts, Social Sciences, and Education) groupings, using the Statistics Canada STEM and BHASE groupings variant of the Classification of Instructional Programs (CIP) 2016, listed on the Statistics Canada website (Statistics Canada, n.d.). Secondly, to create a variable which allowed more fine-grained analysis of differences between discipline groups, all disciplines were manually categorized into six large disciplinary

groupings (Appendix I ) The Formal Sciences category had too few responses (<25) to be used in regression analyses, so this category was combined with the Natural Sciences group to create a variable (*5 disciplinary groups*) with five disciplinary categories: Natural & Formal Sciences, Humanities, Social Sciences, Professions, and Other. Participants were placed into the Professions category based on a combination of their listed discipline, and if the respondent selected that they were part of a professional program and listed a relevant profession.

The program type analyses involved two sub-groups: rapidly changing fields, and professional programs. The rapidly changing fields variable was *rapidly changing fields*, and this variable was derived from a question that asked respondents to assess the rate of change in their field by considering the knowledge and skills required for most common jobs in the field, in comparison to other fields of study, and select whether they judge it to be changing less rapidly than others, at the same rate as others, or more rapidly than others. To focus on just the most rapidly changing fields, I created a binary variable for those who said ‘more rapidly than others”, compared to all other respondents.

The other program type I examined was professional programs. Participants were asked if they fit into 1 of 4 groups – having no connection to a professional program, teaching in a pre-professional program, teaching some courses in a professional program, or teaching most or all of their courses within a professional program, and if they selected more than one of these options they were grouped with the “higher” professional content group. The binary variable *professional programs* was

created to compare those who taught in a pre-professional program, or taught some or all of their courses within a professional program, to those instructors with no connection to a professional program.

The support for teaching variables fall into 2 groups: Departmental and University-level values and support for teaching is the first group, and whether their colleagues or community valued teaching is the second group. The questions that contribute to the departmental values, university values, and colleagues' values questions were from the second part of the survey, while the community question was from the first part. To keep the sample consistent across these analyses, the community values variable was filtered to include only participants who completed the second part of the survey.

The departmental support score was created from three questions which asked about the extent to which they agreed that their department 1) states that it values teaching excellence, 2) backs up these statements with action, and 3) recognizes or compensates quality teaching. These questions were 5-point Likert scales from Strongly Disagree to Strongly Agree (see Appendix K ). The *departmental support score* was created by summation of these three question variables, to produce a conceptually continuous score that ranges from 0 (strongly disagree on all three questions) to 15 (strongly agree on all three questions). The *university support score* was created by following this same method, from three parallel questions which focused on the university level instead of the departmental level. It also ranges from 0 to 15.

The colleague values variable *supportive colleagues* is based on a 5-point (Strongly Disagree to Strongly Agree) Likert scale question from the second survey that asked respondents if they agreed that “my colleagues value teaching quality”. Due to low response numbers for the strongly disagree category, this variable was recoded into a binary variable with somewhat agree and strongly agree responses being coded as “Yes” the respondents’ colleagues value teaching, while responses of strongly disagree, somewhat disagree, and neither agree nor disagree were coded as “No” (Table 3.11). This question did not state if these colleagues needed to be from the same department or institution as the respondent, but since this question was grouped with the other departmental and university-wide questions, it is likely that most respondents would interpret this as referring to colleagues at their own institution. There is no way to know whether respondents considered colleagues only within or also outside their own department when answering this question, so it likely varies among respondents.

The *community support* variable is a binary variable that was created from a question on the first part of the survey that asked if respondents felt they were “Part of a community that values teaching excellence” or not (Table 3.11). Participants were not given any context for this question so they were free to define this community in any way they want (it did not have to refer to their colleagues in their own department or university, and it could include more broadly defined communities such as online communities). Since this was the only variable in this cultural context section that was from the first survey, I filtered this variable to only include participants who responded to

the second survey, so that more direct comparisons could be made between these variables.

**Appendix H Table of recodes and variable creation decisions for all variables used in Chapter 3**

<b>Original variable and type</b>	<b>Description &amp; original levels or groups</b>	<b>Recodes</b>	<b>New Variable or Scale</b>
<b>Tools used during course design (summary)</b> – From Part 1 of the Survey All original variables were indicator variables, dependent, select all that apply			
<b>design_tools_sum_1</b>  indicator variable, dependent	1 Course outlines from prev courses	Totalled the number of all the different tools that respondents selected.	<b>num_tools_used</b>  Continuous dependent variable  Range 0-6  Scaled to apply across professional and non-professional respondents
<b>design_tools_sum_2</b>  indicator variable, dependent	1 Textbooks or readings for courses	Created a version that excluded the professional requirements (var 5).	
<b>design_tools_sum_3</b>  indicator variable, dependent	1 Course descriptions or learning outcome	<b>Scaling:</b> Converted both variables into proportions, and used the participants' score on profess_any to determine which version to apply in a combined variable. Multiplied the result by the total possible tool use (6), then rounded all decimal values to nearest whole number to create a scaled variable applicable to those in professional and non-professional programs.	
<b>design_tools_sum_4</b>  indicator variable, dependent	1 Program curriculum docs		
<b>design_tools_sum_5</b>  indicator variable, dependent	1 Requirements for certifications or professional programs		
<b>design_tools_sum_6</b>  indicator variable, dependent	1 Other tools		
<b>How often particular tools were used during course design (detailed)</b> – From Part 2 of the Survey Likert variables (4 point scale, Never-Sometimes-Most of the time-Always), dependent			
<b>design_tools_detail_01</b>	course outlines, from that course, from others in program	Filtered based on whether they answered the second survey and	<b>tools_use_amt</b>

4-point Likert variable, dependent		answered any of the tools questions. If so, then NA responses were recoded as “never”.  Created a score of all tool use, created as a sum of all the individual variables.  Created a version of the score that excluded the professional requirements.  Used the same scaling approach as above, multiplying by the total possible tool use score (33).	Continuous dependent variable  Range 0-33  Scaled to apply across professional and non-professional respondents
<b>design_tools_detail_02</b> 4-point Likert variable, dependent	course outlines from similar courses found online		
<b>design_tools_detail_03</b> 4-point Likert variable, dependent	description from course calendar		
<b>design_tools_detail_04</b> 4-point Likert variable, dependent	Learning outcomes from the course		
<b>design_tools_detail_05</b> 4-point Likert variable, dependent	textbook for course		
<b>design_tools_detail_06</b> 4-point Likert variable, dependent	non-textbook readings to be used in the course		
<b>design_tools_detail_07</b> 4-point Likert variable, dependent	latest research in the field		
<b>design_tools_detail_08</b> 4-point Likert variable, dependent	curriculum mapping or program level curriculum documents		
<b>design_tools_detail_09</b> 4-point Likert variable, dependent	university wide learning outcomes		
<b>design_tools_detail_10</b> 4-point Likert variable, dependent	requirements for registered profession		
<b>design_tools_detail_11</b> 4-point Likert variable, dependent	create mind maps, spreadsheets or other planning tools		
<b>Curriculum documents used during course design (summary) – From Part 1 of the Survey</b>			

<b>All original variables were indicator variables, dependent, select all that apply</b>			
<b>design_tools_sum_3</b> indicator variable, dependent	1 Course descriptions or learning outcome	Totalled the number of all the different curriculum document tools that respondents selected (vars 3, 4, 5).  Created a version that excluded the professional requirements (var 5).  Used the same scaling approach as above, multiplying by the total possible curriculum use score (3).	<b>num_curr_used</b>  Continuous dependent variable  Range 0-3  Scaled to apply across professional and non-professional respondents
<b>design_tools_sum_4</b> indicator variable, dependent	1 Program curriculum docs		
<b>design_tools_sum_5</b> indicator variable, dependent	1 Requirements for certifications or professional programs		
<b>How often particular curriculum documents were used during course design (detailed)</b> – From Part 2 Likert variables (4 point scale, Never-Sometimes-Most of the time-Always), dependent			
<b>design_tools_detail_04</b> 4-point Likert variable, dependent	Learning outcomes from the course	Created a score of all tool use, created as a sum of all the individual variables (vars 4, 8, 9, 10).  Created a version of the score that excluded the professional requirements (var 10).  Used the same scaling approach as above, multiplying by the total possible curriculum use score (4).	<b>curr_use_amt</b>  Continuous dependent variable  Range 0-4  Scaled to apply across professional and non-professional respondents
<b>design_tools_detail_08</b> 4-point Likert variable, dependent	curriculum mapping or program level curriculum documents		
<b>design_tools_detail_09</b> 4-point Likert variable, dependent	university wide learning outcomes		
<b>design_tools_detail_10</b> 4-point Likert variable, dependent	requirements for registered profession		
<b>Frequency of Course Changes</b> All indicator variables, dependent, select all that apply			
<b>freq_changes_1</b> indicator variable, dependent	1 Never or very rarely	If respondents picked more than one, they were counted as the “higher” frequency category.	<b>change_every</b>  Binary indicator variable, dependent
<b>freq_changes_2</b> indicator variable, dependent	1 Occasionally		

<b>freq_changes_4</b> indicator variable, dependent	1 Regularly but not every time	The number of responses for 1 & 2 were too low to combine into one increasing categorical variable, so created a binary variable for whether they change their courses every time they teach it, or less frequently.	0 – No 1 – Yes
<b>freq_changes_5</b> indicator variable, dependent	1 First few times		
<b>freq_changes_6</b> indicator variable, dependent	1 Every time I teach it		
<b>Independent Variables</b>			
<b>Institution Type</b>			
<b>uni_type</b>  categorical, independent	Self-report type of university  1 Primarily Undergraduate 2 Comprehensive 3 Medical Doctoral 4 Unsure	Dropped the 4 people who selected “unsure”	<b>uni_type3</b>  categorical, independent variable  1 Primarily Undergraduate 2 Comprehensive 3 Medical Doctoral
<b>Disciplines</b>			
<b>discipline</b>  Respondents each wrote in their primary discipline	Manually categorized into STEM and Non- STEM fields using the Statistics Canada CIP variant for STEM and BHASE groupings as reference.	No recodes needed after the derived variable was created	<b>disc_stem</b>  Categorical variable:  0 - BHASE 1 - STEM
	Manually categorized into six categories based on the image and table listed in Appendix 2.	Formal Sciences category was too small, so I combined this category with the Natural Sciences category, and made a 5-category variable.	<b>disc_group5</b>  Categorical variable:  1 - Natural & Formal Sciences 2 - Humanities 3 - Social Sciences 4 - Professions 5 - Other

<b>Program Type – A) Rapidly Changing Fields</b>			
<b>rapid_change</b>  categorical, independent	Self-report rate of change in field compared to other fields  1 More rapid change 2 About the same rate 3 Less rapid change 4 Not sure	Combined “not sure” group with “about the same.”  Created a binary variable to single out the most rapidly changing group from the other categories.	<b>most_rapid</b>  Binary, independent  0 Similar or less rapid than others 1 More rapid than others
<b>Program Type – B) Professional Program Involvement</b>			
<b>professional_1</b>  indicator variable, independent	Most or all courses are in a professional program	Created a combined variable to indicate the highest level of professional program content that was selected.  Then created a binary variable for non-professional and pre-professional courses only vs some or most/all professional courses. AND Created a binary variable that focuses on the primarily professional (most-all courses in professional program), vs mostly non-professional courses group	<b>profess_any</b>  Binary, independent  0 No Professional Connection 1 Any Professional Connection
<b>professional_2</b>  indicator variable, independent	Some courses are in a professional program		
<b>professional_3</b>  Indicator variable, independent	I teach in a pre-professional program		<b>primary_profess</b>  Binary, independent  0 Mostly Non-professional 1 Primarily Professional
<b>professional_4</b>  Indicator variable, independent	I do not teach in a professional program		
<b>Cultural Context – A) Departmental &amp; University Culture</b>			
Likert variables (5 point scale, Strongly Disagree-Strongly Agree), dependent			
<b>dept_says_val_teach</b>	Department states it values teaching excellence	Combined these three variables into one by summation.	<b>dept_val_score</b>  Conceptually continuous independent variable
<b>dept_valu_backup</b>	Department's teaching statements backed up with action		

<b>dept_recog_teach</b>	Department recognizes/compensates quality teaching		Range 0-15
<b>uni_says_val_teach</b>	University states it values teaching excellence	Combined these three variables into one by summation.	<b>uni_val_score</b>  Conceptually continuous independent variable  Range 0-15
<b>uni_valu_backup</b>	University's teaching statements backed up with action		
<b>uni_recog_teach</b>	University recognizes/compensates quality teaching		
<b>Cultural Context – B) Colleagues and Community Culture</b>			
<b>colleagues_val_teach</b>  Conceptually continuous independent variable	My colleagues value teaching quality 1 - Strongly Disagree 2 - Somewhat Disagree 3 - Neither Agree nor Disagree 4 - Somewhat Agree 5 - Strongly Agree	Created a binary variable by recoding categories 1, 2, 3 into 0 (no), and 4 & 5 into 1 (yes).	<b>colleagues_val</b>  Binary independent variable:  0 - No 1 - Yes
<b>teach_behav_2</b>  Indicator variable, independent	I am part of a community that values excellence in teaching and learning 0 - No 1 - Yes	Renamed variable for a more meaningful name	<b>comm_val_teach</b>  Binary independent variable: 0 - No 1 - Yes

**Appendix I How disciplines were grouped into six large disciplinary categories for Chapter 3. Natural and Formal Sciences were later combined.**

<b>Big Disciplinary Groups</b>	<b>Example Disciplines</b>
Natural Sciences	Biology
	Chemistry/biochemistry
	Physics
	Earth Sciences
	Space-sciences
	Environmental science
Formal Sciences	Computer sciences
	Mathematics
	Statistics
Humanities	Arts
	Literature
	Linguistics
	Philosophy
	Human History
Social Sciences	Religion
	Archaeology
	Area-studies
	Anthropology
	Geography
	Cultural-ethnic studies
	Gender/Sexuality studies
	Psychology
	Economics
	Sociology
	Political Science
Professions	Education
	Law
	Social work
	Medicine
	Nursing
	Veterinary/vet tech
	Other health professions
	Library/museum studies
	Engineering & engineering technology
	Architecture/Design
Other	Business
	Agriculture/horticulture/animal sci
	Military/intelligence
	Family/consumer science
	Public administration/policy
	forestry
	Sport & recreation/kinesiology
	Transportation
	Divinity
	Journalism/media/ communication
	(Any hard to categorize or interdisciplinary fields)

## Appendix J Institutional affiliations of instructors who completed the survey

*Based on emails provided for the raffle; may not reflect the affiliation of teaching experience on the survey*

Institutions Included in Survey	Province
Brock University	ON
Capilano University	BC
Carleton University	ON
Concordia University	QC
Dalhousie University	NS
Douglas College	BC
First Nations University	SK
Kwantlen Polytechnic University	BC
Lakehead University	ON
McEwan University	AB
McGill University	QC
McMaster University	ON
Memorial University of Newfoundland	NL
Mount Allison University	NB
Mount Royal University	AB
Mount Saint Vincent University	NS
Ottawa University	ON
Queen's University	ON
Ryerson University (Toronto Metropolitan University)	ON
Simon Fraser University	BC
St. Mary's University	NS
St. Thomas University	NB
Thompson Rivers University	BC
Trent University	ON
Université du Québec à Chicoutimi	QC
Université Laval	QC
University of Alberta	AB
University of British Columbia	BC
University of Calgary	AB
University of Fraser Valley	BC
University of Guelph	ON
University of Lethbridge	AB
University of Manitoba	MB
University of New Brunswick	NB
University of Northern British Columbia	BC
University of Regina	SK
University of Saskatchewan	SK
University of Toronto	ON
University of Victoria	BC
University of Waterloo	ON
University of Windsor	ON
University of Winnipeg	MB
Vancouver Island University	BC
Western University	ON
York University	ON
Yukon University	YK

## **Appendix K Descriptive Results of Courses Taught by Respondents**

Respondents were asked how many different courses<sup>22</sup> they had taught over the last five years (Table K). The response rates were relatively balanced across the different categories; the largest group taught 3-4 different courses (28%), followed by 7 or more courses (28%), 5-6 courses (23%), and 1-2 courses (21%). In terms of levels of courses taught, almost all the respondents had taught undergraduate courses (93%), and most reported teaching graduate courses<sup>23</sup> as well (62%). A large majority of respondents (77%) said they were able to make substantial changes to their courses (Table K), while 11% said they were able to make changes to some courses but not others, and 10% said they could make only minor changes to their courses. The remaining 3% said they were not able to change their courses or responded with “other”.

---

<sup>22</sup> This referred to differently named courses, not multiple sections of the same course

<sup>23</sup> Supervising or co-supervising graduate students was not included in this total

Table K: Descriptive variables related to courses taught by survey respondents

<b>Descriptive Variables - Courses</b>	<b>Frequencies</b>	<b>Percentages</b>	<b>Visual</b>
<b>Number of different courses taught in last 5 years</b>			
1-2 courses	110	21.15	
3-4 courses	147	28.27	
5-6 courses	117	22.5	
7 or different courses	146	28.08	
<b>Taught undergraduate courses</b>			
No	35	6.73	
Yes	485	93.27	
<b>Taught graduate courses</b>			
No	198	38.08	
Yes	322	61.92	
<b>Ability to change courses</b>			
Can make substantial changes to courses	398	76.54	
Can make changes to come courses, not others	55	10.58	
Can make minor changes to courses	51	9.81	
No, cannot make changes to courses	7	1.35	
Other	9	1.73	

## Appendix L Details of Departmental & University Support Score Descriptive Results

The mean *departmental support score* was 10.38 (Std Dev. 3.01) out of 15, for those who completed the second part of the survey (Table L.1), and no one scored below a 3 on this measure. For the first of three questions that contributed to this score, 51% of respondents said they strongly agreed that their department or chair states that they value excellence in teaching, while only 19% strongly agreed (and 34% somewhat agreed) that their department backs up these statements with action, and 13% strongly disagreed. The final question was whether their department recognizes or compensates quality teaching, and this has the lowest agreement of the three; only 12% strongly agreed, and 26% somewhat agreed, while 22% strongly disagreed with this statement.

Table L.1: Questions relating to department support for teaching, which contributed to the departmental support score. Includes percentages of respondents from the second part of the survey who gave each response.

Department Support for Teaching Questions	Responses	Frequencies	Percentages	Visual
My department and/or chair states that they value excellence in teaching	Strongly Disagree	3	1.44	
	Somewhat Disagree	14	6.73	
	Neither Agree Nor Disagree	28	13.46	
	Somewhat Agree	57	27.40	
	Strongly Agree	106	50.96	
My department's teaching statements are backed up with resources or action	Strongly Disagree	27	13.30	
	Somewhat Disagree	28	13.79	
	Neither Agree Nor Disagree	40	19.70	
	Somewhat Agree	69	33.99	
	Strongly Agree	39	19.21	
My department recognizes/compensates quality teaching	Strongly Disagree	46	21.90	
	Somewhat Disagree	39	18.57	
	Neither Agree Nor Disagree	45	21.43	
	Somewhat Agree	54	25.71	
	Strongly Agree	26	12.38	

The mean *university support score* was 10.58 (Std Dev 2.42) out of 15, for those who completed the second part of the survey (Table L.2), and no one scored below a 3

on this measure. For the first of three questions that contributed to this score, 69% of respondents strongly agreed that their university states that they value excellence in teaching, while only 10% strongly agreed (and 40% somewhat agreed) that their university backs up these statements with action, and 10% strongly disagreed. The final statement had the lowest level of agreement: only 6% of respondents strongly agreed that their university recognizes or compensates quality teaching, 29% somewhat agreed, while 28% somewhat disagreed, and 17% strongly disagreed.

Table L.2: Questions relating to university support for teaching, which contributed to the university support score. Includes percentages of respondents from the second part of the survey who gave each response.

University Support for Teaching Questions	Responses	Frequencies	Percentages	Visual
My university states that it values excellence in teaching	Strongly Disagree	1	0.47	
	Somewhat Disagree	3	1.40	
	Neither Agree Nor Disagree	9	4.21	
	Somewhat Agree	53	24.77	
	Strongly Agree	148	69.16	
My university's teaching statements are backed up with resources or action	Strongly Disagree	22	10.33	
	Somewhat Disagree	48	22.54	
	Neither Agree Nor Disagree	35	16.43	
	Somewhat Agree	86	40.38	
	Strongly Agree	22	10.33	
My university recognizes/compensates quality teaching	Strongly Disagree	37	17.37	
	Somewhat Disagree	59	27.70	
	Neither Agree Nor Disagree	43	20.19	
	Somewhat Agree	61	28.64	
	Strongly Agree	13	6.10	

## Appendix M Detailed Statistical Analyses Results

### Institution Type

There were no significant impacts of *univeristy type* on either the number ( $F_{(2, 496)} = 1.60, p = 0.20$ ) or degree of tool use ( $F_{(2, 208)} = 1.40, p = 0.25$ ), or the number ( $F_{(2, 496)} = 0.59, p = 0.56$ ) or degree of curriculum documents used ( $F_{(2, 208)} = 2.34, p = 0.10$ ) to design courses, or on the frequency of updating courses (LR  $X^2_{(1)} = 2.19, p = 0.33$ ) (Figure M.1).

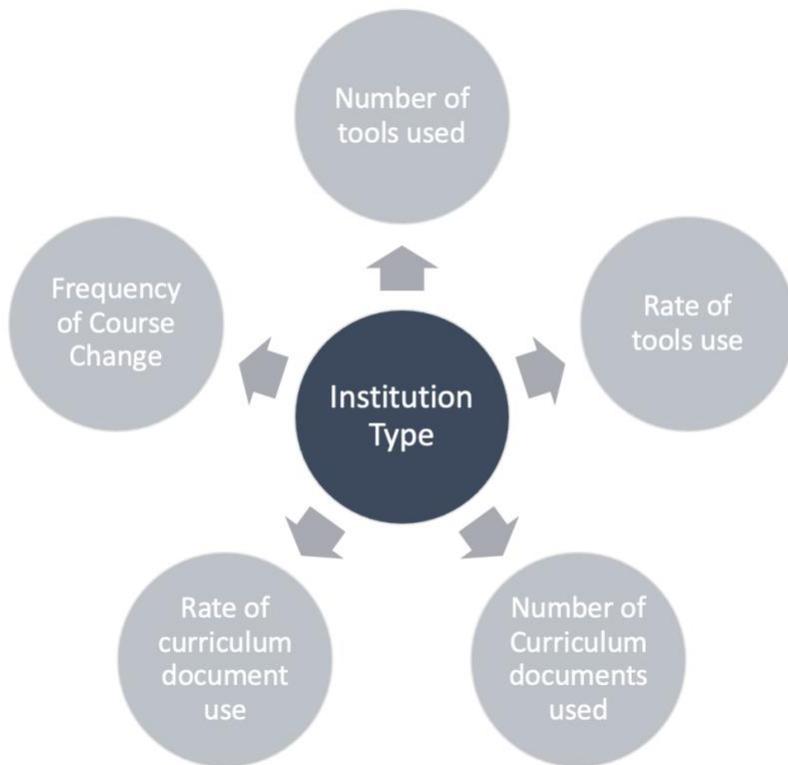


Figure M.1 Impacts of Institution type on all five dependent variables. Any significant impacts on dependent variables are shown in full colour with the percentage variance explained listed on the arrow. Greyed out variables were non-significant.

## Discipline

### *Tools Use*

Respondents in STEM fields were found to use significantly fewer total tools ( $F_{(1, 495)} = 4.13, p = 0.04$ ) than those in BHASE fields, though this only accounted for 1% of the variance in the number of tools used. There was no difference in number of tools used across the other 5 disciplinary groups ( $F_{(4, 492)} = 0.51, p = 0.73$ ) (Figure M.3).

Among the respondents who completed the second part of the survey, there was no difference in the degree of tool use by discipline, using either categorization method (STEM:  $F_{(1, 208)} = 0.00, p = 0.96$ ; five groups:  $F_{(4, 204)} = 1.32, p = 0.26$ ).

### *Curriculum Document Use*

There was no significant difference found in the number of curriculum documents used by discipline, using either categorization method (STEM:  $F_{(1, 495)} = 0.29, p = 0.59$ ); five groups:  $F_{(4, 492)} = 0.39, p = 0.81$ ) (Figure M.3).

Among the respondents to the second part of the survey, there was a difference in degree of curriculum document use found between the STEM and BHASE groups, with STEM respondents using curriculum documents to a higher degree than BHASE respondents ( $F_{(1, 208)} = 5.15, p = 0.02$ ), which accounts for 2% of the variance.

Across the 5 disciplinary groups, respondents in the Professions category had the highest degree of curriculum document use ( $F_{(4, 204)} = 3.05, p = 0.02$ ), followed closely by the Natural & Formal Sciences group and Other, which accounts for 6% of

variance. Both Humanities and Social Sciences groups were considerably lower, but only Social Sciences was significantly lower than the Professions category (Figure M.2).

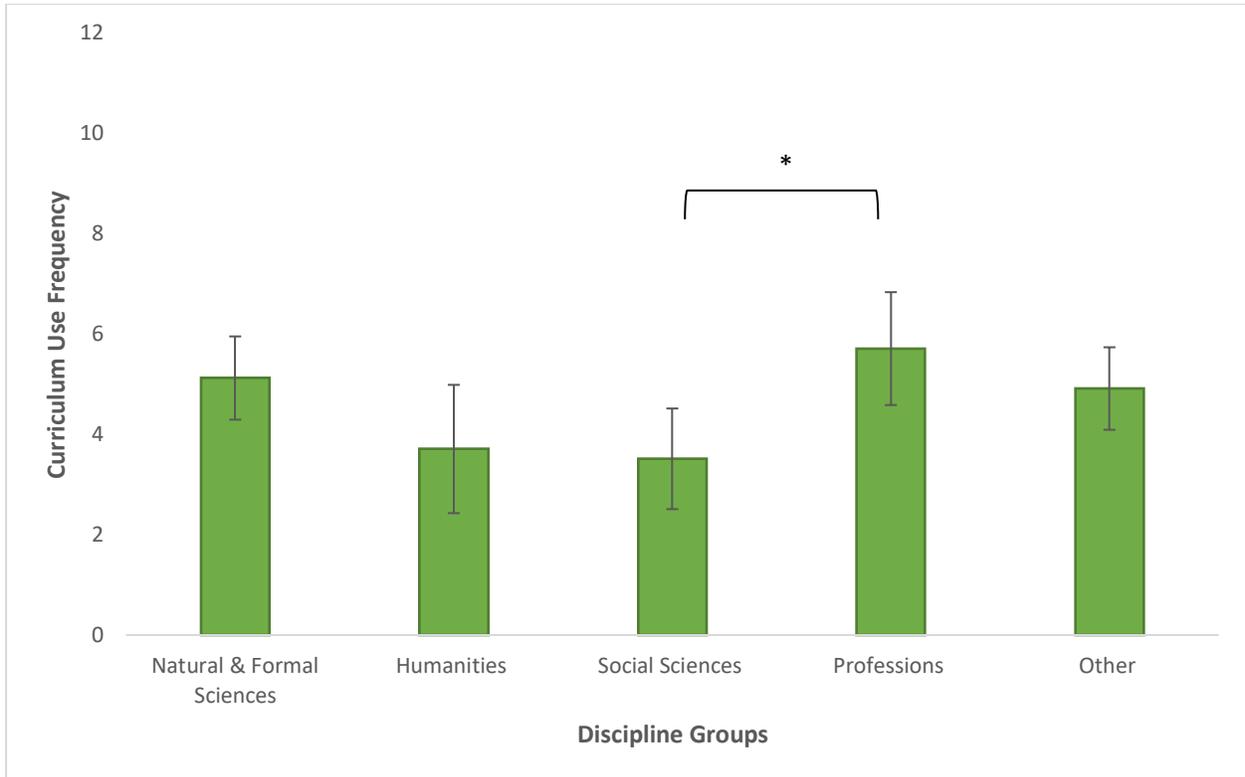


Figure M.2 Margins for frequency of curriculum use by disciplinary group. Error bars represent 95% confidence intervals.

### *Frequency of Course Change*

There was no significant difference between disciplinary groups in terms of the likelihood of changing courses every time they were taught (STEM: LR  $X^2_{(1)} = 1.61$ ,  $p = 0.20$ ); five groups: LR  $X^2_{(4)} = 6.19$ ,  $p = 0.19$ ).



Figure M.3: Impacts of Discipline on all five dependent variables. Any significant impacts on dependent variables are shown in full colour with the percentage variance explained listed on the arrow. Greyed out variables were non-significant.

## Program Type – Rapidly Changing Fields

### *Tools Use*

There was no difference in the number ( $F_{(1, 518)} = 0.46, p = 0.50$ ) or degree of tools use ( $F_{(1, 209)} = 3.03, p = 0.08$ ), based on the respondents' perception of the rate of change in their field (Figure M.4).

### *Curriculum Document Use*

There was no significant difference in the total number of different curriculum documents used by rate of change in the field ( $F_{(1, 518)} = 0.05, p = 0.83$ ) (Figure M.4).

Among the respondents from the second part of the survey, respondents in rapidly changing fields used curriculum documents to a significantly higher degree than other fields ( $F_{(1, 209)} = 5.20, p = 0.02$ ), which accounted for 2% of variance.

### *Frequency of Course Change*

Respondents in rapidly changing fields are significantly more likely to change their courses every time they teach it, compared to other fields (LR  $\chi^2_{(1)} = 10.88$ ,  $p = 0.001$ ), 2% of variance. This was the only group that showed a significant difference in the frequency of course updating, across all variables measured (Figure M.4).

### Program Type – Professional Programs

#### *Tools Use*

Respondents with any connection to a professional program ( $F_{(1, 518)} = 13.89$ ,  $p < 0.001$ ) and respondents that teach primarily within a professional program ( $F_{(1, 518)} = 12.76$ ,  $p < 0.001$ ) both used significantly fewer tools when designing courses than respondents in non-professional programs. This accounted for 3% and 2% of the variance respectively (Figure M.4).

There was no difference in the degree of tool use between professional and non-professional programs using either categorization (profess\_any:  $F_{(1, 209)} = 2.61$ ,  $p = 0.11$ ; primary\_profess:  $F_{(1, 209)} = 0.06$ ,  $p = 0.80$ ), among respondents of the second survey.

#### *Curriculum Document Use*

There was a lower number of curriculum documents used by respondents tied to professional programs than those in non-professional programs. ( $F_{(1, 518)} = 14.19$ ,  $p < 0.001$ ), which accounts for 3% of the variance.

Among respondents to the second part of the survey, those respondents with any connection to a professional program had a significantly higher degree of curriculum document use compared to those with no connection to a professional program ( $F_{(1, 209)} = 6.40, p = 0.01$ ), which accounts for 3% of variance (Figure M.4).

### Frequency of Course Change

There was no difference in the log likelihood of respondents updating their courses each time they teach it, between those with a professional program connection and those without ( $LR X^2_{(1)} = 0.12, p = 0.72$ ) (Figure M.4).



Figure M.4: Impacts of Program Type on all five dependent variables. Any significant impacts on dependent variables are shown in full colour with the percentage variance explained listed on the arrow. Greyed out variables were non-significant.

## Workplace Cultural Contexts – Departmental and University Culture

### Tools Use

The number of tools used by respondents when designing their courses is significantly impacted by the departmental support score ( $F_{(1, 196)} = 11.31, p < 0.001$ ).

The higher that a respondent rated their department on this scale, the more total tools were used by that respondent when designing courses, and this accounts for 5% of the variance in this measure. There was no significant impact of the university support score on the number of tools used when designing courses ( $F_{(1, 210)} = 3.19, p = 0.08$ ) (Figure M.5).

This departmental values score did not have a significant impact on the degree of tool use ( $F_{(1, 192)} = 3.10, p = 0.08$ ). The university values score had a significant influence on the degree of tool use for course design, with higher scores leading to a higher degree of tools use ( $F_{(1, 206)} = 6.54, p = 0.01$ ), which accounted for 3% of the variance.

#### *Curriculum Document Use*

The number of curriculum documents used when designing courses was significantly impacted by the departmental support score, with higher scores leading to more curriculum docs being used ( $F_{(1, 196)} = 5.34, p = 0.02$ ), and this accounts for 3% of the variance. The university support score had no impact on the number of curriculum documents used for course design ( $F_{(1, 210)} = 0.60, p = 0.44$ ).

The departmental support score did not have a significant impact on the degree of curriculum document use ( $F_{(1, 192)} = 2.16, p = 0.14$ ). There was a significant impact of the university support score on the degree of curriculum document use ( $F_{(1, 206)} = 6.68, p = 0.01$ ), which accounted for 3% of the variance (Figure M.5).

#### *Frequency of Course Change*

The departmental support score had no significant impact on the likelihood of respondents changing their courses each time they were taught (LR  $X^2_{(1)} = 0.12$ ,  $p = 0.73$ ). The university support score had no significant impact on the likelihood of respondents changing their courses each time they were taught (LR  $X^2_{(1)} = 0.16$ ,  $p = 0.69$ ) (Figure M.5).

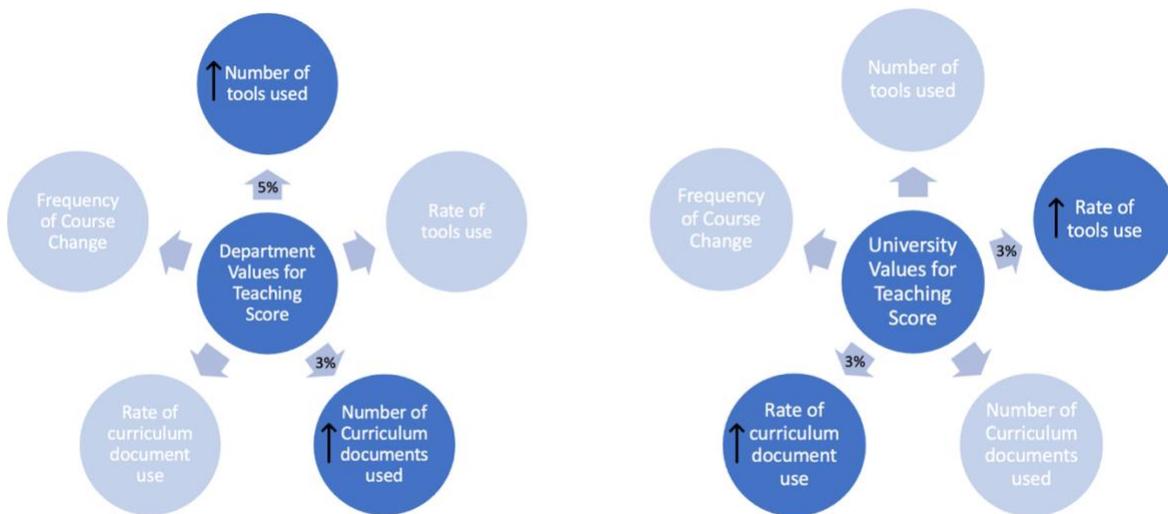


Figure M.5: Impacts of Department and University values on all five dependent variables. Any significant impacts on dependent variables are shown in full colour with the percentage variance explained listed on the arrow. Greyed out variables were non-significant.

## Workplace Cultural Contexts – Colleagues and Community Culture

### *Tools Use*

Respondents who stated that their colleagues value quality teaching used significantly more total tools when designing their courses, compared to those who stated their colleagues did not value teaching ( $F_{(1, 210)} = 4.07$ ,  $p = 0.04$ ), 1% of variance. The impact of being part of a community that values teaching (whether this community was made up of their immediate colleagues or not) was a much stronger influence on

number of tools used, however ( $F_{(1, 216)} = 13.28, p < 0.001$ ), and this accounted for 6% of variance in number of tools used (Figure M.6).

Having colleagues who value teaching did not significantly impact the degree of tools use when designing courses ( $F_{(1, 206)} = 3.40, p = 0.07$ ). However, the impact of being part of a community that values teaching on the degree of tools use was highly significant ( $F_{(1, 209)} = 15.81, p < 0.001$ ), and this accounted for 7% of the variance in degree of tools use in this group.

#### *Curriculum Document Use*

The presence of colleagues that value teaching did not significantly impact the number of curriculum documents used for course design ( $F_{(1, 210)} = 3.81, p = 0.05$ ). In contrast, being part of a community that values teaching had a highly significant impact on the number of curriculum documents used ( $F_{(1, 216)} = 10.29, p < 0.01$ ), which explains 5% of the variance (Figure M.6).

The degree of curriculum document use was significantly increased by both having colleagues that value teaching ( $F_{(1, 206)} = 6.32, p = 0.01$ ), which accounted for 3% of the variance; and particularly by being part of a community that values teaching ( $F_{(1, 209)} = 16.76, p < 0.001$ ), which explains 7% of the variance in degree of curriculum use.

#### *Frequency of Course Change*

Neither of these influences (colleague values (LR  $X^2_{(1)} = 0.00, p = 0.95$ ) or community membership (LR  $X^2_{(1)} = 2.20, p = 0.14$ )) impacted the likelihood of changing courses each time they were taught (Figure M.6).

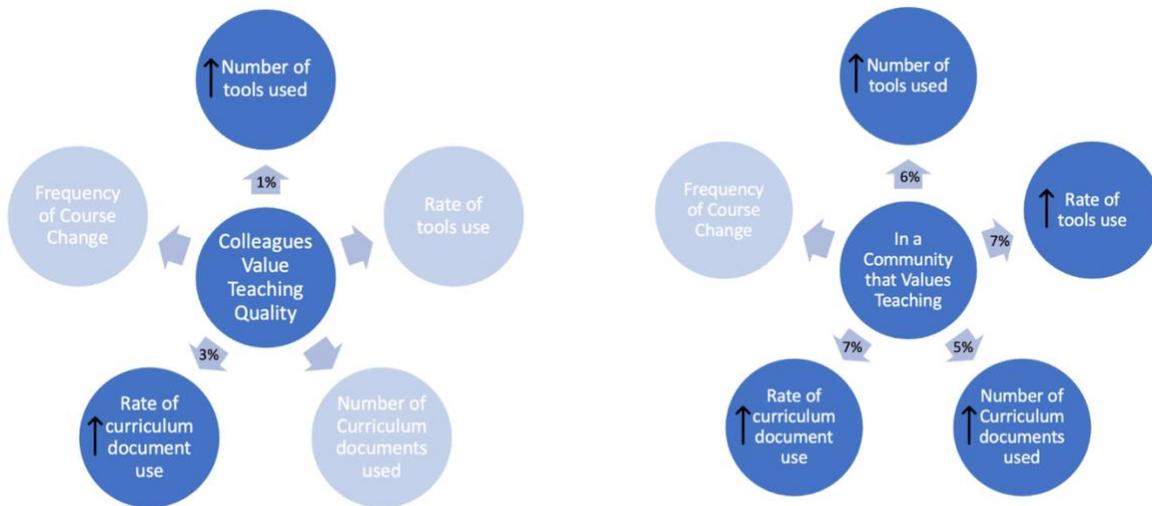


Figure M.6: Impacts of Colleagues and Community on all five dependent variables. Any significant impacts on dependent variables are shown in full colour with the percentage variance explained listed on the arrow. Greyed out variables were non-significant.

## Appendix N Stata Syntax for Chapter 3 survey recodes and analysis

```
//Recodes for my MSc Thesis instructor survey analyses
```

```
*** Bookmark #1 - General recoding & combining  
//Recode variables to remove unsure, combine categories
```

```
//gender (2 versions)  
tab gender  
recode gender (1=0)(2=1)(3=.) (4=.), gen (gender_bin)  
tab gender_bin  
label define gender2 0 "Man" 1 "Woman"  
label values gender_bin gender2  
tab gender_bin  
  
tab gender  
recode gender (1=1)(2=2)(3 4 = 3), gen (gender_incl)  
tab gender_incl  
label define gender3 1 "Man" 2 "Woman" 3 "Other ID / No Resp"  
label values gender_incl gender3  
tab gender_incl
```

```
//did they take the second survey?  
tab sec_survey  
recode sec_survey (1=1)(. 0 =0)  
tab sec_survey
```

```
*** Bookmark #2 - Independent Vars - Discipline
```

```
tab disc_binary  
recode disc_binary (1=1) (2=0)  
label define disc_lab 0 "BHASE" 1 "STEM"  
label values disc_binary disc_lab  
tab disc_binary
```

```
rename disc_binary disc_stem  
tab disc_stem
```

```
tab disc_group  
label define disc_group_lab 1 "Natural Sciences" 2 "Formal Sciences" 3 "Humanities" 4 "Social Sciences" 5 "Professions" 6 "Other"  
label values disc_group disc_group_lab  
tab disc_group
```

```
tab disc_group  
recode disc_group (1 2 = 1)(3=2)(4=3)(5=4)(6=5), gen (disc_group5)  
label define disc_group_lab5 1 "Natural & Formal Sciences" 2 "Humanities" 3 "Social Sciences" 4 "Professions" 5 "Other"  
label values disc_group5 disc_group_lab5  
tab disc_group5
```

```
*** Bookmark #3 - Indep Vars - Institution & Dept & Uni Culture
```

```
//uni_type3  
tab uni_type  
recode uni_type (1=1)(2=2)(3=3)(4=.), gen (uni_type3)  
tab uni_type3  
label define uni 1 "Primarily Undergraduate " 2 "Comprehensive" 3 "Medical-Doctoral "  
label values uni_type3 uni  
tab uni_type3
```

```

//dept value for teaching
tab dept_says_val_teach

gen dept_says_val_bi = .
replace dept_says_val_bi = 0 if dept_says_val_teach == 1 | dept_says_val_teach == 2 | dept_says_val_teach == 3
replace dept_says_val_bi = 1 if dept_says_val_teach == 4 | dept_says_val_teach == 5
tab dept_says_val_bi
label define dept_say 0 "Department does not value teaching" 1 "Department says it values teaching"
label values dept_says_val_bi dept_say
tab dept_says_val_bi

tab dept_valu_backup
gen dept_backup_bi = .
replace dept_backup_bi = 0 if dept_valu_backup == 1 | dept_valu_backup == 2 | dept_valu_backup == 3
replace dept_backup_bi = 1 if dept_valu_backup == 4 | dept_valu_backup == 5
tab dept_backup_bi
label define dept_val_back 0 "Not backed up with action" 1 "Dept Value Backed up with Action"
label values dept_backup_bi dept_val_back
tab dept_backup_bi

tab dept_recog_teach
gen dept_recog_bi = .
replace dept_recog_bi = 0 if dept_recog_teach == 1 | dept_recog_teach == 2 | dept_recog_teach == 3
replace dept_recog_bi = 1 if dept_recog_teach == 4 | dept_recog_teach == 5
tab dept_recog_bi
label define dept_rec 0 "Does not recognize teaching" 1 "Dept recognizes/compensates quality teaching"
label values dept_recog_bi dept_rec
tab dept_recog_bi

//scale of all 3 dept vars
gen dept_val_score = dept_says_val_teach + dept_valu_backup + dept_recog_teach
alpha dept_says_val_teach dept_valu_backup dept_recog_teach
tab dept_val_score /** this one

//university value for teaching
tab uni_says_val_teach

tab uni_valu_backup

tab uni_recog_teach

//scale of all 3 uni vars
gen uni_val_score = uni_says_val_teach + uni_valu_backup + uni_recog_teach
alpha uni_says_val_teach uni_valu_backup uni_recog_teach
tab uni_val_score /** this one

//colleagues value teaching
tab colleagues_val_teach // 5 level likert but first category too small

//3 level version
gen colleagues_val3 = .
replace colleagues_val3 = 1 if colleagues_val_teach == 1 | colleagues_val_teach == 2
replace colleagues_val3 = 2 if colleagues_val_teach == 3
replace colleagues_val3 = 3 if colleagues_val_teach == 4 | colleagues_val_teach == 5
tab colleagues_val3

//binary version
gen colleagues_val = .
replace colleagues_val = 0 if colleagues_val_teach == 1 | colleagues_val_teach == 2 | colleagues_val_teach == 3
replace colleagues_val = 1 if colleagues_val_teach == 4 | colleagues_val_teach == 5
tab colleagues_val

```

```
//community that values teaching
//(binary variable)
recode teach_behav_2 (1=1)(.=0), gen (comm_val_teach)
tab comm_val_teach
label values comm_val_teach n_y
tab comm_val_teach
```

\*\*\* Bookmark #4 - Indep Vars - Rapid Change

```
//Make versions of self ID rapid_change variable
tab rapid_change
//recode to add the "not sure" to the "About the same" category
recode rapid_change (1=1)(2 5 = 2)(3=3)
label define rapid 1 "More rapid change" 2 "About the same/unsure" 3 "Less rapid change"
label values rapid_change rapid
tab rapid_change
//make one where the values are increasing with more change
recode rapid_change (1=3)(2=2)(3=1), gen(rapid_chg_inc)
label define rapid_i 1 "Less rapid change" 2 "About the same/unsure" 3 "More rapid change"
label values rapid_chg_inc rapid_i
tab rapid_chg_inc
// make binary version
tab rapid_change
recode rapid_change (1=1)(2 3 = 0), gen(most_rapid)
label define mostrapid 0 "Similar or less rapid than others" 1 "More rapid than others"
label values most_rapid mostrapid
tab most_rapid //*****
```

\*\*\* Bookmark #5 - Indep vars - Professional vs not

```
////Professional Program - bucket categories in different ways
tab professional_1
tab professional_2
tab professional_3
tab professional_4
//recode so each one is binary, with "no" as the zero
recode professional_1 (1=1)(.=0)
tab professional_1
recode professional_2 (1=1)(.=0)
tab professional_2
recode professional_3 (1=1)(.=0)
tab professional_3
recode professional_4 (1=1)(.=0) //this case: 1="I don't teach in professional program" is selected
tab professional_4
```

```
//combine into 1 variable where increasing number indicates more professional content
//if multiple levels were clicked, highest one is retained
gen profess_comb = 0 //
replace profess_comb = 1 if professional_3 //only pre-professional
replace profess_comb = 2 if professional_2 //some courses in prof program
replace profess_comb = 3 if professional_1 //most or all in prof program
tab profess_comb
label define prof_comb1 0 "No professional connection" 1 "Pre-Professional" 2 "Some courses in professional program" 3 "Most or
all courses in professional Program"
label values profess_comb prof_comb1
tab profess_comb
```

```
//create variable for primarily professional vs primarily non professional (also binary)
recode profess_comb(0 = 0) (1 2 3 = 1), gen (profess_any)
label define prof_any 0 "No professional connection" 1 "Any professional connection"
label values profess_any prof_any
tab profess_any //*****
```

```
recode profess_comb (0 1 2 = 0) (3 = 1), gen (primary_profess)
label define prof_pri 0 "Mostly Non-Professional" 1 "Primarily Professional"
```

```
label values primary_profess prof_pri
tab primary_profess //*****
```

```
*** Bookmark #6 - Dependent Vars - Developing (a) Tool Use
```

```
//Detailed version (from survey part 2)
```

```
//detail version
```

```
tab design_tools_detail_01 //course outlines, that course, others in program
tab design_tools_detail_02 //course outlines similar courses - online
tab design_tools_detail_03 //desc from course calendar
tab design_tools_detail_04 //LOs from course
tab design_tools_detail_05 //textbook for course
tab design_tools_detail_06 //non-textbook readings for course
tab design_tools_detail_07 //latest research in the field
tab design_tools_detail_08 // curriculum mapping or program level curriculum docs
tab design_tools_detail_09 // university wide learning outcomes
tab design_tools_detail_10 // requirements for registered profession
tab design_tools_detail_11 // create mind maps, spreadsheets or other planning tools
tab design_tools_detail_12 // other 1
tab design_tools_detail_13 // other 2
```

```
//rename the "other" text entry questions first
```

```
rename design_tools_detail_12_TEXT design_tools_detailTEXT12
rename design_tools_detail_13_TEXT design_tools_detailTEXT13
```

```
//create a tools q filter - did they answer the second survey? If so, did they answer ANY of the design tools questions?
```

```
gen tools_filter = .
replace tools_filter = 0 if sec_survey == 1
replace tools_filter = 1 if design_tools_detail_01 !=. | design_tools_detail_02 !=. | design_tools_detail_03 !=. | design_tools_detail_04
!=. | design_tools_detail_05 !=. | design_tools_detail_06 !=. | design_tools_detail_07 !=. | design_tools_detail_08 !=. |
design_tools_detail_09 !=. | design_tools_detail_10 !=. | design_tools_detail_11 !=. | design_tools_detail_12 !=. |
design_tools_detail_13 !=.
tab tools_filter
```

```
//Tools etc renaming (detail)
```

```
gen outline_prog = design_tools_detail_01 //course outlines, that course, others in program
//if they skipped this question (or selected N/A) but answered other q in this block, change . to 0 so it's not dropped from later scales.
replace outline_prog = 0 if design_tools_detail_01 == . & tools_filter == 1
label define never_always 0 "Never or Not Available" 1 "Sometimes" 2 "Most of the time" 3 "Always"
label values outline_prog never_always
tab outline_prog
gen outline_online = design_tools_detail_02 //course outlines similar courses - online
replace outline_online = 0 if design_tools_detail_02 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values outline_online never_always
tab outline_online
gen course_desc = design_tools_detail_03 //desc from course calendar
replace course_desc = 0 if design_tools_detail_03 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values course_desc never_always
tab course_desc
gen course_LOs = design_tools_detail_04 //LOs from course
replace course_LOs = 0 if design_tools_detail_04 == . & tools_filter == 1 //add back in those who skipped/NA this Q
// Note that 25 people skipped/NA this Q - might not have access to Course LOs
label values course_LOs never_always
tab course_LOs
gen textbook = design_tools_detail_05 //textbook for course
replace textbook = 0 if design_tools_detail_05 == . & tools_filter == 1 //add back in those who skipped/NA this Q
//20 skipped this Q, might not have a textbook
label values textbook never_always
tab textbook
gen readings = design_tools_detail_06 //non-textbook readings for course
replace readings = 0 if design_tools_detail_06 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values readings never_always
tab readings
gen new_research = design_tools_detail_07 //latest research in the field
replace new_research = 0 if design_tools_detail_07 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values new_research never_always
```

```

tab new_research
gen curr_map_prog = design_tools_detail_08 // curriculum mapping or program level curriculum docs
replace curr_map_prog = 0 if design_tools_detail_08 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values curr_map_prog never_always
tab curr_map_prog
gen uni_LOs = design_tools_detail_09 // university wide learning outcomes
replace uni_LOs = 0 if design_tools_detail_09 == . & tools_filter == 1 //add back in those who skipped/NA this Q
//22 ppl skipped/NA
label values uni_LOs never_always
tab uni_LOs
gen prof_req = design_tools_detail_10 // requirements for registered profession
replace prof_req = 0 if design_tools_detail_10 == . & tools_filter == 1 //add back in those who skipped/NA this Q
//109 skipped/NA
label values prof_req never_always
tab prof_req
gen mind_map_etc = design_tools_detail_11 // create mind maps, spreadsheets or other planning tools
replace mind_map_etc = 0 if design_tools_detail_11 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values mind_map_etc never_always
tab mind_map_etc
gen other_tool_1 = design_tools_detail_12 // other 1
replace other_tool_1 = 0 if design_tools_detail_12 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values other_tool_1 never_always
tab other_tool_1
gen other_tool_2 = design_tools_detail_13 // other 2
replace other_tool_2 = 0 if design_tools_detail_13 == . & tools_filter == 1 //add back in those who skipped/NA this Q
label values other_tool_2 never_always
tab other_tool_2

//Scale for ALL tool use (detail)
gen all_tools_use = outline_prog + outline_online + course_desc + course_LOs + textbook + readings + new_research +
curr_map_prog + uni_LOs + prof_req + mind_map_etc
tab all_tools_use

//scale for all tool use without professional requirements
gen all_tools_use_nonprof = outline_prog + outline_online + course_desc + course_LOs + textbook + readings + new_research +
curr_map_prog + uni_LOs + mind_map_etc
tab all_tools_use_nonprof

//proportion versions of these tools use scales
//total of all tools (33) includingg professional req
gen tools_use_prop_all = all_tools_use/33
tab tools_use_prop_all

//total of all tools except professional requirements
gen tools_use_prop_nonprof = all_tools_use_nonprof/30
tab tools_use_prop_nonprof

//scale for detailed tools use - applying the right proportional scale depending on if they're professional or not
gen tools_use_all = .
replace tools_use_all = tools_use_prop_all if profess_any == 1
replace tools_use_all = tools_use_prop_nonprof if profess_any == 0
tab tools_use_all

//create a version with whole numbers to combine with input and consideration totals
gen tools_use_all_scaled = tools_use_all*33
tab tools_use_all_scaled
recode tools_use_all_scaled
(5.5=6)(6.6/7=7)(8=8)(8.8=9)(9.900001/10=10)(11=11)(12/12.1=12)(13/13.2=13)(14/14.3=14)(15/15.4=15)(16=16)(16.5/17=17)(17.6
/18=18)(18.7/19=19)(19.8/20=20)(20.9/21=21)(22=22)(23/23.1=23)(24/24.2=24)(25/25.3=25)(26/26.4=26)(27=27)(27.5=28)(28.6=2
9)(30=30)(31=31)(33=33)
tab tools_use_all_scaled

gen tools_use_amt = tools_use_all_scaled
tab tools_use_amt //use this one ***

```

```

//summary version from first part of the survey
//row counts of tools & resources

//tools for designing courses

//rename the "other" text entry question first
rename design_tools_sum_6_TEXT design_tools_sumTEXT

recode design_tools_sum_1 (1=1)(.=0)
tab design_tools_sum_1 //course outlines - prev courses
recode design_tools_sum_2 (1=1)(.=0)
tab design_tools_sum_2 //textbooks or course readings
recode design_tools_sum_3 (1=1)(.=0)
tab design_tools_sum_3 //course description
recode design_tools_sum_4 (1=1)(.=0)
tab design_tools_sum_4 //program curr docs
recode design_tools_sum_5 (1=1)(.=0)
tab design_tools_sum_5 //professional requirements **
recode design_tools_sum_6 (1=1)(.=0)
tab design_tools_sum_6 //other tools

//create count of these tools used
egen totsum_des_tools = rowtotal(design_tools_sum_*)
tab totsum_des_tools

//create proportion version out of total possible score (6)
gen totsum_tools_prop = totsum_des_tools/6
tab totsum_tools_prop

tab totsum_tools_prop if profess_any == 1 //only folks with professional connections

//version of tools list without the professional requirements option
egen totsum_nonprof_des_tools = rowtotal(design_tools_sum_1 design_tools_sum_2 design_tools_sum_3 design_tools_sum_4
design_tools_sum_6)
tab totsum_nonprof_des_tools

//create proportion version out of total possible score (5)
gen totsum_tools_prop_nonprof = totsum_nonprof_des_tools/5
tab totsum_tools_prop_nonprof

tab totsum_tools_prop_nonprof if profess_any == 0 //only folks without professional connections

//Scale 3 - create one combined total usign the proportions,
//and applying the correct scale based on whether they teach in a professional program or not
gen totsum_tools_use_all = .
replace totsum_tools_use_all = totsum_tools_prop if profess_comb > 0
replace totsum_tools_use_all = totsum_tools_prop_nonprof if profess_comb == 0
tab totsum_tools_use_all

//create a version with whole numbers to combine with input and consideration totals
gen totsum_scaled_tools_all = totsum_tools_use_all*6
tab totsum_scaled_tools_all
recode totsum_scaled_tools_all (0=0)(1/1.2=1)(2/2.4=2)(3=3)(3.6/4=4)(4.8/5=5)(6=6)
tab totsum_scaled_tools_all

gen num_tools_used = totsum_scaled_tools_all
tab num_tools_used //use this one ****

*** Bookmark #7 - Developing (b) - Curr Doc Use
//NOTE - must run all of bookmark 2 before this section will work

//summary version - from first survey

```

```

//scale(s) of formal curriculum tools
//summary version - includes professional standards
tab design_tools_sum_3
tab design_tools_sum_4
tab design_tools_sum_5

egen totsum_curr_des_tools = rowtotal(design_tools_sum_3 design_tools_sum_4 design_tools_sum_5)
tab totsum_curr_des_tools

//create proportion version out of total possible score (3)
gen totsum_curr_tools_prop = totsum_curr_des_tools/3
tab totsum_curr_tools_prop

tab totsum_curr_tools_prop if profess_any == 1 //only folks with professional connections

//summary, not including professional standards
egen totsum_curr_des_tools_nonprof = rowtotal(design_tools_sum_3 design_tools_sum_4)
tab totsum_curr_des_tools_nonprof

//make it a proportion of total possible score (2)
gen totsum_curr_tools_nonprof_prop = totsum_curr_des_tools_nonprof/2
tab totsum_curr_tools_nonprof_prop

tab totsum_curr_tools_nonprof_prop if profess_any == 0

//Scale 3 - create one combined scale using the proportions,
//and applying the correct scale based on whether they teach in a professional program or not
gen totsum_curr_use_all = .
replace totsum_curr_use_all = totsum_curr_tools_prop if profess_any == 1
replace totsum_curr_use_all = totsum_curr_tools_nonprof_prop if profess_any == 0
tab totsum_curr_use_all

//scaled version
gen totsum_curr_all_scaled = totsum_curr_use_all*3
tab totsum_curr_all_scaled
recode totsum_curr_all_scaled (0=0)(1=1)(1.5/2=2)(3=3)
tab totsum_curr_all_scaled

gen num_curr_used = totsum_curr_all_scaled
tab num_curr_used //Use this one *****

//detailed version - from second part of the survey
//formal curriculum tools
tab course_LOs //LOs from course
tab curr_map_prog // curriculum mapping or program level curriculum docs
tab uni_LOs // university wide learning outcomes
tab design_tools_detail_10 // requirements for registered profession

//scale 1 - including professional option (only includes people who answered all 4)
//creating new scale variable, checking it's Cronbach's alpha score
gen curr_doc_use = (course_LOs + curr_map_prog + uni_LOs + prof_req)
alpha course_LOs curr_map_prog uni_LOs prof_req
tab curr_doc_use

tab curr_doc_use if profess_any == 1 //use this one,
//it only removes 2 ppl who say they sometimes use professional req even when not in professional programs

//make it a proportion of total possible score (12)
gen curr_use_prop = curr_doc_use/12
tab curr_use_prop

```

```

tab curr_use_prop if profess_any == 1

//scale 2 - not including professional option (only includes people who answered all 4)
//creating new scale variable, checking it's Cronbach's alpha score
gen curr_doc_use_nonprof = course_LOs + curr_map_prog + uni_LOs
alpha course_LOs curr_map_prog uni_LOs
sum curr_doc_use_nonprof
tab curr_doc_use_nonprof

//make it a proportion of total possible score (9)
gen curr_use_nonprof_prop = curr_doc_use_nonprof/9
tab curr_use_nonprof_prop

//Scale 3 - create one combined scale using the proportions,
//and applying the correct scale based on whether they teach in a professional program or not
gen curr_use_all = .
replace curr_use_all = curr_use_prop if profess_any == 1
replace curr_use_all = curr_use_nonprof_prop if profess_any == 0
tab curr_use_all

//scaled version

gen curr_use_all_scaled = curr_use_all*12
tab curr_use_all_scaled
recode curr_use_all_scaled
(0=0)(1/1.3333334=1)(2=2)(2.6666666/3=3)(4=4)(5/5.3333333=5)(6=6)(6.6666667=7)(8=8)(9/9.3333334=9)(10=10)(10.6666667=11)
1)(12=12)
tab curr_use_all_scaled

//rename variable
gen curr_use_amt = curr_use_all_scaled
tab curr_use_amt //use this one ****

//Professional requirements use

//binary y/n option - from first survey
tab design_tools_sum_5
gen use_prof_req = design_tools_sum_5
label values use_prof_req n_y
tab use_prof_req

//frequency option - from second survey
tab prof_req
gen freq_prof_req = prof_req
label values freq_prof_req never_always
tab freq_prof_req

*** Bookmark #8 - Dependent Vars - Updating Courses

//frequency of course changes overall
//recode so each one is binary, with "no" as the zero
recode freq_changes_1 (1=1)(.=0)
tab freq_changes_1 //never or very rarely
recode freq_changes_2 (1=1)(.=0)
tab freq_changes_2 //occasionally
recode freq_changes_3 (1=1)(.=0)
tab freq_changes_3 //regularly but not every time
recode freq_changes_4 (1=1)(.=0)
tab freq_changes_4 //first few times
recode freq_changes_5 (1=1)(.=0)
tab freq_changes_5 //every time I teach it
recode freq_changes_8 (1=1)(.=0)
tab freq_changes_8 //some courses changed more than others

```

```

recode freq_changes_9 (1=1)(.=0)
tab freq_changes_9 //never taught a course more than once
recode freq_changes_10 (1=1)(.=0)
tab freq_changes_10 //other

//make new variable that combines all, takes the higher freq option if more than one
gen freq_change_inc = 0 // NA, Other only, hasn't taught a class more than once
replace freq_change_inc = 1 if freq_changes_1 //never or very rarely
replace freq_change_inc = 2 if freq_changes_2 //occasionally
replace freq_change_inc = 3 if freq_changes_3 | freq_changes_4 //regularly, or the first few times
replace freq_change_inc = 4 if freq_changes_5 //every time
tab freq_change_inc
recode freq_change_inc (0=.) (1=1)(2=2)(3=3)(4=4)
label define freq 1 "Never or very rarely" 2 "Occasionally" 3 "Regularly or first few times" 4 "Every time I teach it"
label values freq_change_inc freq
tab freq_change_inc

//make a binary variable and use logit
gen change_every = freq_change_inc
recode change_every (0/3=0)(4=1)
label define change_freq 0 "Not every time" 1 "Every time I teach it"
label values change_every change_freq
tab change_every

// for descriptive variables

//Taught undergrad courses
recode course_types_ug_1 (1=1)(.=0)
tab course_types_ug_1 //first year ug
recode course_types_ug_2 (1=1)(.=0)
tab course_types_ug_2 //second year ug
recode course_types_ug_3 (1=1)(.=0)
tab course_types_ug_3 //third year ug
recode course_types_ug_4 (1=1)(.=0)
tab course_types_ug_4 //fourth year ug

recode course_types_ug_6 (1=1)(.=0)
tab course_types_ug_6 //core/required ug
recode course_types_ug_7 (1=1)(.=0)
tab course_types_ug_7 //restricted electives ug
recode course_types_ug_8 (1=1)(.=0)
tab course_types_ug_8 //electives ug
recode course_types_ug_9 (1=1)(.=0)
tab course_types_ug_9 //applied/indep study/capstone ug
recode course_types_ug_10 (1=1)(.=0)
tab course_types_ug_10 //honours thesis ug
recode course_types_ug_11 (1=1)(.=0)
tab course_types_ug_11 //practicum ug
recode course_types_ug_14 (1=1)(.=0)
tab course_types_ug_14 //other ug

gen course_types_ug_16 = 0 //new category for labs, field schools (note: write-in only)

gen course_types_ug_17 = 0 //new category for non-degree courses/programs (note: write-in only)

rename course_types_ug_14_TEXT course_types_ugTEXT //rename "other" text entry so doesn't cause error
tab course_types_ugTEXT

recode course_types_ug_15 (1=1)(.=0)
tab course_types_ug_15 //none ug
rename course_types_ug_15 course_types_ugNONE //rename so not counted with the others
tab course_types_ugNONE

//changing specific values to recategorize "other" into existing or new groups

```

//respondent 107  
replace course\_types\_ug\_9 = 1 in 107 //capstone - group with indep study  
replace course\_types\_ug\_14 = 0 in 107 //no longer code this as an other

//respondent 141  
replace course\_types\_ug\_9 = 1 in 141 //capstone - group with indep study  
replace course\_types\_ug\_14 = 0 in 141 //no longer code this as an other

//respondent 148  
replace course\_types\_ug\_14 = 0 in 148 //masters & phd supervision - no longer code this as an other

////respondent 153  
replace course\_types\_ug\_16 = 1 in 153 //lab course - to new category  
replace course\_types\_ug\_14 = 0 in 153 //no longer code this as an other

//respondent 157  
replace course\_types\_ug\_16 = 1 in 157 //lab course - to new category  
replace course\_types\_ug\_14 = 0 in 157 //no longer code this as an other

//respondent 179  
replace course\_types\_ug\_16 = 1 in 179 //field course - to new category  
replace course\_types\_ug\_14 = 0 in 179 //no longer code this as an other

//respondent 196  
replace course\_types\_ug\_14 = 0 in 196 //seminar - no longer code this as an other

//respondent 205  
replace course\_types\_ug\_17 = 1 in 205 //catch up courses - to new category for non-degree courses  
replace course\_types\_ug\_14 = 0 in 205 //no longer code this as an other

//respondent 235  
replace course\_types\_ug\_17 = 1 in 235 //continuing ed - to new category for non-degree courses  
replace course\_types\_ug\_14 = 0 in 235 //no longer code this as an other

//respondent 246  
replace course\_types\_ug\_9 = 1 in 246 //research coaching (FR) - group with indep study  
replace course\_types\_ug\_14 = 0 in 246 //no longer code this as an other

//respondent 264  
replace course\_types\_ug\_14 = 0 in 264 //grad tech training - no longer code this as an other

//respondent 298  
replace course\_types\_ug\_16 = 1 in 298 //field course - to new category  
replace course\_types\_ug\_14 = 0 in 298 //no longer code this as an other

//respondent 303  
replace course\_types\_ug\_11 = 1 in 303 //internship - group with practicum  
replace course\_types\_ug\_14 = 0 in 303 //no longer code this as an other

//respondent 339  
replace course\_types\_ug\_14 = 0 in 339 //dissertation & MBA - no longer code this as an other

//respondent 393  
replace course\_types\_ug\_17 = 1 in 393 //certification - to new category for non-degree courses  
replace course\_types\_ug\_14 = 0 in 393 //no longer code this as an other

//respondent 422  
replace course\_types\_ug\_9 = 1 in 422 //capstone - group with indep study  
replace course\_types\_ug\_14 = 0 in 422 //no longer code this as an other

//respondent 425  
replace course\_types\_ug\_16 = 1 in 425 //lab course - to new category  
replace course\_types\_ug\_14 = 0 in 425 //no longer code this as an other

//respondent 441  
replace course\_types\_ug\_7 = 1 in 441 //special topics - group with restricted electives  
replace course\_types\_ug\_14 = 0 in 441 //no longer code this as an other

```

//respondent 442
replace course_types_ug_17 = 1 in 442 //associate diploma - to new category for non-degree courses
replace course_types_ug_14 = 0 in 442 //no longer code this as an other

//respondent 448
replace course_types_ug_17 = 1 in 448 //open learning - to new category for non-degree courses
replace course_types_ug_14 = 0 in 448 //no longer code this as an other

//respondent 455
replace course_types_ug_14 = 0 in 455 //grad supervision - no longer code this as an other

//respondent 466
replace course_types_ug_14 = 0 in 466 //indep study (already checked that one) - no longer code this as an other

//Note: there should be no entries in "other" for this question anymore

//make a binary variable for if they taught any undergrad courses
egen taught_ug = rowtotal(course_types_ug_*)
tab taught_ug
replace taught_ug = 1 if taught_ug>0
tab taught_ug

//Taught Grad Courses
recode course_types_gr_1 (1=1)(.=0)
tab course_types_gr_1 //core/required grad
recode course_types_gr_2 (1=1)(.=0)
tab course_types_gr_2 //elective grad
recode course_types_gr_3 (1=1)(.=0)
tab course_types_gr_3 //directed readings/indep study grad/major project
recode course_types_gr_4 (1=1)(.=0)
tab course_types_gr_4 //supervising grad students
recode course_types_gr_5 (1=1)(.=0)
tab course_types_gr_5 //practicum grad
recode course_types_gr_6 (1=1)(.=0)
tab course_types_gr_6 // other grad

rename course_types_gr_6_TEXT course_types_grTEXT //rename "other" text entry so doesn't cause error
tab course_types_grTEXT

//changing specific values to recategorize "other" into existing or new groups
//respondent 149
replace course_types_gr_3 = 1 in 149 //indep study course
replace course_types_gr_6 = 0 in 149 //no longer code this as an other

//respondent 264
replace course_types_gr_6 = 0 in 264 //tech training for jr lab members - remove from other

//respondent 265
replace course_types_gr_6 = 0 in 265 //committee for grad students - remove from other

//respondent 347
replace course_types_gr_1 = 1 in 347 //core/required grad course
replace course_types_gr_6 = 0 in 347 //no longer code this as an other

//respondent 439
replace course_types_gr_3 = 1 in 439 //indep study course
replace course_types_gr_6 = 0 in 439 //no longer code this as an other

//respondent 459
replace course_types_gr_6 = 0 in 459 //1/3 of a grad course only - remove from other

//Note: Other category currently contains: responses about intensive summer school, international study tours, grad level certificate
and teaching grd level in the US

```

```

//make a binary variable for if they taught grad courses (exclude grad student supervision or committees)
gen taught_grad = 0 // NA - can drop this group probably?
replace taught_grad = 1 if course_types_gr_1 | course_types_gr_2 | course_types_gr_3 | course_types_gr_5 | course_types_gr_6
tab taught_grad

//type of position

//current position variables
//positions
recode current_employ_1 (1=1)(.=0), gen(grad_stu) //grad student
tab grad_stu
label define n_y 0"No" 1 "Yes"
label values grad_stu n_y
tab grad_stu

recode current_employ_2 (1=1)(.=0), gen(post_doc) //post-doc
tab post_doc
label values post_doc n_y
tab post_doc

recode current_employ_3 (1=1)(.=0), gen(sessional) //sessional
tab sessional
label values sessional n_y
tab sessional

recode current_employ_4 (1=1)(.=0), gen(cont_term) //contract/term
tab cont_term
label values cont_term n_y
tab cont_term

recode current_employ_5 (1=1)(.=0), gen(sec_indus) //secondments & other industry arrangements
tab sec_indus
label values sec_indus n_y
tab sec_indus

recode current_employ_6 (1=1)(.=0), gen(teach_staff_lect) //non-faculty teaching staff (put other lecturers here)
tab teach_staff_lect
label values teach_staff_lect n_y
tab teach_staff_lect

recode current_employ_7 (1=1)(.=0), gen(assis_prof) //assistant prof
tab assis_prof
label values assis_prof n_y
tab assis_prof

recode current_employ_8 (1=1)(.=0), gen(assoc_prof) //associate prof
tab assoc_prof
label values assoc_prof n_y
tab assoc_prof

recode current_employ_9 (1=1)(.=0), gen(full_prof) //full prof
tab full_prof
label values full_prof n_y
tab full_prof

recode current_employ_10 (1=1)(.=0), gen(prof_emer) //professor emeritus
tab prof_emer
label values prof_emer n_y
tab prof_emer

//?? Do I need an ED category? how much overlap?
// order of contract/secondment/non-faculty instructors

//other categories

```

```

recode current_employ_11 (1=1)(.=0), gen(pre_tenure) //pre-tenure but tenure track
tab pre_tenure
label values pre_tenure n_y
tab pre_tenure

recode current_employ_12 (1=1)(.=0), gen(tenured) //tenured
tab tenured
label values tenured n_y
tab tenured

recode current_employ_13 (1=1)(.=0), gen(other_pos) //other
tab other_pos
label values other_pos n_y
tab other_pos

gen current_employ_15 = 0 //New category for Ed Developers (Write-in only)

gen current_employ_16 = 0 //New category for Teaching Stream (Write-in only)

gen current_employ_17 = 0 //New category for Administration (Write-in only)

//changing specific values to recategorize
replace sec_indus = 1 in 116 //federal gov't employee
replace other_pos = 0 in 116 //no longer code this as an other

replace sec_indus = 1 in 136 //federal gov't employee
replace other_pos = 0 in 136 //no longer code this as an other

replace sec_indus = 1 in 225 //industry arrangement
replace other_pos = 0 in 225 //no longer code this as an other

//recategorizing lecturers and instructors

replace teach_staff_lec = 1 in 97
replace other_pos = 0 in 97 //no longer code this as an other

replace teach_staff_lec = 1 in 146
replace other_pos = 0 in 146 //no longer code this as an other

replace teach_staff_lec = 1 in 147
replace other_pos = 0 in 147 //no longer code this as an other

replace teach_staff_lec = 1 in 156
replace other_pos = 0 in 156 //no longer code this as an other

replace teach_staff_lec = 1 in 167
replace other_pos = 0 in 167 //no longer code this as an other

replace teach_staff_lec = 1 in 189
replace other_pos = 0 in 189 //no longer code this as an other

replace teach_staff_lec = 1 in 203
replace other_pos = 0 in 203 //no longer code this as an other

replace teach_staff_lec = 1 in 205
replace other_pos = 0 in 205 //no longer code this as an other

replace teach_staff_lec = 1 in 242
replace other_pos = 0 in 242 //no longer code this as an other

replace teach_staff_lec = 1 in 276
replace other_pos = 0 in 276 //no longer code this as an other

replace teach_staff_lec = 1 in 279
replace other_pos = 0 in 279 //no longer code this as an other

```

```
replace teach_staff_lec = 1 in 281
replace other_pos = 0 in 281 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 311
replace other_pos = 0 in 311 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 319
replace other_pos = 0 in 319 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 375
replace other_pos = 0 in 375 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 425
replace other_pos = 0 in 425 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 429
replace other_pos = 0 in 429 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 456
replace other_pos = 0 in 456 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 469
replace other_pos = 0 in 469 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 471
replace other_pos = 0 in 471 //no longer code this as an other
```

```
replace teach_staff_lec = 1 in 515
replace other_pos = 0 in 515 //no longer code this as an other
```

```
//create more or less "increasing" categorical variable,
//put people in the "higher" category if they chose multiple
gen current_pos = 0 // NA - can drop this group probably?
replace current_pos = 8 if other_pos //Other only - put this first so it doesn't overwrite
replace current_pos = 1 if grad_stu | post_doc //grad student or postdoc "only"
replace current_pos = 2 if sessional //sessional
replace current_pos = 3 if cont_term | sec_indus //contract/term/secondment
replace current_pos = 4 if teach_staff_lec //non-faculty teaching staff/lecturer/instructor
replace current_pos = 5 if assis_prof //assistant prof
replace current_pos = 6 if assoc_prof //associate prof
replace current_pos = 7 if full_prof | prof_emer //full prof or emeritus
tab current_pos
```

```
recode current_pos (0=.) (1=1) (2=2) (3=3) (4=4) (5=5) (6=6) (7=7) (8=8)
label define position 1 "Grad student/Postdoc" 2 "Sessional Instructor" 3 "Contract/Term/Secondment" 4 "Non-Faculty Teach Staff/Lecturer" 5 "Assitant Professor" 6 "Associate Professor" 7 "Full or Emeritus Prof" 8 "Other"
label values current_pos position
tab current_pos
```

```
//3 tenure category groups (including non-tenure track)
gen tenure_cat = 0 // NA - can drop this group probably?
replace tenure_cat = 6 if other_pos //Other only - put this first so it doesn't overwrite
replace tenure_cat = 1 if grad_stu | post_doc | sessional | cont_term | sec_indus | teach_staff_lec //non-tenure-track roles
replace tenure_cat = 2 if assis_prof | pre_tenure //tenure track roles but not tenured
replace tenure_cat = 3 if assoc_prof | full_prof | prof_emer | tenured //tenured or in typically-tenured roles
tab tenure_cat
recode tenure_cat (0=.) (1=1) (2=2) (3=3) (6=6)
tab tenure_cat
```

```
//3 tenure or permanent category groups (including non-tenure track) - non-faculty teaching staff with assistant profs
gen tenure_perm_cat = 0 // NA - can drop this group probably?
replace tenure_perm_cat = 6 if other_pos //Other only - put this first so it doesn't overwrite
replace tenure_perm_cat = 1 if grad_stu | post_doc | sessional | cont_term | sec_indus //non-tenure-track roles
```

```

replace tenure_perm_cat = 2 if teach_staff_lec | assis_prof | pre_tenure //tenure track roles or permanent/continuing roles but not
tenured
replace tenure_perm_cat = 3 if assoc_prof | full_prof | prof_emer | tenured //tenured or in typically-tenured roles
tab tenure_perm_cat
recode tenure_perm_cat (0=.) (1=1)(2=2)(3=3)(6=6)
tab tenure_perm_cat

//Tenured vs not tenured (including non-tenure track)
gen tenure_or_not = 0 // NA - can drop this group probably?
replace tenure_or_not = 6 if other_pos //Other only - put this first so it doesn't overwrite
replace tenure_or_not = 1 if grad_stu | post_doc | sessional | cont_term | sec_indus | teach_staff_lec | assis_prof | pre_tenure //not
tenured, or non-tenure-track roles
replace tenure_or_not = 2 if assoc_prof | full_prof | prof_emer | tenured //tenured or in typically-tenured roles
tab tenure_or_not
recode tenure_or_not (0 6=.) (1=1)(2=2)
tab tenure_or_not

// The analyses that will be used in my MSc thesis survey analysis

*** Bookmark #1 - Institution Type

//Hyp 1 - Intitution type
///Developing Courses - Tools

//summary
reg num_tools_used i.uni_type3 //not sig

//detail
reg tools_use_amt i.uni_type3 //not sig

//Developing Courses - Curriculum docs

//summary
reg num_curr_used i.uni_type3 //not sig

//detail
reg curr_use_amt i.uni_type3 //not sig

///Updating Courses

logit change_every i.uni_type3 //not sig

*** Bookmark #2 - Discipline

//Hyp 1 - Vary by Discipline

///Developing Courses - Tools

//summary
reg num_tools_used i.disc_stem //sig *
//r2 = 0.0083 - STEM lower than BHASE

reg num_tools_used i.disc_group5 //not sig

//detail
reg tools_use_amt i.disc_stem //not sig
reg tools_use_amt i.disc_group5 //not sig

```

//Developing Courses - Curriculum docs

//summary

reg num\_curr\_used i.disc\_stem //not sig

reg num\_curr\_used i.disc\_group5 //not sig

//detail

reg curr\_use\_amt i.disc\_stem //sig

//r2 = 0.0242 - STEM higher

reg curr\_use\_amt ib4.disc\_group5 //sig \*

//r2 = 0.0563- professions highest, then natural sciences

//only social sciences are sig lower

margins disc\_group5

marginplot

///Updating Courses

logit change\_every i.disc\_stem //not sig

logit change\_every i.disc\_group5 //not sig

\*\*\* Bookmark #3 - Program Type (a) - Rapid Change

//Hyp 2a - Vary based on amount of perceived change in the discipline

///Developing Courses - Tools

//summary

reg num\_tools\_used i.most\_rapid //not sig

//detail

reg tools\_use\_amt i.most\_rapid //not sig

//Developing Courses - Curriculum docs

//summary

reg num\_curr\_used i.most\_rapid //not sig

//detail

reg curr\_use\_amt i.most\_rapid //sig

//R2 = 0.0243 - rapid field = more use of curr docs

///Updating Courses

logit change\_every i.most\_rapid //sig

//R2 = 0.0188 rapid field = more likely to change course every time they teach it

\*\*\* Bookmark #4 - Program Type (b) - Professional

//Hyp 2a - Vary based on whether in a professional program or not

//(primary\_profess not going to be included in thesis except in a footnote, so commented out here)

///Developing Courses - Tools

```

//summary
reg num_tools_used i.profess_any //highly sig
//r2 = 0.0261 - professional prog use fewer tools

//reg num_tools_used i.primary_profess //highly sig
//r2 = 0.0240 - professional prog use fewer tools

//detail
reg tools_use_amt i.profess_any //not sig

//reg tools_use_amt i.primary_profess //not sig

//Developing Courses - Curriculum docs

//summary
reg num_curr_used i.profess_any //highly sig ***
//r2 = 0.0267 - any professional program connection, lower num of formal curriculum docs (summary)

reg num_curr_used i.primary_profess //sig **
//r2 = 0.0145 - primary professional, lower num of formal curr docs (summary)

//detail
reg curr_use_amt i.profess_any //sig *
//r2 = 0.0297 - any professional program connection, use more formal curriculum docs and/or more often

//reg curr_use_amt i.primary_profess //not sig

///Updating Courses

logit change_every i.profess_any //not sig

//logit change_every i.primary_profess //not sig

*** Bookmark #5 - Culture (a) - Departments

//Culture Analyses:

///Department culture

///Developing Courses - Tools

//summary

reg num_tools_used dept_val_score //highly sig ***
//r2 = 0.0545

//detail

reg tools_use_amt dept_val_score //not sig

//Developing Courses - Curriculum docs

//summary

reg num_curr_used dept_val_score //sig
//r2 = 0.0265

//detail

```

reg curr\_use\_amt dept\_val\_score //not sig

///Updating Courses

logit change\_every dept\_val\_score // not sig

\*\*\*# Bookmark #6 - Culture - University

///University culture

///Developing Courses - Tools

//summary

reg num\_tools\_used uni\_val\_score //not sig

//detail

reg tools\_use\_amt uni\_val\_score //sig \*  
//r2 = 0.0308

///Developing Courses - Curriculum docs

//summary

reg num\_curr\_used uni\_val\_score //not sig

//detail

reg curr\_use\_amt uni\_val\_score //sig \*  
//r2 = 0.0314

///Updating Courses

logit change\_every uni\_val\_score // not sig

\*\*\*# Bookmark #7 - Culture (b) - Colleagues and Community

///Colleagues/Community culture

///Developing Courses - Tools

//summary

reg num\_tools\_used i.colleagues\_val //sig \*  
//r2 = 0.0190

reg num\_tools\_used i.comm\_val\_teach if sec\_survey == 1 //highly sig \*\*\*  
//r2 = 0.0579

//detail

reg tools\_use\_amt i.colleagues\_val // not sig

reg tools\_use\_amt i.comm\_val\_teach if sec\_survey == 1 //highly sig \*\*\*  
//r2 = 0.0703

///Developing Courses - Curriculum docs

```

//summary
reg num_curr_used i.colleagues_val //not sig (barely)

reg num_curr_used i.comm_val_teach if sec_survey == 1 //sig **
//r2 = 0.0455

//detail
reg curr_use_amt i.colleagues_val //sig *
//r2 = 0.0298

reg curr_use_amt i.comm_val_teach if sec_survey == 1 //highly sig ***
//r2 = 0.0743

///Updating Courses
logit change_every i.colleagues_val // not sig

logit change_every i.comm_val_teach if sec_survey == 1

**# Bookmark #8 - Crosstabs

//textbook use
tab disc_stem textbook

tab disc_stem design_tools_sum_2

//Rate of Professional Req Use among Professional Programs
tab profess_any

tab design_tools_sum_3 if profess_any == 0
tab design_tools_sum_3 if profess_any == 1

tab design_tools_sum_4 if profess_any == 0
tab design_tools_sum_4 if profess_any == 1

tab design_tools_sum_5 if profess_any == 1

tab freq_prof_req if profess_any == 1

tab design_tools_detail_04 profess_any //course LOs
tab design_tools_detail_04 if profess_any == 0 //not prof
tab design_tools_detail_04 if profess_any == 1 //prof

tab design_tools_detail_08 profess_any //program level curr
tab design_tools_detail_08 if profess_any == 0 //not prof
tab design_tools_detail_08 if profess_any == 1 //prof

tab design_tools_detail_09 profess_any //uni LOs
tab design_tools_detail_09 if profess_any == 0 //not prof
tab design_tools_detail_09 if profess_any == 1 //prof

tab design_tools_detail_10 if profess_any == 1

**# Bookmark #9 - Descriptive Stats

//Dependent Vars

```

```
//Quantitative
tab num_tools_used
sum num_tools_used
```

```
tab tools_use_amt
sum tools_use_amt
```

```
tab num_curr_used
sum num_curr_used
```

```
tab curr_use_amt
sum curr_use_amt
```

```
//Categorical
tab change_every
sum change_every
```

```
//Independent Vars
```

```
//categorical
tab uni_type3
sum uni_type3
```

```
tab disc_stem
sum disc_stem
```

```
tab disc_group5
sum disc_group5
```

```
tab most_rapid
sum most_rapid
```

```
tab profess_any
sum profess_any
```

```
tab primary_profess
sum primary_profess
```

```
tab colleagues_val
sum colleagues_val
```

```
tab comm_val_teach
sum comm_val_teach
```

```
tab comm_val_teach if sec_survey == 1
sum comm_val_teach if sec_survey == 1
```

```
//quantitative
tab dept_val_score
sum dept_val_score
```

```
tab uni_val_score
sum uni_val_score
```

```
//Descriptive Variables
```

```
tab region
tab age_group
tab gender_incl
tab career_stage
tab current_pos
tab taught_ug
tab taught_grad
```

tab outline\_prog  
tab outline\_online  
tab course\_desc  
tab course\_LOs  
tab textbook  
tab readings  
tab new\_research  
tab curr\_map\_prog  
tab uni\_LOs  
tab prof\_req  
tab mind\_map\_etc  
tab other\_tool\_1  
tab other\_tool\_2

tab dept\_says\_val\_teach  
tab dept\_valu\_backup  
tab dept\_recog\_teach

tab uni\_says\_val\_teach  
tab uni\_valu\_backup  
tab uni\_recog\_teach