

The Non-Linear Paths of Women in STEM: The Barriers in the Current System of Professional Training



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Heather VanVolkenburg

Heather VanVolkenburg is a current Master student in the Biological sciences program at Brock University. Her path to higher education began with an undergraduate degree in Biological Sciences that she began as a full-time student at the age of 35. Despite the many challenges that face mature women entering university for the first time, Heather successfully graduated at the top of her class while simultaneously donating a great deal of her time to volunteering in Brock's ecology lab on various projects both on and off campus. Heather's passion is ecology and gaining a better understanding of the complexity that exists between the various biotic and abiotic components of agroecosystems. The focus of her MSc work is the development of multitrophic community theory in vineyards. Heather has many additional interests that are highly interdisciplinary in nature and has worked on projects as diverse as Ontario species at risk, the curation of the Brock University Herbarium, as well as projects affiliated with the Canadian Coalition of Women in Engineering, Science, Trades and Technology (CCWESTT), volunteering at the 2016 biannual conference in Ottawa. Recognizing that not all pathways to success are straight forward and pushed forward by the challenges that existed and continue to exist throughout her own journey, Heather has developed a passion for bringing to the forefront the challenges that face women trying to fill non-traditional roles in non-traditional ways.

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Summary

Mature women in science, technology, engineering, mathematics (STEM), and trades are increasingly present but face many challenges. This reflection paper originates from discussions and questioning at the Gender Summit 11 in Montréal, in November 2017. It first briefly describes the current situation of women who are not taking the usual linear path from high school to university and professional life. It examines how the current system may overlook their capabilities and highlights the potential that they have to significantly contribute to the Canadian job market and economy. It summarizes the challenges they face and proposes potential avenues for solutions and strategies that may help improve their chances of contributing to Canadian innovation. The data show that mature students are becoming a large part of Canadian higher education institutions and in general have a better graduation rate than students coming directly from high school, or cégep, in Québec. Barriers can be numerous for mature women who are interested in returning to higher education, and include entry requirements and admission criteria, lack or limited support (e.g. financial, childcare, etc.), and marginalisation and negative perceptions. Establishment of networks or support groups for mature women in STEM and trades, as well as changing institutional culture, are among some of the strategies that were put forward in the three round tables that were organized to discuss the issue. It is expected that this reflection/policy paper will help funding agencies, governments and institutions such as colleges and universities to develop solutions for the better inclusion of people (especially women) not following the usual path from high school, or cégep, and universities to careers in STEM.

Introduction

During the Gender Summit 11 held in Montréal in November 2017, there were discussions on the many aspects of the lives of women, Indigenous Peoples, and LGBTQ2 communities, that impact how they contribute to science and innovation in Canada and across the world. These discussions led to many ideas and potential actions. One discussion focused on how the current Canadian education and educational financial systems may have failed to provide for those who do not have a regular linear path from high school to university/college and professional life. Indeed, over time, it has become clear that several women (and some men, to a lesser extent) do not have a linear path from high school to university, that is, going from baccalaureate to Masters and then PhD with no or little break. The several reasons for this are often overlooked. First, mature women do not represent a large proportion of the student STEM population. Second, they are usually mixed in the mature student category, which represents a very diverse group with different circumstances. Finally, there has been a long-term perception that they can only come back part-time, will not pursue further studies, and therefore may not contribute significantly to the workforce. There is still a perception that these women are coming back to school just as a leisure or personal interest, not necessarily for a career.

There is a need, however, to understand the reasons for taking time off and why mature women want to come back to finish degrees. Osborne, Marks & Turner (2004) have identified six reasons for mature students to return to higher education: new career options, need for more credentials, delay due to family reasons, need for family support, career prospect improvement, and self-interest. Women may be more represented in categories such as delay due to family reasons. Indeed, women often take some time off after their high school or often after their baccalaureate with the aim of having a family and in some cases, to raise their children before going back to school. Baker (2010) highlights the fact that, unlike their male counterparts, many women perceive the incompatibility of raising a family while simultaneously pursuing academic degrees/careers. As childbearing years are relatively limited, and, in theory, academic pursuit can happen at any age, there is a high likelihood that choosing to break between high school and/or a baccalaureate in order to fulfill the desire to raise a family stems from this perceived incompatibility of the two.

Most women return to school because they know that they have the capacity and ability to contribute to society. These people are usually highly motivated and efficient in their studies in part because of their level of maturity. Many of them also come back of the need to support their family (especially if they are a single parent). Unfortunately, they face several barriers that they most likely never anticipated. For example, not all professors are ready to positively accept their return to study. Some professors may believe that these women will not be able to dedicate enough time to their studies due to family commitments. If they have success and engage in research in a lab, they may often be limited to being volunteers if funding is limited as they do not qualify for many summer employment scholarships.

It appears that many scholarships and employment opportunities are limited to young people less than 30 years old. Often, the scholarships that are achievable are capped or cannot be carried simultaneously which, while it is understandable that there is a need to spread support among individuals, fails to take into consideration the relatively higher financial needs of many mature students in terms of supporting a family. Once they graduate, these same people are also limited in the employment recruitment and retention

programs, which also have age limitations. Even financial support and bursaries may have similar restrictions depending on provinces and universities. Finally, for those interested in pursuing further studies and research with a PhD or a postdoc, the barriers are even greater, with some preconceived ideas on the part of the potential supervisors to the effect that they may not be able to produce enough work for some supervisors to be accepted.

There is therefore a need to first examine what these barriers are, in order to discuss their impacts (both negative and positive) on both the capacity to attract quality people in the fields of STEM in universities and gradually in positions, and the opportunities that may exist to support their return to school and to the workforce. This reflection paper will allow us to better understand the current situation and suggest potential avenues of solutions to ensure that no one is left behind, especially when these people are ready to contribute to the fields of STEM in Canada.

The body of this paper will have four components: 1) statistics related to people coming back to school (women and men, disaggregated data), 2) social and cultural conditions that may marginalize them, 3) financial and employment barriers in current programs (governmental or academic), and 4) potential solutions and strategies that may help better integrate, recruit, and retain these people in the fields of STEM. It is clear that many women are highly capable of significantly contributing to research, innovation, and education. The question is how to ensure their inclusion in the current system.

Context: Current Situation of Women in Workforce and STEM Education

A recent Organisation for Economic Co-operation and Development (OECD) document (2017) reports that in the past five years very little progress has been made on improving gender equality, and no country in the world has achieved it. Indeed, it mentions that while young women generally have more schooling than men, they are not likely to go into STEM fields and they are less likely to be engaged in paid work than men. The report also mentions that women are more likely to work part-time, and even in full time employment, they earn 15% less than men. Interestingly more women are married to men who have the same level of education as them, but most are not necessarily entering the career path again because of family issues and current policies that are not family-friendly (although the new federal budget is trying to address these issues in part).

While in some countries the system is evolving, with 25% of women being the main breadwinner, no report has come from Canada (at least to our knowledge for women in STEM). Another aspect which has not been well studied is that most women who are leaving post-secondary education early for family bearing are also very vulnerable in terms of financial support and may not be able to go back to higher education. In Australia, financial vulnerability has been found to be amplified in newly divorced women (substantially for those with dependants) for six years post-divorce (household incomes after deductions often dropped over 23% initially; de Vaus *et al.*, 2014), which could conceivably substantially increase the financial burden on those pursuing academic careers or cut short any attempts to do so.

The report entitled “Analysis of the distribution of gender in STEM fields in Canada” (NSERC Chairs Women in Science and Engineering, 2018) states that “The distribution of females across STEM fields by type of degree was lower than males, for all three degree types. For Bachelor’s degrees, the distribution of females who

were awarded degrees in STEM fields was highest, at 42.2% in 2000, and lowest in 2009, at 37.3%. The distribution of Masters degrees awarded to females remained relatively constant, and was at 37.2% in 2009. For Doctorate degrees awarded, the distribution of females was lowest in 2000, at 26.8%, and rose to 33.9% in 2009” (p. 4). The report also found the existence of pay gaps between males and females in the STEM workforce. For example, in 2016, men made nearly \$7 an hour more than women in STEM (all fields combined) while in biology alone men made more than \$15 an hour more than women (also in 2016; p. 48). The gap between men and women is therefore present and, as the OECD report mentions, progress is very slow and a strong call for action is needed.

Analysis of Canadian Universities and Colleges

Methodology

Data were extracted from the Statistics Canada website for university enrollments and graduations at the undergraduate, and career, technical and professional program levels ending in either a degree, diploma, or certificate. Enrollment and graduation numbers were analyzed according to age groups (CANSIM tables 477-0033 and 477-0034), and included individuals less than 20, 20-24 years, 25-30 years, 31-34 years, 35-39 years, and greater than 40 years of age. Because of the difficulty in identifying a young *versus* a mature student, the analysis used two categories, those less than 25 years old representing the youth and 25 years and older being the mature students. Simultaneous analyses of age groups and individual STEM disciplines were not possible using Statistics Canada data, therefore discipline categories were analyzed according to male *versus* female enrollments and graduations only (CANSIM tables 477-0029 and 477-0030 respectively). Included in the discipline analysis were the instructional program primary grouping classification numbers six (physical and life sciences and technologies), seven (mathematics, computer, and information sciences), and eight (engineering, and related technologies) (Figure 1), as they were the most representative STEM categories.

Code	Primary Grouping	Includes
06	Physical and life sciences and technologies	Biological and biomedical sciences Biological and physical sciences Human biology Marine sciences Natural sciences Nutrition sciences Physical sciences Science technologies/technicians
07	Mathematics, computer and information sciences	Computational science Computer and information sciences and support services Library science Mathematics and computer science Mathematics and statistics Systems science and theory
08	Architecture, engineering, and related technologies	Architecture and related services Construction trades Engineering Engineering technologies and engineering-related fields Historic preservation and conservation Mechanic and repair technologies/technicians Precision production

Figure 1: Primary Grouping Classifications Used for Enrollment and Graduation Statistics Analysis (variant of the Classification of Instructional Programs 2011 as defined by Statistics Canada)

It should be noted that this breakdown may present certain limitations in understanding trends as each category consists of an aggregation of between six and eight subcategories, some of which may skew results of female student representation for the entire group. For example, primary grouping classification seven (i.e. mathematics, computer and informatic sciences) pools participants from six different programs, some of which may have greater female student enrollment than others (e.g. library science programs may attract more female students *versus* mathematics and computer science programs). Both age group data and discipline data were considered over a 24-year period (i.e. 1992-2016).

In age as well as discipline analyses, undergraduate programs were included where the outcome was a degree, or diploma. Undergraduate certificate programs were left out of consideration as prerequisites for enrollment typically require fewer credits and are more flexible. In addition, undergraduate certificates do not require high school diplomas for enrollment which would in theory decrease many of the obstacles that mature students may encounter. Results were reviewed at the national (Canada-wide) level to gain an understanding of the broad trends that exist between male and female students. Without the ability to pair age category data with specific STEM categories, it is not possible to assess what mature student enrollment and graduation levels are in these fields Canada-wide, but it is possible to infer some overall enrollment and graduation trends.

Mature student enrollment and graduation by gender and STEM field data were possible for universities in the Maritime provinces as the raw data provided by the Maritime Provinces Higher Education Commission (MPHEC) included the amalgamation of these criteria over an approximately 18-year period between 1999 and 2017 (MPHEC PSIS, 2018). Age groups represented included 24 or under as well as 25 or older and three main categories were included as STEM fields (i.e. engineering and engineering technology, mathematics and computer sciences, and science). Data were analyzed at the undergraduate level and were further divided by gender (i.e. female and male). Results were pooled and reported with Maritime Provinces being the primary location of interest.

Lastly, data were retrieved and analyzed from Statistics Canada for both enrollments and graduations of mature and young students in college trades programs (CANSIM tables 477-0053 and 477-0054 respectively) (note that data from Québec were excluded as it was difficult to obtain the right number since some trades are taught in high school while other in cégep). Trades data were taken over a 24-year period (i.e. 1992-2015) and included a pool of the following major trade categories: i) automotive service; ii) heavy duty equipment mechanics; iii) heavy equipment and crane operator; iv) millwrights; v) oil and gas well drillers, servicers, testers, and related workers; vi) stationary engineers and power plant operators; and vii) welders. Individual student ages were grouped as either 24 years and under or 25 years and over. A brief overview of findings and implications of interpretation for both university and college data are presented in the following sections.

Trends in enrollments and graduation rates

Public University Trends

Figure 2 describes the trends in female undergraduate enrollments of “young” (101 category in Ontario) and “mature” (105 category in Ontario) students from 1992 to 2015.

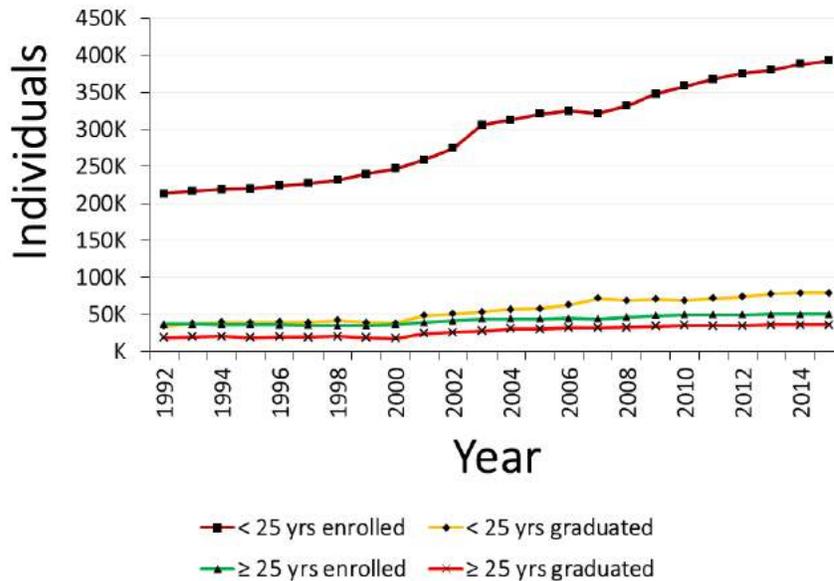


Figure 2. Canada-wide individual female university undergraduate enrollments and graduations between the years of 1992 and 2015 according to Statistics Canada. Mature student graduation rates were approximately 59% higher than young students in the years leading up to 2015 (graduation rate considered as a function of enrollment in the same time period).

Between 1992-2000, female university student enrollment remained relatively stable Canada-wide for those individuals under the age of 25 (i.e. young; approximately between 220K and 250K). By 2015, young female student enrollment peaked at 390K. As expected and often published, the number of young students enrolling in universities in Canada has steadily increased over the past 20 years, however it is interesting to observe that graduation rates have not necessarily kept the same trend. In the same period, mature female student enrollment (i.e. over 25 years of age) hovered below 50K before reaching 50K for the remainder of the period under study. It was shown that when mature female students do enroll, unlike young students, they have a higher success rate despite the challenges these individuals often face. This contrasts with what is seen in young females where graduation rates have only increased 3-5% (from 15% in 1992 to 20% in 2015) for the same period. Mature student graduation rate as a function of enrollment was four times higher than that of young students for the years leading into 2015 (mature: 80%, young: 21%).

When compared to Canada-wide university young males, young females' enrollment and graduation data (Figure 3) is consistently higher than males from 1992 through to 2015 (female enrollment: 220K-390K *versus* male enrollment: 180K-300K; female graduation: 35K-80K *versus* male graduation: 25K-50K; Figure 3).

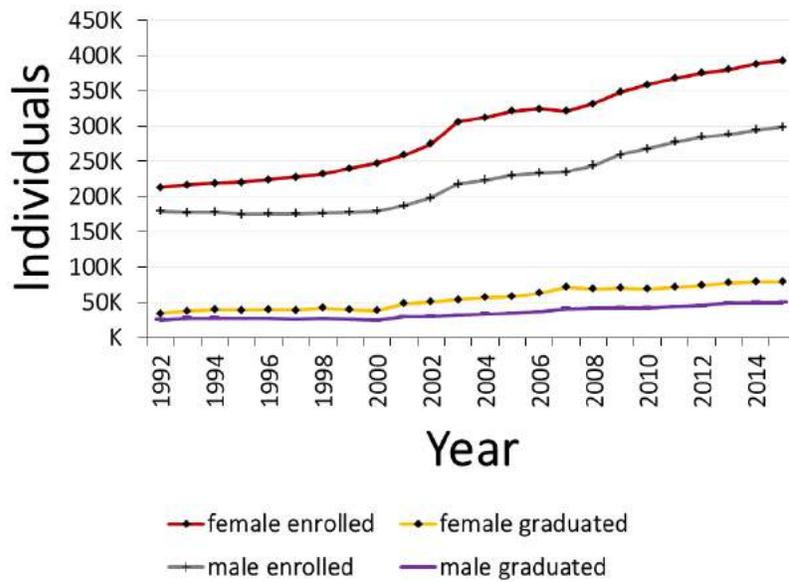


Figure 3: Canada-wide individual young (i.e. < 25 years) male and female university undergraduate enrollments and graduations between the years of 1992 and 2015 according to Statistics Canada. Female student enrollments and graduations were consistently higher than males for the entire period.

Such results could potentially lead one to believe that both young males and females are on an equal playing field in terms of university participation. Interestingly, mature male enrollment and graduation statistics also fell below that of mature females (2015 enrollment: 8K lower; 2015 graduation: 10K lower) with males having only a 56% graduation rate as opposed to females’ 70% (Figure 4).

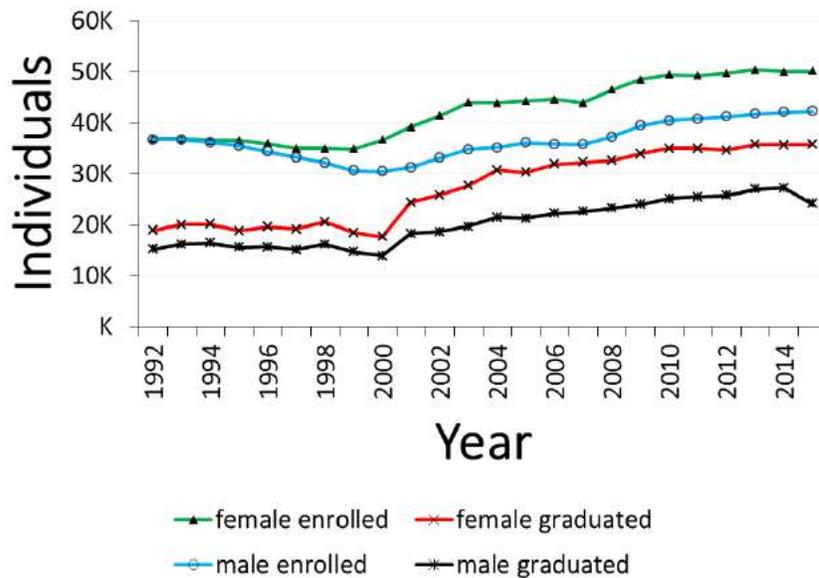


Figure 4: Canada-wide individual mature (i.e. ≥ 25 years) male and female university enrollments and graduations between the years of 1992 and 2015 according to Statistics Canada. Female student graduation rates were approximately 14% higher than male students (graduation success rate considered as a function of enrollment in the same time period).

As disparities in female participation in STEM fields are known to exist, the previous results suggest that age-related data collected from Statistics Canada may not be the best way to assess mature female student success in STEM at the university level. Of equal importance is understanding what specific trends may be

within each province, as not all reflect patterns that are found Canada-wide. For example, in Alberta, data show that from 1992-2008, there was a constant increase in the number of both young and mature female students enrolling in universities in STEM programs. However, with the economic and oil crises in 2008-2009, universities saw a drastic increase in enrollment numbers for both groups, although it was more pronounced for young students. Interestingly, this was not reflected by an increase in graduation rates (Figure 5).

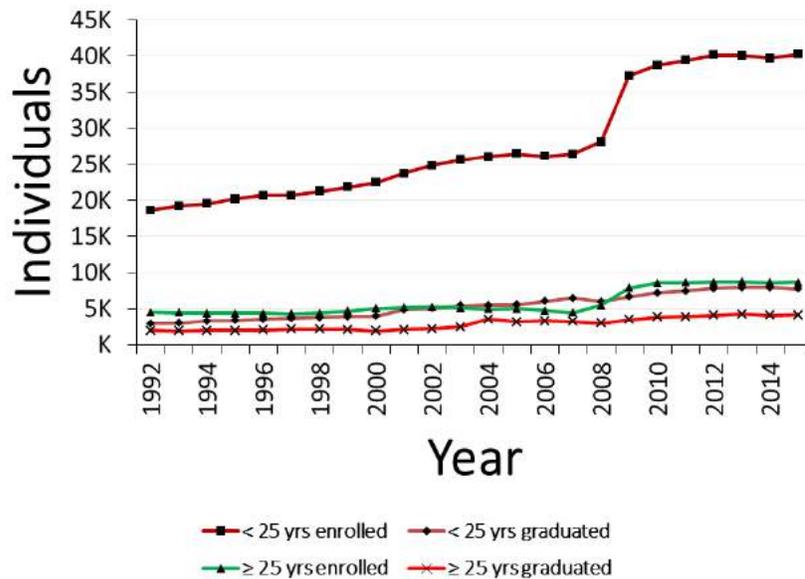


Figure 5: Alberta individual young and mature female university enrollments and graduations between the years of 1992 and 2015 according to Statistics Canada. An enrollment spike coinciding with the economic and oil crises in 2008-2009 is quite apparent in both age groups, however, this spike is not reflected in graduation data.

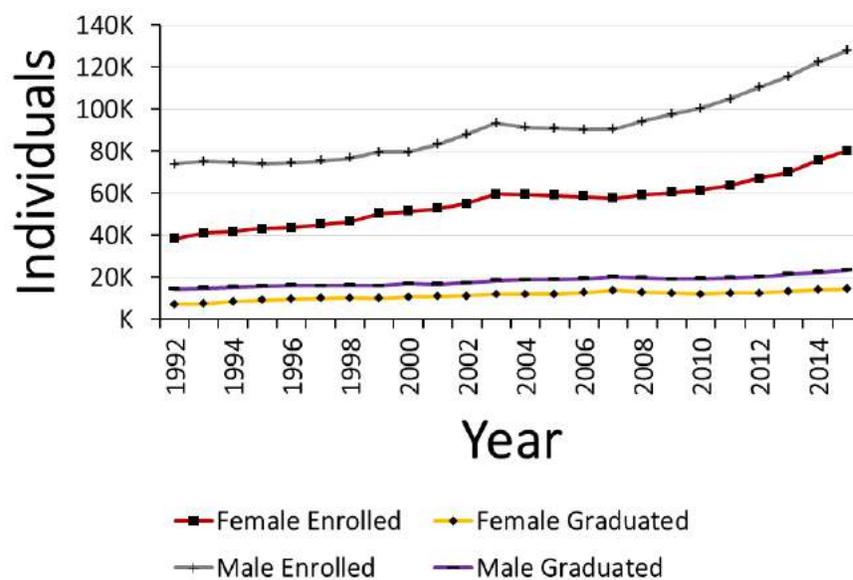


Figure 6: Canada-wide individual male and female (all ages) university STEM undergraduate enrollments and graduations between the years of 1992 and 2015 according to Statistics Canada. Female enrollments and graduations were approximately 36% lower than that of males. Note that STEM category division at this scale is still relatively broad and may not be representative of the known male-dominated fields (e.g. engineering, computer science).

Despite the difficulties in combining both age and well-divided STEM discipline data, a more accurate picture of female student success in STEM may be made more apparent in the analysis by discipline alone. While all ages of female student undergraduate enrollments and graduations have nearly doubled since 1992 (enrollment: 40K-80K; graduation: 7K-15K) with a graduation rate of nearly 20% (similar to males), numbers are still approximately 36% lower than males of all ages enrollments and graduations (enrollment: 75K-125K; graduation: 15K-24K; Figure 6).

It is imperative that data be broken down into age categories within more discrete STEM fields to gain a better understanding of what challenges may exist for mature female students in STEM.

Once the Maritime data were examined, it became even more apparent that Canada-wide data tracking must be made readily available. A good example of why is found when looking at enrollment and graduation data that is more delineated (e.g. by age and gender) for the very specific STEM stream of engineering and engineering technology. Engineering undergraduate young female enrollment nearly doubled between 2000-2016 (from 500 to 890 individuals) while mature female student enrollment remained constant at just under 100 individuals (Figure 7).

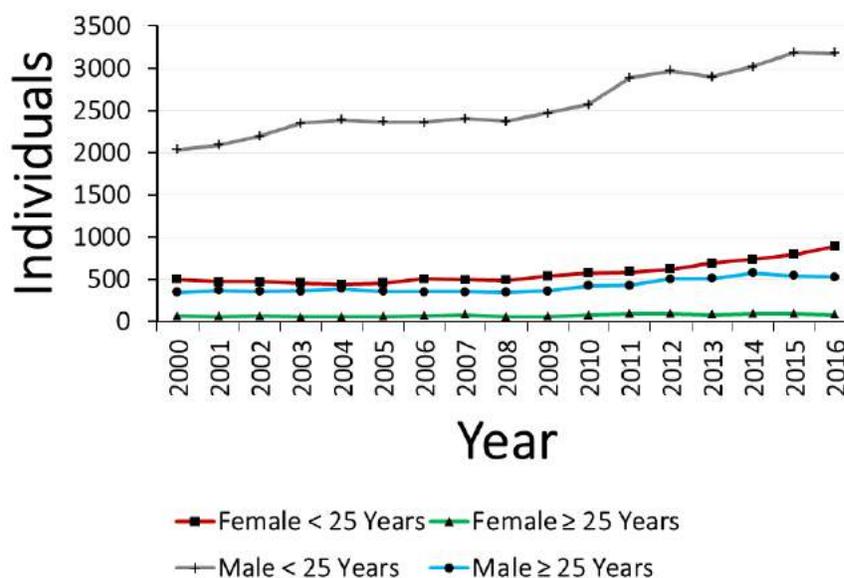


Figure 7: Maritime individual male and female engineering and engineering technology university undergraduate student enrollments between the years of 2000 and 2016 as provided by Maritime Provinces Higher Education Commission (MPHEC). While young female enrollment nearly doubled between 2000 and 2016, numbers are still considerably below males, which continued to increase through the same period (mature female students were also consistently lower).

Despite graduation rates of both young and mature female students being comparable to those of males from the same two groups (young female: 22% *versus* young male: 25%; mature female: 50% *versus* mature male: 60%; Figure 8), female students still remain underrepresented in the field (young female enrollment was 27% lower than the young male enrollment number of 3200 in 2016; Figure 7).

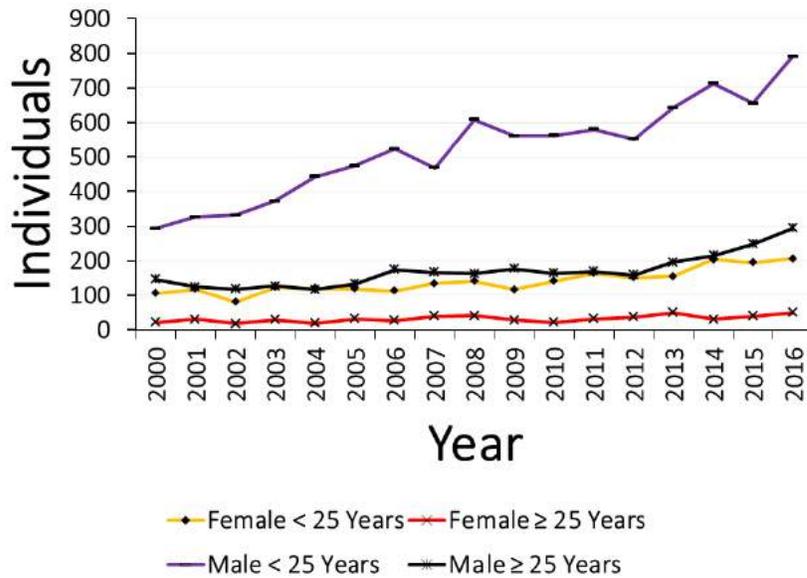


Figure 8: Maritime individual male and female engineering and engineering technology university undergraduate student graduations (young and mature) between the years of 2000 and 2016 as provided by MPHEC. In 2016, young female enrollments were 75% lower than the young male enrollment of 800 while mature females were 85% lower than their male counterparts.

Mature female undergraduate students’ enrollment was also lower compared to that of males (85% lower than the male enrollment number of 500 in 2016; Figure 7). Similar disparities between male and female Maritime enrollments and graduations were found in mathematics and computer science (Figures 9 and 10).

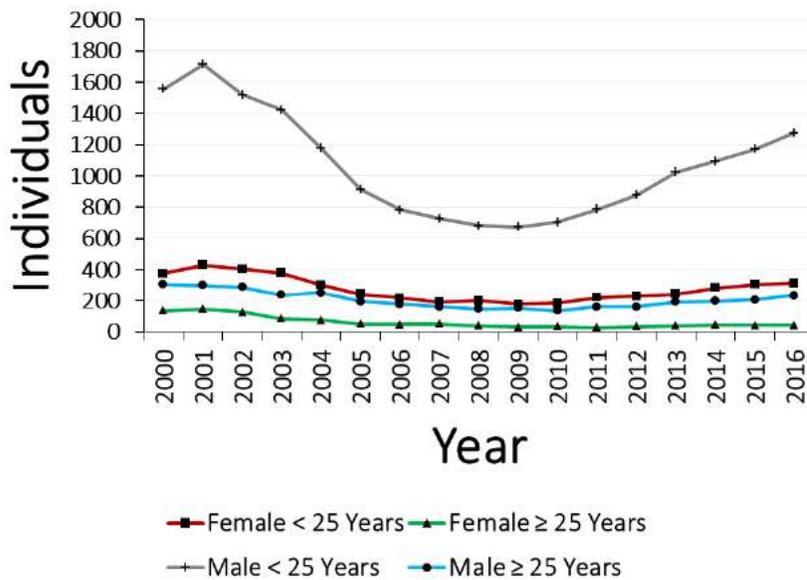


Figure 9: Maritime individual male and female mathematics and computer sciences university undergraduate student enrollments (young and mature) between the years of 2000 and 2016 as provided by MPHEC. While both young female and male enrollment dipped beginning in 2001, both showed signs of recovery after 2010. However, female enrollment numbers are still considerably below males (mature female students were also consistently lower and do not show the same recovery trends seen in the other groups).

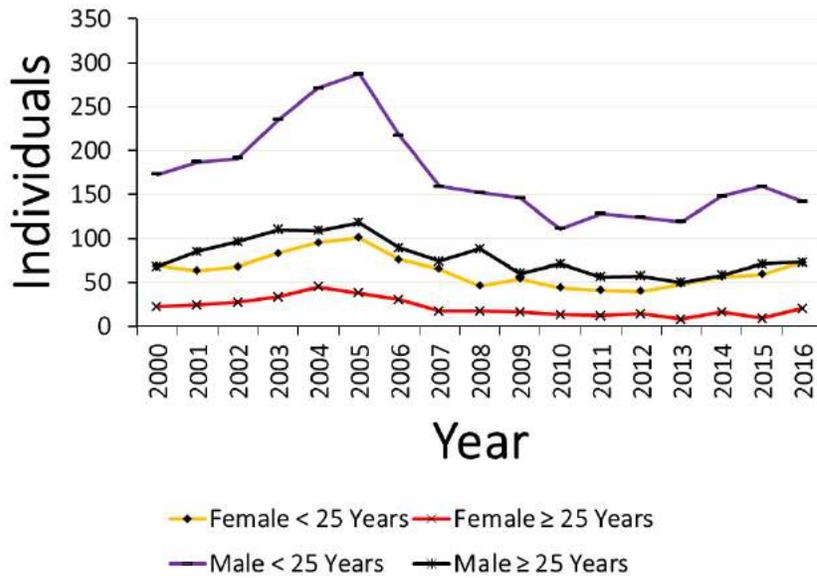


Figure 10: Maritime individual male and female mathematics and computer science university undergraduate student graduations (young and mature) between the years of 2000 and 2016 as provided by MPHEC. Mature females consistently graduate at a lower rate than all other groups throughout the period analyzed.

Interestingly, the trend does not hold true for all groups of individuals enrolled and graduating from the Maritime science stream (Figures 11 and 12).

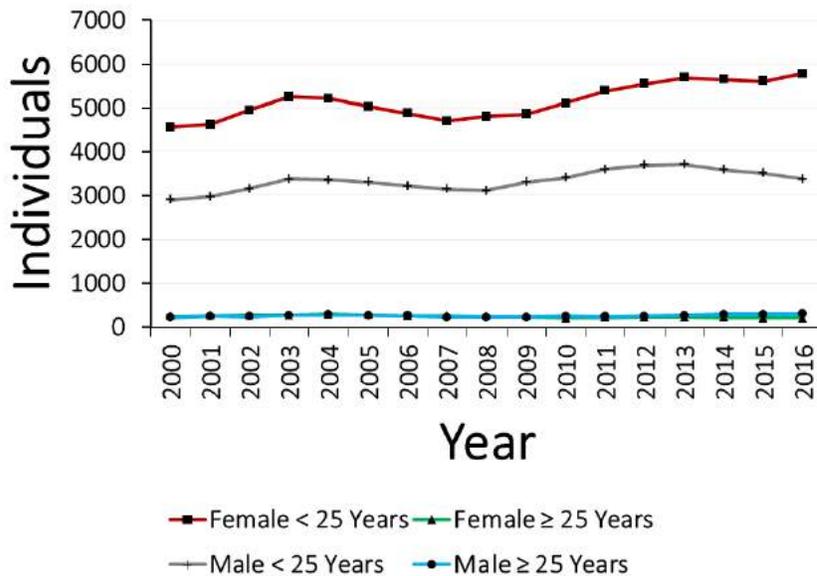


Figure 11: Maritime individual male and female science university undergraduate student enrollments (young and mature) between the years of 2000 and 2016 as provided by MPHEC. Contrary to other STEM fields, young female enrollments are considerably higher than all other groups throughout the period. Mature female and male enrollment numbers are relatively lower but are similar to one another and remain relatively constant all throughout.

For example, young females represent nearly twice the number of both enrolled and graduating young males while mature females and males remain quite similar in enrollment and graduating numbers throughout the period (except for graduating numbers from 2015-2016 where females were shown to be approximately 30% less successful than their male counterparts; Figure 12).

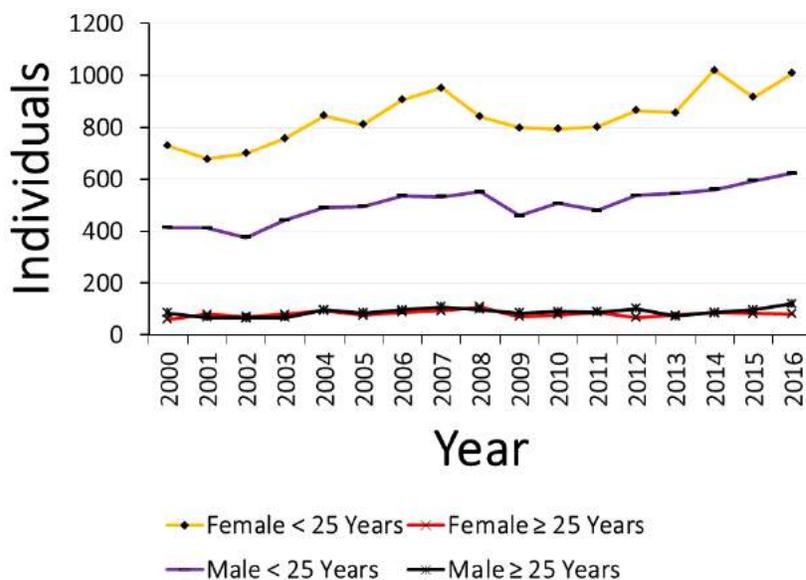


Figure 12: Maritime individual male and female science university undergraduate student graduations (young and mature) between the years of 2000 and 2016 as provided by MPHEC. As with enrollments, young female graduations are considerably higher than all other groups throughout the period. Mature female and male enrollment numbers are relatively lower but are similar to one another up until 2015 when male graduation exceeds that of female by approximately 30%.

After considering these results, the STEM disciplines in need of the most help in terms of female support (both young and mature), appear to be engineering, mathematics, and computer sciences rather than those represented in the general sciences stream (which often lead to nursing, medical school, or education). However, the general sciences stream category included pooled data from biological science, physics, and chemistry, and may not be representative of these streams individually.

Public College Trends

Canada-wide enrollment and graduation trends from trade programs were found to have increased from 1991 to 2015, except for enrollment decreases in both age groups, and genders between 2008-2009 and 2014-2015 (Figures 13 and 14).

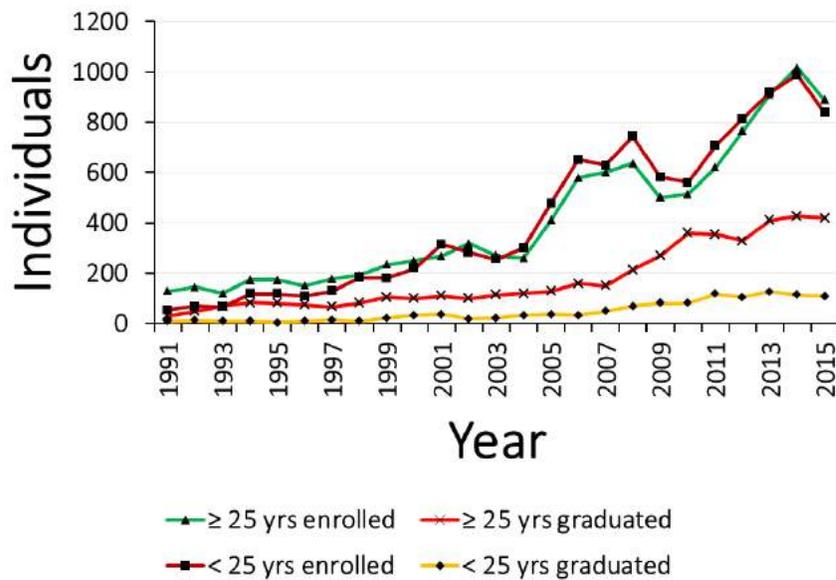


Figure 13: Canada-wide individual female college trades enrollment and graduation between the years of 1991 and 2015 as provided by Statistics Canada. Mature student graduation rates are approximately 29% higher than that of young students (graduation rates considered as a function of enrollment during the same period).

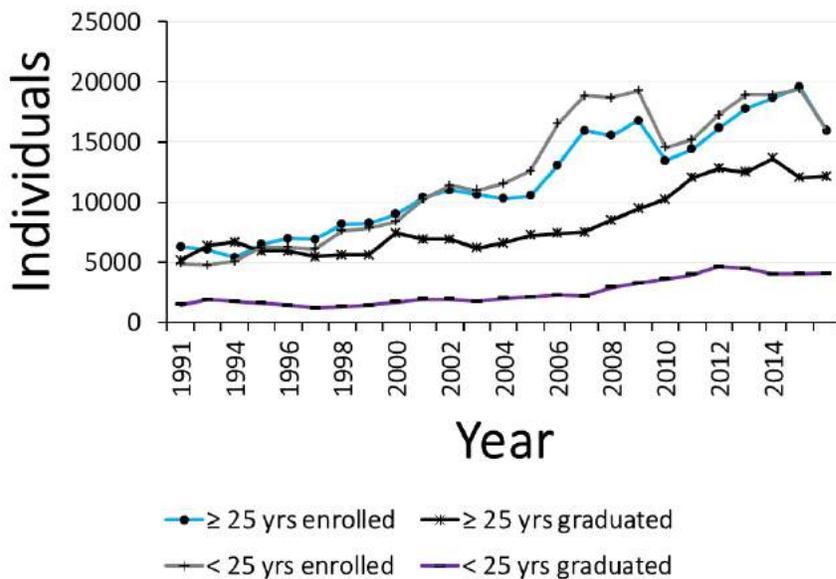


Figure 14: Canada-wide individual male college trades enrollment and graduation between the years of 1991 and 2015 as provided by Statistics Canada. Approximately 73% of males, both young and mature, graduate.

Despite an impressive graduation number percentage, mature female enrollment and graduation numbers represent less than 17% of overall mature student numbers (Figure 15) and mature males have a much higher success rate in general (73% of male enrollments graduate; Figure 14).

Similar trends were observed throughout individual provinces and territories across Canada suggesting that an opportunity exists to better promote trade disciplines to mature women as they tend to have higher

success rates compared to their younger female counterparts (young female graduation rate in 2015 was only 12% of enrollments, Figure 13).

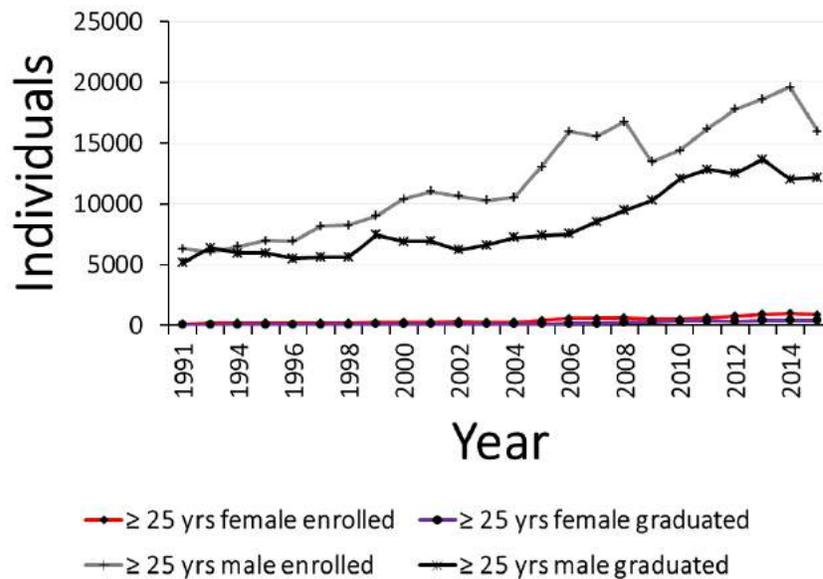


Figure 15: Canada-wide individual male *versus* female mature student college trades enrollment and graduation between the years of 1991 and 2015 as provided by Statistics Canada. Mature female students represent less than 17% of overall mature student enrollment and graduations.

To encourage more mature females to consider STEM, and to provide those enrolled with better support systems that ensure long term success, there is a need to understand what barriers, challenges, and support currently exist. This next section will explore entry requirements and stipulations that exist for mature students at the individual institution level to identify areas of opportunity for improving mature female success in STEM programs.

Mature Student Entry Criteria

Methodology

To determine mature student entry criteria for individual institutions Canada-wide, a google search that included the “institution title”, “mature/adult student”, “nom de l’institution”, and “étudiant mature/adulte” was performed. It is important to understand that in many cases even if institutions offer information and support to prospective mature students, the information may not be immediately obvious or accessible to those searching for it. Information was obtained for both public universities and public colleges Canada-wide except for publicly funded pre-university colleges (cégep) in Québec.

Categories of comparison were made from the most relevant criteria obtained from search results (those considered both barriers and supports) and are explained as follows (universities: Appendix A; colleges: Appendix B):

University Criteria (barriers)

- **Minimum Age:** the age stipulated by the institution to be considered for mature student enrollment
- **Years Away:** defined as the number of years one must have been out of the formal education system to be considered a mature student
- **Post-Secondary Credit Cap:** many institutions do not allow individuals to enroll as mature students if they are in possession of other post-secondary credits from previous academic attempts
- **Regular Admission:** in many cases, mature students must first attempt to apply as regular entry students and may only apply as a mature student if the first application is rejected
- **Letter:** it may be necessary to submit a letter of intent detailing past accomplishments, future goals, and reasons for returning to academia
- **Reference:** various requirements exist in terms of reference support (e.g. current/former employers, professional acquaintances, etc.)
- **Transcripts:** despite the possibility that prospective mature students have been out of the education system for a long period of time, it is still in many cases considered mandatory to obtain past transcripts
- **Interview:** once an applicant is deemed admissible, interviews with institution admission personnel may be required prior to final admission decisions being made
- **Part Time:** in some cases, newly enrolled mature students are automatically placed on a probation that only allows part-time studies for a given period
- **Prerequisites:** often specific programs require additional prerequisites to be met (in many cases they are the same prerequisites required of young applicants)
- **Program Restrictions:** mature students are occasionally prevented from enrolling in specific programs all together

University Criteria (supports)

- **Equivalency:** equivalent experience may be considered in place of other requirements
- **Specifically Mention Women:** whether an institution makes clear through their website if women are given equal opportunity (i.e. equal opportunity disclaimer)
- **Childcare Offered:** the specific acknowledgement that childcare supports are in place for students
- **Financial Aid:** if financial aid specific to mature students (females in particular) is clearly offered

College Criteria (barriers)

- **Minimum Age:** the age stipulated by the institution that one will be considered for mature student enrollment
- **Years Away:** defined as the number of years one must have been out of the formal education system to be considered a mature student
- **High School or GED Inadmissible:** many institutions do not allow individuals to enroll as mature students if they are in possession of a high school diploma or GED
- **Regular Admission:** in many cases mature students must first attempt to apply as regular entry students and may only apply as a mature student if the first application is rejected
- **Letter:** it may be necessary to submit a letter of intent detailing past accomplishments, future goals, and reasons for returning to academia
- **Reference:** various requirements exist in terms of reference support (e.g. current/former employers, professional acquaintances, etc.)

- Resume: required in addition to letters and references
- Transcripts: despite the possibility that prospective mature students have been out of the education system for a long period of time, it is still in many cases considered mandatory to obtain past transcripts
- Case Specificity: each mature student applicant is treated individually
- Assessments: mature students must successfully complete various program specific assessment tests to be considered admissible (e.g. Academic and Career Entrance – ACE)
- Prerequisites: often specific programs require additional prerequisites to be met (in many cases they are the same prerequisites required of young applicants)
- Program Restrictions: mature students are occasionally prevented from enrolling in specific programs all together

College Criteria (supports)

- Equivalency: equivalent experience may be considered in place of other requirements
- Additional Support: supports that are in place specifically catering to mature students (e.g. mature student support services office)
- Childcare Offered: the specific acknowledgement that childcare supports are in place for students
- Financial Aid: if financial aid specific to mature students (females in particular) is clearly offered

Public University Entry Requirements

Requirements were examined through the admission websites of each Canadian university, as a mature student wanting to enroll would have been doing, by searching “institution title” and “mature student”. Some institutions do not possess outlines at all for mature students and a user would have to navigate a website that is not set up for mature students. For example, it is likely that most schools would require transcripts and resumes but only schools that specifically mention this requirement in their mature student outlines are indicated in the compiled data (Appendix A).

University entry requirements and age for being considered a mature student can be quite vague from institution to institution with mature student status meaning different things in different universities both across and within provinces. In some cases, age is not as much of a factor as the number of credits that had been taken prior to the absence and the return to university. In many cases, the terms “adult learners” and “continuing students” are used interchangeably and not always for the same reasons. For example, the University of Victoria uses different terminology by classifying mature students as “special access students”. Except for Concordia University in Québec and the First Nations University of Canada in Saskatchewan, no institution website included a disclaimer clause that is specific to equal opportunities for mature women student applicants despite many indicating that equality is an important consideration in the application process. It may be that individual institutions are avoiding labeling different categories of students in an attempt to convey the message that equal treatment exists.

However, this strategy may actually work against promoting mature women to be successful in STEM fields as they may feel that they are not capable of performing in the same ways that traditional students are expected to perform and thus be discouraged from enrolling into this perceived environment. While mature men may also face such challenges, the current disparity of women in STEM fields creates a greater urgency for understanding all of the barriers faced by women who wish to pursue this line of study.

While some institutions indicate flexibility in enrollment options and a willingness to consider admission on a case-by-case basis (e.g. Royal Roads University, Mount Saint Vincent University, and McGill University), others are far more stringent and limited in mature student opportunities (e.g. McMaster University and University of Ottawa). Part time entry restrictions exist in 13 of the 82 institutions Canada-wide (e.g., Brock University and Brandon University) and should be considered for removal as mature students have likely had life experiences and enough additional responsibilities to prepare them for the time and stress management that comes with university attendance. In all, ten institutions make either zero reference to mature student protocol or direct prospective mature students to contact admissions (e.g. Université de Moncton, Université de Sherbrooke, and Université du Québec including all affiliated institutions).

When examining the requirements and admissions, variations exist even among provinces. In British Columbia (BC), age restrictions for mature students range from 19-23. The University of British Columbia and University of Northern British Columbia require that an applicant has been out of school for three to four years minimum before being accepted as a mature student. Six of the eight universities in BC do not allow applicants that have any previous university-level credits or cap allowable credits anywhere between 11 and 23 credits to be admitted as an undergraduate. All applicants must first attempt regular admission and will qualify for mature student admission only once they are rejected through all other means. From an administrative perspective, half of BC universities requires one to two letters of reference from professionals (not relatives or friends) and, as with a few other universities in other provinces, Royal Roads University has an interview process in place for mature students.

Like most other Canadian universities, prerequisites for entering as a mature student in BC are program specific (in most cases they are the same as the requirements for regular applicants, which begs the question: How are programs accommodating mature students? Three institutions indicate that equivalencies would be considered in place of program requirements. The University of British Columbia cites itself as having a highly competitive mature student program that does not include eligibility for any technology, math, and engineering programs (an obvious barrier to facilitating access into STEM disciplines for mature women).

In Alberta, mature student age restrictions range from 16-21. MacEwan University requires that an individual be out of school for one year before they are considered a mature student, while the University of Lethbridge enforces a credit cap of 14 in order to enroll. Most universities in Alberta require applicants to attempt regular admission first, applying for mature student status only if rejected on their initial application. On a positive note, University of Lethbridge and MacEwan University both specifically indicate that equivalency is considered. In contrast, University of Alberta requires an interview, and more than half the programs have specific prerequisites as well.

The University of Regina website provides instructions for mature student enrollment processes which are mainly administrative (i.e. transcripts, resume, etc.), except for the Faculty of Science which indicates that completion of a qualifying year may be necessary prior to enrollment, if the required prerequisite courses are not done. It requires mature students to be at least 21 years old, at least two years out of high-school, and they must have attempted fewer than 24 university-level credits.

Despite not mentioning anything specific to mature student enrollment, the First Nations University of Canada does specify women in their statement of equality in terms of admittance. The University of Saskatchewan also considers mature students to be at least 21 years old. They must enter in the first year and cannot be eligible if they have already completed more than 18 university-level credits. Like many other Canadian universities, the mature person must first apply through regular admission. If found eligible under mature student status, the applicant must also submit a written request, explaining the reasons for their decision to apply, in order to be granted Special (Mature) Admission.

In Manitoba, mature entry age restrictions are consistently set at 21 years of age for all universities except for St. Paul's University, which only indicates that a prospective mature student should be out of school for at least two years. Only the Université de Saint-Boniface informs potential students that they must not possess any previous post-secondary credits. All Manitoba institutions require that a prospective applicant attempts to be first admitted under the regular admission category before applying as a mature student. Half of the institutions possess program specific pre-requisites with two of them indicating that equivalency would be considered. The Canadian Mennonite University enforces a one-year probationary period for mature applicants. Brandon University requires that mature students are limited to part-time enrollment in their initial year. St. Paul's University College makes a vague remark that consideration of mature student applicants exists if the individual holds promise of academic success. This sentence seems open to interpretation, which may seem quite daunting to the potential applicant.

Universities located in Ontario show a wide range of differences in mature student enrollment protocols. This is not surprising as it also boasts 35% of public universities Canada-wide. Age restrictions fluctuate from 20 to 25, with 21 being the rule in eleven of the institutions. Over 62% of Canadian universities that implement a part time study restriction for mature student enrollment are found in Ontario. Some, like the Ontario College of Art & Design, require all mature applicants to participate in an Academic Bridging program prior to acceptance into any full-time programs. Brock University not only restricts mature students to part-time in their first year, but also does not allow enrollment in any programs other than General Studies for the first year. Other institutions that restrict individuals to part-time include Queen's University, Wilfred Laurier University, Huron University College, King's University College, McMaster University, and Carlton University.

McMaster University also prevents mature student applicants from applying to the Faculty of Engineering, Arts & Science program, Bachelor of Health Sciences, Medical Radiation Sciences, and Integrated Biomedical Engineering and Health Sciences program. The Royal Military College of Canada requires mature students wishing to enroll in any Science or Engineering program to first complete two full university courses. The University of Waterloo does not permit mature student status in its Engineering programs. Other barriers may exist when applying to the University of Guelph, for example, which has an "if space permits" policy. In addition, the University of Toronto specifically states that no mature program exists and that those wishing to apply but lack the proper credentials must first take a Transitional Year Programme (for Science programs).

Three out of the seven Québec universities considered do not clearly indicate online a mature student enrollment policy. All institutions require students to be a minimum of 21 years old except for McGill University that stipulates mature students be at least 23 and will evaluate mature student applications on an individual basis using an interview process. Université Laval recognizes mature students through a webpage

geared specifically towards this group and acknowledges that equivalent skills will be considered in place of traditional prerequisites. Concordia University also acknowledges women mature student applicants in a statement of equality, one of only two universities in the country that provide this disclaimer.

Two of the four universities in New Brunswick consider mature students to be at least 21 or 22 years of age and do not qualify for acceptance under regular admittance criteria, while the other two do not mention anything about mature students. The University of New Brunswick considers equivalency qualifications for program requirements, but like Brandon University, it does restrict mature applicants to part time initially. Memorial University of Newfoundland is similar to other institutions in that mature students must be 21 or over and not qualify under regular admission.

However, the application process is relatively more stringent as it requires two professional references as well as an interview (which in some cases may be an indication of flexibility in terms of situation-specific eligibility determination). The University of Prince Edward Island, the only public university in the province, does not have any restrictions placed on mature student enrollment other than that an individual must have been out of school for at least three years and must not qualify for entry under regular registration.

To be considered a mature student in Nova Scotia, one must be at least 21 or 22 years of age, although five of the nine institutions represented have no age requirement listed. Most universities follow some sort of general administrative requirements (i.e. transcripts, resumes, etc.) but seem relatively simple in terms of expectations except for both Acadia and Dalhousie University, which restrict mature students to part-time in their first year of attendance. Dalhousie University may be enforcing such a restriction to maximize student success rates as it also offers extensive support programs specific to mature students. Interestingly, Dalhousie is also the only public Canadian university that specifically includes mature international status students. Mount Saint Vincent University permits entry on a case-by-case basis and is one of the few institutions that indicate applicants may require upgrading prior to admission.

Overall, entry requirements can be quite difficult to define and may be quite confusing for mature students trying to enroll in a Canadian university. While some universities appear to be open to accepting mature students, these applicants may have to first jump through a few hoops before proving that they are worth being admitted. For women, these first barriers may be daunting but other barriers, such as the lack of support services, may be the final barrier stopping them from applying to be admitted.

Support services and other potential challenges

Existing support services for mature women may make a difference in whether or not to pursue higher education. This is especially true for women with young children who may need daycare or financial support due to their status (e.g. single mother, low income families, etc.). In general, some universities offer general support services for all students and a few additional services for mature students. For example, University of New Brunswick has a specific website for mature students although support appears to be through a “Supporting your partner through school” and “Support services for adult learners” webpages. They mainly focus on how to get some basic services. Others may have more complete services. For example, the University of Northern British Columbia has an entire floor devoted to mature student support (e.g. counselling, daycare options, tutoring, etc.).

Such a concept is found in few other institutions (apart from Laurentian University in Ontario, Mount Saint Vincent in Nova Scotia which has a mature students' society and webpage that links to various general supports, and Dalhousie in Nova Scotia which offers an extensive support system in addition to welcoming international mature students and Université Laval in Québec). These may be good places for further investigation and for the potential transfer of best practices to other institutions that have a more limited environment.

Daycare may be one of the most important challenges for women coming back to university or colleges. For mothers coming back to higher education, it is often not only the issue of accessibility but also affordability that can become a barrier. Friendly and MacDonald's (2014) survey of U-15 universities and universities in Manitoba suggests that access is the first step, but the needs of families with children with disabilities, Indigenous families, etc. may not be offered. Finally, unless students have some grants or subsidies, costs can be significant. Their report mentions that, except for Québec, the monthly university childcare costs can be between \$431 and \$631 in Manitoba to \$835 to \$1152 in Ontario for a preschool child and an infant, respectively (2012 price, Friendly and MacDonald 2014). Brandon University is supportive in that it specifically mentions availability of childcare to mature students.

However, it appears that this is one childcare service for all the campus and mature students must apply like any other people on campus. As reported by Friendly and MacDonald (2014), eligibility and priority criteria are broad and can include undergraduate and graduate students, staff, and faculty, and most childcare facilities surveyed do not make specific distinctions, except that students in general are on the highest priority list. Some universities do not have childcare facilities or may only have them for graduate students, postdocs, staff and faculty, as is the case at Western University in Ontario.

Public College Entry Requirements

College entry requirements and the existence of mature student status were found to be relatively easier to understand than that of university criteria (Appendix B). Ease of system use was notable in Ontario specifically through an amalgamated website that serves all public colleges in the province (<https://www.ontariocolleges.ca/en>). None of the 73 Canada-wide college websites investigated had a clear disclaimer specific to equal opportunity for female mature student applicants. Such a disclaimer may be particularly important to include for trades and apprenticeships programs to persuade women that many of these traditionally male dominated fields are practising inclusive recruitment strategies.

As with universities, it is likely that most schools would require transcripts and resumes but only schools that specifically mention this requirement in their mature student outlines are indicated in the compiled data. Mature student age stipulations range from at least 18-25 years of age with most institutions offering access to those aged 19 and over. This is in contrast to Canada-wide universities where the mean age of allowed entry is 21 (university age stipulations range from 16-25 years).

Another stark contrast to university mature student enrollment stipulations exists in that only 5% of colleges require students to attempt regular enrollment status first, compared to 52% of universities, suggesting that colleges may be more advanced in terms of acknowledging mature students as a unique category. Approximately half of colleges nation-wide require a student to have been out of the system for at least one year (Keyano College in Alberta is the only other college with an absence requirement at 3 years) compared

to universities where over 40% of universities require an individual to have been out of school for more than two years (and in some cases as many as five years).

Unlike universities that are concerned mainly with previous post-secondary credits, all 25 Ontario colleges require that mature students not be in possession of a high school diploma or General Equivalency Diploma (GED). Only one other public college institution in Canada has such a stipulation (Nova Scotia Community College) but this requirement is difficult to understand as it may simply be information that has been omitted from the other college websites. It is likely that the same lack of reported information applies to the need for students to present references, resumes, letters, and transcripts as only six colleges Canada-wide specifically indicate submission of these documents as a necessity.

Similar to universities, 73% of colleges Canada-wide require that mature applicants meet program-specific requirements. This again raises the question: What exactly is different in terms of institutional expectations of mature *versus* young potential students? Surprisingly, even some colleges possess program restrictions on entering mature students (notably Nova Scotia Community College, Lambton College in Ontario, and Langara College and College of New Caledonia in British Columbia), with barriers either not clarified or present in various STEM fields (e.g. math, chemistry, etc.). In addition, most colleges require that mature students participate in and pass various assessment programs and tests in order to be qualified for admission.

Overall, entry requirements for mature students may not be as stringent in Canadian colleges as compared to universities, however, there are opportunities for improvement. For example, clarifying restrictions that prevent mature individuals from applying if they possess a high school diploma may help increase the number of enrollments. Additionally, providing a website similar to that of Ontario would make amalgamation of consistent mature student college enrollment requirements more readily available to those attempting to access such information.

Support services and other potential challenges

The importance of childcare availability has been well covered in the university section and applies in much the same way for Canada-wide colleges. In fact, only one college out of the seventy-five indicates that childcare is available (Lethbridge College in Alberta) suggesting that an opportunity for improvement exists not only nation-wide but likely institution-wide as well. While only 9% of colleges Canada-wide indicate that additional support is offered to mature students, those that do offer it appear to have good supports in place.

For example, online resources including career planning, mid-life career guidance, academic and study skills workshops, specific to mature students, are implemented at four institutions (Ambrose University College, Lethbridge College, and Northern Alberta Institute of Technology-NAIT in Alberta as well as Fanshawe College in Ontario). In addition, North Island College in British Columbia specifically indicates the possibility of obtaining instructor prerequisite waiver forms, a possibility that should in fact be implemented across all colleges. New Brunswick Community College takes support one step further by offering financial counselling specifically geared towards mature students (a service that should arguably be tailored to all age groups and offered at all institutions). Humber College in Ontario sets the bar even higher through their “mix and mingle sessions” offered to mature students as networking opportunities for those students finding themselves in the unique position of returning to school later in life.

Analysis of current programs for student employment and retention

Financial support to mature students in higher education is probably one of the major barriers for them to continue. A study by Newson et al. (2011) at the University of Surrey in UK, or demonstrated that this group of students is often marginalized when it comes to financial support. Finding support may not always be easy, especially for women who also have a family to support. In Canada, finding financial support can be quite demanding for mature students. As stated by Universities Canada, there are “3,500 scholarships each year to young people interested in pursuing higher education. We also manage more than 175 scholarships and over \$11 million in student awards which are available both for the general public and dependents of employees of certain organizations” (<http://www.universitystudy.ca/plan-for-university/scholarships-grants-and-bursaries-for-canadian-students/>).

It was not the scope of this reflection paper to examine all of these grants as the system is quite complex and varies among regions. The federal government supports the provinces and territories in regard to student loans but the way it operates varies depending on the region. For example, in Ontario, British Columbia, Saskatchewan, New Brunswick, and Newfoundland, the system of student loans is integrated with the provincial system. However, in Alberta, Manitoba, Nova Scotia, and Prince Edward Island, the federal loans are alongside the provincial or territorial loan systems. In the Yukon, only federal loans are available while in Nunavut, the Northwest Territories and Québec, there is no direct federal system. Some federal programs can be beneficial for women such as the Canada Student Grant for Full-Time Students with Dependents, which supports full-time students in post-secondary institutions who are from a low-income family and have dependant(s) under the age of 12 years old.

We briefly summarize some of the financial support programs in Ontario. Mature students are eligible for some of them. For example, mature students can be eligible for Ontario Scholarship Assistance Program (OSAP). This program deals with loans and scholarships that can cover part of the living expenses including 30% of tuition fees. OSAP also has other supports such as Child Care Bursary, which helps support child care costs for three or more children. Other financial supports include the Bursary for Students with Disabilities and the First Generation Bursary. The Ontario Special Bursary Program is only possible for mature students from low incomes attending higher education on a part-time basis. While there are many other scholarships available, most are for specific needs and usually target younger students.

Some universities have specific scholarships for mature students as well. For example, Concordia University of Edmonton and St. Francis Xavier University in Nova Scotia specifically mention the availability of a mature student award/bursary. York University also has a scholarship specific for mature students (Mature Student Scholarship \$3,000). Queen’s University offers the Science 48 ½ Mature Student Entrance Bursary, which is given for mature students in engineering who have been out of traditional schooling for at least three years and have financial needs. Laurier Brantford Toronto Award at the Brantford campus is flexible as it is offered to students entering with a minimum final high school B+ (77%) average or with mature student status.

Université de Hearst (affiliated with Laurentian University) offers a \$1,000 scholarship (Bourse Jacqueline et Jean-Noël Lafrance) to mature students. Ryerson University offers the Ann and Bill McKay Entrance Award for Aboriginal Students in Recognition of Joanne Dallaire, Ryerson's First Elder for mature aboriginal students. While it is not mentioned if mature students are eligible, Saint Mary’s University Montréal Women's Memorial Scholarship is available to a female student enrolled in the Engineering program at Saint

Mary's University. Mount Saint Vincent University may be the university with the most scholarships available to mature students such as the Bernice Jacobson Chatt Endowed Memorial Bursary (female mature student), Frederick and Helen Kennedy Bursary (mature student), Helena Edna d'Entremont Memorial Bursary (mature student preference to single parent), Mairi St. John Macdonald Endowed Bursary (female student over 30 years old), Leslie V. Sansom Continuing Education Endowment Scholarship (mature student). While some universities mention that bursaries or scholarships are available, their websites redirect prospective mature students to the general scholarships website of the university and it is therefore unclear whether mature students are eligible.

While the basic financial support is a main challenge, the next one is the capacity for mature students to acquire work or research experience through co-op or summer student employment programs. Programs exist at the federal, provincial or even organizational levels. In this section, we examined from the websites the various available programs for students interested in enhancing their experience during their undergraduate studies. At the federal level, there are 14 programs that could be found, of which six have an age limit and another one where the age depends on the province where the employment is located (Appendix C).

Provincial and territorial governments also offer at least 31 employment or internship to post-secondary students with at least five mentioning the age limit being 29 years old. The Student Work-Integrated Learning Program seems to have no apparent age restriction; it is STEM specific and mentions including women.

Recommendations

It is important to remember that a large number of Canadian universities were created in the 1950s and 1960s to respond to the need of a new young generation to become educated. The role of most universities has remained focused on youth coming directly from high school or cégep. However, with changing times and demographic slow-downs in most industrialized countries, there is an increase in mature students returning to higher education. In the UK, mature students represent a large proportion of university populations and women are significantly contributing to this (Newson et al. 2011). To be able to respond to the demand, programs and services had to be modified in order to better support mature students.

With an aging population and the importance of integrating new immigrants, Canadian universities and colleges together with governments may have to start a dialogue on how to better organize the system to be more flexible in terms of age of admission and support services. The demographics recorded here demonstrate the need to start thinking on how post-secondary institutions will be able to satisfy the workforce demand for more qualified people coming from various age groups. A few testimonies and links to other testimonies found online have been included in this reflection paper to illustrate the current challenges that mature women (especially) are currently facing due to the inflexibility of the higher education system, mainly universities (Appendix D).

In March 2018, three round table discussions were organized to first present the preliminary results and then discuss further challenges and potential avenues for solutions, strategies or recommendations. The list of participants is included in Appendix E, considering that the reflection paper is a collective process and

everyone was interested in continuing to interact and contribute to the process. One first important point that came up when looking at some of the data was the concern about human rights and discrimination. For some participants, it was an occasion to reflect as to whether their own programs might be eliminating potentially good mature students who could use summer employment opportunities.

As a few participants had also experienced these challenges, they explained how they often felt marginalized. One of the first strategies that was brought up in the three round tables was the possibility of creating a support group or a network for mature women in STEM. This would help others learn how to navigate the system and feel less isolated. The network should also include mentors who could support the students and explain what their rights are, as it was mentioned that many do not have the information.

The following list represents the suggestions provided by the participants:

- Improve information for mature students, encompassing all services and admission assessment criteria in universities and colleges in order to understand what is and is not offered in terms of services and entrance criteria for prospective students. Most websites were very difficult to navigate and therefore better organization (consistency, display, ease of navigation) would be useful in most of them. This would include better information on specific awards to mature students (particularly women) as this may be one of the main challenges. Admission criteria greatly vary among universities and it was felt there is a need to better standardize them. For example, work experience should be taken into consideration more for mature students. During the round table in Montreal, it was mentioned that the current study in Québec by the STEM and Gender Advancement (SAGA) program confirms that the entry requirements are not clear.
- Online education was suggested as a way to probably increase flexibility for women who cannot go to universities or colleges for early morning or evening classes. The early morning classes were especially discussed in terms of daycare availability, as most centres do not open before 8 am. Classes starting at 8 am (e.g. Brock University) were found to be particularly discriminatory towards women with young children. It was noted that while in theory both parents should be supporting the children, in general childcare reverts to the woman.
- The issue of unconscious bias was mentioned in various occasions as a barrier. It was suggested that training should not only target professors but also admission offices and other departments that offer services to undergraduate students.
- Possibly increase the number and flexibility of internships or capstone projects, like in colleges, for mature students so that they can get real life experience.
- Scholarships and summer employment programs should not have age limits. If this is the case, they should be very explicit about why they have an age limit. Many summer work placements are offered with very low salaries (often minimum wage) and can be a barrier for mature women. It was also mentioned that when women returned to higher education after taking a break for family reasons, the time should not become a reason for discrimination when applying for scholarships or being admitted with no recognition of previous earned credits. It was even suggested that there should be scholarships for mature students coming back to higher education to give them the possibility to “catch-up”.
- It was also suggested that institutions should reserve a certain number of places for mature students in programs that are in high demand to ensure a better balance. This is especially important in regions where women may not have the possibility of moving or travelling to large centres to study due to family obligations.

- Offering paid paternity leave and family-friendly policies remained an important point of discussion. However, it was also felt that support should not be related and under the purview of the Employment Insurance Program.

Other organizations such as OECD (2017) have also underlined similar avenues of solutions including making childcare more accessible, increasing flexible work arrangements for women, and ensuring that recruitment procedures are not discriminatory. Some solutions have been implemented in other areas of the world (e.g. United States: sick-child daycares based out of hospitals; Sweden: night nurseries) and could be adopted here in Canada. The work-life balance has been discussed at the round tables and in the literature as a major challenge for women coming back to higher education.

In conclusion, this reflection paper scratches only the surface of the challenges of mature women coming back to higher education. Stereotypes need to be removed from early childhood as people from all ages can contribute significantly to society. Culture and norms can play a major role in gender inequality and round table participants underlined the importance of changing the culture of universities through education and better understanding of these issues. The cultural change in institutions has also been promoted by the Natural Sciences and Engineering Research Council of Canada (NSERC) in its Guide for Applicants: Considering equity, diversity and inclusion in your application stating that “the NSE culture and institutions need to be fixed to attract and retain the best talent of all identities and backgrounds and allow all members of the community to flourish” (p.5, http://www.nserc-crsng.gc.ca/doc/EDI/Guide_for_Applicants_EN.pdf). It is possible that certain subject groups that are scientific in nature have an overrepresentation of female students in some of their subdisciplines (e.g. life sciences and technology or agriculture, natural resources, and conservation).

Consequently, this skews the results of those female individuals present in some of the fields better known as being underrepresented (e.g. in 2009 females earned only 20% of the total engineering degrees awarded and just 11% of those earned in physics during the same time; NSERC Chairs Women in Science and Engineering, 2018). Defining who is a mature student was not only a limitation for this study as it was already reported in other studies, such as Kerr (2011). Disaggregated data would improve the understanding of the challenges that mature students face when they return to higher education after being away for a while.

We should not lose sight of other groups including racialized and indigenous students who also have their own challenges. To this end, immigrant mature students, especially women, may add another dimension that universities and colleges have to consider as well in the future. Intersectionality should be further investigated while looking at how women in STEM face barriers, which are more complex than what we have been able to find in this paper. Future research will require more personalized surveys to better understand the day-to-day challenges that women from different races and groups have to face in the pursuit of higher education in STEM.

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Appendix A

Tabulation of the information for admission of mature students found on websites of Canadian universities (accessed January 2018).

Province	Institution	Age ¹	Years Away ²	PS Credit Cap ³	Reg Admt ⁴	Letter ⁵	Reference ⁶	Resume ⁷	Restrictions					Considerations				
									Transcripts	Interview	Part Time ⁸	Prereq ⁹	Program ¹⁰	Equivalency	Mention Women	Mention Childcare	Financial Aid ¹¹	
Alberta	Athabasca University	16						yes									yes	
	Concordia University of Edmonton	20	1		yes						PS	yes						
	MacEwan University	21			yes													
	Mount Royal University	21							yes		PS							
	University of Alberta	21								yes	PS							
British Columbia	University of Calgary	21		yes				yes			PS							
	University of Lethbridge	21		14	yes	yes	yes	yes			PS	yes						
	Emily Carr University of Art and Design	19		23							HS							
	Kwantlen Polytechnic University	19																
	Royal Roads University	23		23		yes	2	yes	yes	yes			yes	yes				
	Simon Fraser University	23		23		1	may	may	yes				yes	yes				
	The University of British Columbia	4	0	yes	may	may	may	yes			PS	yes						
	Thompson Rivers University	19		0	yes						PS							
	Trinity Western University	21	1															
	University of Northern British Columbia	21	3	14				yes	yes		PS							
Manitoba	University of the Fraser Valley	21			yes						PS							
	University of Victoria	23		11	yes	yes	2	yes	yes		PS	yes						
	Vancouver Island University	21									PS							
	Brandon University	21			yes			yes	yes	yes	PS	yes	yes			yes		
	Canadian Mennonite University	21			yes							yes	yes					
New Brunswick	St. Paul's College	21	2		yes						PS							
	The University of Winnipeg	21			yes													
	Université de Saint-Boniface	21		0	yes													
	University of Manitoba	21		yes	yes			yes			PS	yes						
Newfoundland and Labrador	Mount Allison University	22		17	yes	yes		yes	yes									
	St. Thomas University																	
	Université de Moncton	21		0	yes	yes				yes	PS	yes						
Nova Scotia	University of New Brunswick	21		0	yes	yes		yes		yes	PS	yes						
	Memorial University of Newfoundland	21			yes	yes	2		yes	yes								
	Acadia University	21	4		yes	yes	yes		yes	yes	yes							
	Cape Breton University	21	2	1 yr	yes				yes	yes	PS							
	Dalhousie University	21	2	1 yr	yes	yes		yes	yes	yes	PS							
	Mount Saint Vincent University	3			yes			yes	yes	yes			yes			yes		
	Nova Scotia College of Art and Design (NSCAD University)	22	3	0			2		yes	yes		yes						
	Saint Mary's University	22	5					yes	yes	yes			yes	yes				
	St. Francis Xavier University	3			yes	1	yes	yes	yes		PS	yes					yes	
	Université Sainte-Anne																	
Ontario	University of Kings College	21		0	yes						PS							
	Algoma University	20	1		yes	yes	1	yes	yes		PS	yes						
	Brock University	21	2		yes					yes		yes						
	Carleton University	2	0 FT		yes	yes				yes	PS	yes	yes					
	Dominican University College	25			yes			yes										
	Huron University College	21	4		yes					yes								
	King's University College at The University of Western Ontario	21	4		yes	yes	1			yes								
	Lakehead University	2	1				1		yes		PS							
	Laurentian University	21	1		yes	yes		yes				yes						
	McMaster University	2	0		yes					yes	PS	yes						
	Nipissing University	20	2		yes			yes			PS	yes						
	Ontario College of Art & Design	20	2		yes			yes			PS							
	Queen's University	5	0		yes					yes	PS							
	Redeemer University College	21	2	0			yes		yes		PS		yes					
	Royal Military College of Canada	21			yes								yes					
	Ryerson University	21	2		yes	yes		yes	yes		PS							
	Saint Paul University	2																
	St. Jerome's University																	
	Trent University	21	2		yes			yes		yes	PS							
	University of Guelph	2	0		yes	yes		yes	yes		PS							
	University of Ontario Institute of Technology	21	2	0	yes						PS		yes					
	University of Ottawa	2	0		yes	yes		yes	yes		PS	yes	yes					
	University of St. Michael's College																	
	University of Toronto				yes						PS		no					
	University of Trinity College				yes													
	University of Waterloo	4	0		yes	yes	yes	yes	yes		PS	yes						
	University of Western	21	4	0	yes					?	PS							
University of Windsor	20	2	0	yes	yes		yes	yes		PS								
Wilfred Laurier University	21		0	yes					yes	PS								
York University	20	2	0	yes	yes		yes	yes		PS								
Prince Edward Island	University of Prince Edward Island	21	3		yes	yes	yes	yes		PS								
	Bishop's University	21	2		yes	yes	yes	yes	yes	yes	PS	yes						
Quebec	Concordia University	21	2		yes	yes	yes	yes	yes				yes					
	McGill University	23			yes	2	yes	yes	yes		PS	yes						
	Université de Montréal	21																
	Université de Sherbrooke	21																
	Université du Québec*	21																
Saskatchewan	Université Laval	21	2		yes			yes	yes		PS	yes						
	Campion College																	
	First Nations University of Canada														yes			
	University of Regina	21	2	23				yes	yes		PS	yes						
University of Saskatchewan	21		17	yes	yes		yes	yes			yes							

Note: Blank areas do not reflect non-existent data/criteria, but rather information that was unobtainable in a timely manner through the institution's website (i.e. approximately 15-30 minutes). *Université du Québec and aggregates all had similar outcomes using same search methodology.

¹ the minimum age an individual may be considered a mature student applicant

² institutions that require an individual be out of formal education prior to application or have had no previous fulltime attendance (0 FT)

³ maximum post secondary credits permitted to enroll as a mature student

⁴ must first apply as a regular student and be denied admittance

⁵ letters of recommendation from previous employers, acquaintances, professionals, etcetera as stipulated by individual institutions

⁶ references from previous employers, acquaintances, professionals, etcetera as stipulated by individual institutions

⁷ interviews may or may not be required and are case dependant

⁸ restricted entry on part time basis as a probation period (usually up to 1 year)

⁹ may require prerequisite credits or experience, often program specific (PS) and/or includes high school (HS) credits

¹⁰ some programs may not allow mature student entry

¹¹ financial aid specific to mature students is available

Appendix B

Tabulation of the information for admission of mature students found on websites of Canadian colleges (accessed January 2018). Québec colleges (cégep) have not been included as they are generally considered pre-university programs entered straight from high school.

Province	Institution	Age ¹	Years Away ²	HS/GED ³	Reg. Adm. ⁴	Letter ⁵	Reference ⁶	Resume	Transc. pts	Case Specific ⁷	Assessments ⁸	Prereq ⁹	Program ¹⁰	Enrichment	Add Support ¹¹	Mention On/Website	Financial Aid ¹²	Restrictions	Considerations
Alberta	Alberta College of Art and Design	21							yes	yes	PS			yes					
	Ambrose University College	21			yes						PS			yes					
	Bow Valley College										PS								
	Grande Prairie Regional College	21							yes	yes	PS								
	Keyano College	21	3						yes	yes	PS								
	Lakeland College				yes					yes	PS			yes					
	Lethbridge College	1								yes	PS			yes	yes	yes			
	Medicine Hat College	21							yes	yes	PS			yes					
	Northern Alberta Institute of Technology (NAIT)									yes	PS			yes	yes				
	NorQuest College										PS								
	Northern Lakes College									yes	PS			yes					
	Olds College									yes	PS			yes					
	Portage College									yes	PS			yes					
Red Deer College	19	1								PS									
Southern Alberta Institute of Technology (SAIT)	18									PS									
British Columbia	Camosun College	19																	
	College of New Caledonia	19	1						yes	PS	yes	yes							
	College of the Rockies	19								PS									
	Langara College	19								yes	PS	yes	yes						
	North Island College									yes	PS	yes	yes	yes					
	Northern Lights College	19	1					yes		PS		yes	yes						
	Northwest Community College								yes	?	PS								yes
	Okanagan College	19	1							PS									
	Selkirk College	19							yes	yes	PS		yes	yes					
	Vancouver Community College	16						yes											
Manitoba	Assiniboine Community College																		
	International College of Manitoba	21							yes				yes	yes					
	Manitoba Institute of Trades and Technology	19								?			yes	yes					
	Red River College	19	1							PS									
New Brunswick	Collège communautaire du Nouveau-Brunswick	21				yes	yes	yes	yes	PS	yes	yes							
	Maritime College of Forest Technology	25			yes		yes	yes	yes	PS	yes	yes							
	New Brunswick Community College	21		yes		3	yes	yes	yes	?	PS	yes	yes						
Newfoundland and Labrador	College of the North Atlantic	19	1		yes			yes	yes	PS									
Northwest Territories	Aurora College	20	1						no	yes	PS								
Nova Scotia	Nova Scotia Community College	19	1	no				yes	no	yes	PS	yes	yes						
Nunavut	Nunavut Arctic College	19	1			yes	2	yes	yes	yes	PS	yes	yes						
Ontario	Algonquin College of Applied Arts and Technology	19		no					yes	yes	PS	yes	yes						
	Cambrian College of Applied Arts and Technology	19		no					yes	yes	PS	yes	yes						
	Canadore College of Applied Arts and Technology	19		no						yes	PS	yes	yes						
	Centennial College of Applied Arts and Technology	19		no		?	?	?	yes	yes	PS	yes	yes						
	Collège Boréal d'arts appliqués et de technologie	19		no						yes	PS	yes	yes						
	Conestoga College Institute of Technology	19		no						yes	PS	yes	yes	yes					
	Confederation College of Applied Arts and Technology	19		no						yes	PS	yes	yes						
	Durham College of Applied Arts and Technology	19		no						yes	PS	yes	yes						
	Fanshawe College of Applied Arts and Technology	19		no							PS	yes	yes						
	Fleming College of Applied Arts and Technology	19		no						yes	PS	yes	yes						
	George Brown College of Applied Arts and Technology	19		no						yes	PS	yes	yes						
	Georgian College of Applied Arts and Technology	19		no							PS	yes	yes	yes					
	Humber College Institute of Technology	19		no							PS	yes	yes	yes					
	La Cité collégiale d'arts appliqués et de technologie	19		no							PS	yes	yes						
	Lambton College of Applied Arts and Technology	19	1	no					yes	yes	PS	yes	yes	yes					yes
	Loyalist College of Applied Arts and Technology	19		no					yes	yes	PS	yes	yes						
	Michener Institute for Applied Health Sciences	19		no							PS	yes	yes						
	Mohawk College of Applied Arts and Technology	19		no							PS	yes	yes	yes	yes				
	Niagara College of Applied Arts and Technology	19		no							PS	yes	yes	yes	yes	yes			
	Northern College	19		no						yes	?	PS	yes	yes					
Sault College of Applied Arts and Technology	19		no						yes	yes	PS	yes	yes	yes	yes				
Seneca College of Applied Arts and Technology	19		no						yes	yes	PS	yes	yes						
Sheridan College Institute of Technology	19		no						yes	yes	PS	yes	yes	yes					
St. Clair College of Applied Arts and Technology	19		no						yes	?	PS	yes	yes						
St. Lawrence College of Applied Arts and Technology	19		no							PS	yes	yes							
Prince Edward Island	Collège Acadie Île du Prince Edouard																		
	Holland College	22	1			yes		yes	yes	yes	PS	yes	yes						
Saskatchewan	Carlton Trail Regional College																		
	Cumberland College																		
	Great Plains College																		
	North West College																		
	Northlands College	18							yes										
	Parkland College																		
Yukon	Saskatchewan Indian Institute of Technologies																		
	Saskatchewan Polytechnic													yes					
	Southeast College																		
Yukon College	19																		

Note: Blank areas do not reflect non-existent data/criteria, but rather information that was unobtainable in a timely manner through the institution's website (i.e. approximately 15-30 minutes).

¹ the minimum age an individual may be considered a mature student applicant

² a stipulation put forth by some institutions that require an individual be out of formal education prior to application or have had no previous fulltime attendance (0 FT)

³ must not have a high school diploma or GED

⁴ must first apply as a regular student and be denied admittance

⁵ letters of recommendation from previous employers, acquaintances, professionals, etcetera as stipulated by individual institutions

⁶ references from previous employers, acquaintances, professionals, etcetera as stipulated by individual institutions

⁷ individual cases considered for enrollment potential

⁸ required to take assessment tests (various examples depending on institution and program requirements)

⁹ may require prerequisite credits or experience, often program specific (PS) and/or includes high school (HS) credits

¹⁰ some programs may not allow mature student entry

¹² financial aid specific to mature students is available

Appendix C

Tabulation of the existing federal and provincial programs that provide either employment or unpaid work experience for students and/or recent graduates (web search performed February 2018). Age represents stipulations put forth by each individual program while the disclaimer information represents whether or not an inclusion clause is present on the program website.

Level	Title	Type	Age	Disclaimer
Federal	National Research Council Co-op program	Co-op		no
	Federal Student Work Experience Program	Employment	no	yes
	Parks Canada Youth Ambassador program	Employment		no
	National Research Council Student Employment Program	Employment		no
	Canadian Conservation Institute internship programs	Internship		no
	Green Jobs-Science and Technology Internship Program	Internship	15-30	no
	International Youth Internship Program	Internship	19-30	no
	Science Horizons Youth Internship Program	Internship	< 30	no
	Career Focus Program	Work Experience	15-30	no
	Technical Work Experience Program	Work Experience	16-30	no
Student Work-Integrated Learning Program	Co-op		yes	
Provincial - Alberta	Alberta Co-op	Co-op		no
	Alberta Summer Opportunities	Employment		no
	Alberta Internships	Internship		no
	Alberta Unpaid Work Experience Placements	Employment		no
Provincial - British Columbia	Co-operative Education Training Program	Co-op		no
	Youth Employment Program	Employment		no
	Canadian Science Policy Fellowship Program	Fellowship		no
Provincial - Manitoba	STEP Services	Employment	min 16	no
Provincial - New Brunswick	Student Employment Experience Development	Employment		yes
	Youth Employment Fund	Employment	18-29	no
Provincial - Newfoundland and Labrador	Environmental and Cultural Hiring Opportunity	Employment	15-30	no
	Internship Program	Internship		no
Provincial - Northwest Territories	Summer Student Employment Program	Employment		no
Provincial - Nova Scotia	Mitacs Accelerate Internships	Internship		no
Provincial - Nunavut	Nunavut Regional Office/Arctic College Internship	Internship		no
Provincial - Ontario	Summer Student Jobs with Ontario Public Service	Employment	varies	no
	Transportation Technician Initiative	Employment		no
	Engineering Development Program	Employment		no
	Ontario Internship Program	Internship	no	yes
	MNRF Internship Program	Internship		no
Provincial - Prince Edward Island	Provincial Parks Student Positions	Employment	no	no
	Youth Internship Program	Internship	15-30	no
Provincial - Quebec	Quebec Civil Service Student Job	Employment	min 16	yes
Provincial - Saskatchewan	Saskatchewan Co-op programs	Co-op		no
	Summer Student Program	Employment		no
	Agriculture Internship Program	Internship		no
	Engineers in Training	Internship		no
Provincial - Yukon	Yukon Co-op Education Program	Co-op		no
	Student Training and Employment Program	Employment		no
	Yukon Youth Conservation Corps	Employment	16-29	no
	Yukon GradCorps	Employment		no

Appendix D

Testimonies and links to blurbs on the experiences of mature women in STEM.

Testimony of Heather VanVolkenburg Master Student Biological Sciences, Brock University

When I first contemplated returning to school to pursue higher education, I was 30 years old, married, had three children (ages 4, 6, and 8 at the time) and working from home providing care for other children. I had been working as a retail manager for years but had not been able to return after the birth of my youngest daughter due to her having several health issues as a baby. My high school experience had been less than ideal as the system did not do a great job promoting higher education in any subject other than those that would turn out physicians, lawyers, or teachers (none of which interested me in any way). At home, the perception was that higher education was an unnecessary luxury, and that I would be better off without it. While always having the ability to perform above average academically, it was not until after my children were born that I truly appreciated what I may be able to achieve. However, with three children under the age of 10 and a husband with a 40 hour a week factory job, it did not seem possible to balance family life financially (e.g. daycare, lack of secondary income, etc.) let alone academically. I was unable to find much in terms of either institutional or government support geared specifically towards older individuals with families seeking to return to school. For this reason, I put off returning for five more years, hoping that with the kids a little older it may be a little easier in terms of expenses and the amount of time I would need to devote to their care. At the age of 35 I finally got up enough nerve to officially enroll as an undergraduate in a general arts program at university.

The general arts program was not my first choice, I would have preferred to begin in a science stream, however, my time away from high school (> 15 years) left me short one credit to qualify for the general science program. In addition, I was unable to enroll specifically as a mature student unless I was willing to commit to just part time in my first year. I assume that the idea behind this is to ease one back into the system gradually to ensure success, however, I found this to be a silly requirement as having so much life experience (e.g. demanding managerial job, family of five, etc.), I was probably more capable of balancing academics than most undergrads first out of high school. Being restricted to part time was not something I felt was fair, and it would have added more time to an already costly and long overdue process. For this reason, I entered as a regular fulltime undergraduate would, coming from high school, but chose courses as though I were in the first-year science program.

After completion of my first year, and a proven record of accomplishment, I was able to switch into my desired science stream (Biological Sciences). All of this was accomplished with investigation and perseverance on my part, nowhere was I able to find supports in place specifically for individuals like myself. Academic advising services that I utilized were always surprised at my age and had little to offer in terms of strategy over and above what I could do on my own. Financial resources were often limited to those available to a typical young undergraduate, and in many cases limited to those under the age of 30. This was particularly daunting as the cost of living as we get older typically goes up (e.g. children, mortgages, etc.) yet does not seem to be accounted for in scholarship/bursary supports offered. While government support (e.g. OSAP) exists, and does make considerations for those with dependants (I used it extensively throughout my undergrad), it is mainly in the form of loans and ends up leaving the borrower saddled with twice the debt an

average undergrad program participant accumulates throughout their study. In addition, many of the awards that I was qualified for in graduate school came at the cost of other funding sources originally offered making them far less financially prestigious than they are made out to be. While it is understandable that funding needs to be stretched for all student categories, it may be worthwhile to reconsider how much this applies to mature students who often have greater financial responsibilities than younger students. Thankfully I was able to receive a few key awards throughout my program of study based on academic merit but as these are often quite competitive and available to the general student body, I wonder how many mature students can perform to such a standard with all of the other life pressures they must deal with. I have been very fortunate in that my husband (as well as his employer) was and continues to be very understanding, supportive, and willing to make large sacrifices financially for me to pursue this dream. His support, rather than the institutions, has held me up both mentally and financially throughout my program as the isolation one feels when they are the only above 30-year old in an auditorium/classroom of at times over 1000 students is incredible.

My own feelings of inadequacy were further amplified by the fact that many young undergraduate students seemed to have the freedom to devote themselves 100% to their studies and were held up with a multitude of support programs geared specifically towards them. I often felt determined to prove myself worthy of being in a class and always avoided requesting extensions or special attention as I felt it would put me at a disadvantage and I did not want to be considered as too weak or preoccupied to be there. While I have faced small burn outs several times throughout my program, many of which were from making the choice to push myself too hard, I think things may have been easier if more supports had been in place or if those that existed were made more obvious. Many mature students do not have the luxury of an extremely supportive partner and would benefit from more comprehensive institution/government support aimed at their age group and life status. Those like myself that are fortunate enough to find an understanding and supportive mentor/supervisor during their tenure as a student are extremely lucky as such individuals seem to be very rare. For myself, having an individual from my department in my corner encouraged me enough to pursue STEM academics further at the graduate level but for those who do not have such a relationship the difficulties of getting through an undergraduate degree in such isolation would likely be quite discouraging and deter them towards continuing studies beyond this point.

Testimony (French): Annie Montpetit

Doctorante en sciences sociales appliquées, Université du Québec en Outaouais

Entre l'obtention de mon baccalauréat en études internationales (2004), puis de ma maîtrise en gouvernance environnementale (2009), j'ai travaillé quelques années. J'ai aussi fait de même avant de décider de m'inscrire au doctorat, en 2012, à l'âge de 32 ans. Avec du recul, je considère que mes expériences de travail m'ont permis de mieux définir mes intérêts de recherche et d'acquérir des connaissances pertinentes dans mon champs d'expertise (adaptation aux changements climatiques). Toutefois, ce parcours atypique ne correspond pas au modèle linéaire mis de l'avant dans le milieu académique. Ainsi, même si j'avais obtenu d'excellents résultats à la maîtrise et que j'avais acquis des expériences pertinentes, je n'ai pas obtenu de bourses au cours de mes premières années de doctorat. Je suis convaincue que les résultats moyens que j'avais obtenus au baccalauréat et le fait que je n'avais jamais obtenu de bourse à la maîtrise ont joué en ma défaveur. Mon profil ne correspondait pas à l'excellence, telle que définie dans les programmes de bourse.

Après beaucoup de travail, j'ai fini par obtenir une bourse de recherche de 3 ans, mais j'ai bien compris que les parcours linéaires excellents sont ceux qui sont favorisés. Et que l'on doit ramer fort si on ne suit pas la vague!

Outre les obstacles inhérents au financement, j'ai dû relever les défis qui s'imposent à celles et ceux qui font le choix d'être parent au cours de leur doctorat. Lorsque j'ai donné naissance à ma fille, pendant mon doctorat, mon université m'a autorisée à prendre un congé, mais il n'existait pas de motif d'absence pour congé parental. J'ai donc utilisé deux des trois « absences autorisées » auxquelles j'ai droit tout au long de mon doctorat comme congé parental. Or, la parentalité est une réalité qui s'impose très souvent pour les personnes qui font un retour aux études comme moi. Loin d'être atypique, il va de soi que pour favoriser les personnes ayant un parcours atypique à poursuivre, les universités doivent reconnaître cette réalité, leur offrir des services adaptés (halte-garderie, ajustements d'horaire, etc) et mettre en place des politiques familiales.

Les organismes subventionnaires doivent donc revoir leurs critères d'excellence pour tenir compte de la richesse des personnes ayant un parcours atypique. Pour ce faire, les expériences extra curriculum et les expériences de travail doivent également être reconnues. Les organismes subventionnaires devraient également accorder un statut particulier pour les parents étudiants (par exemple leur permettre de postuler aux grands concours peu importe s'ils sont à temps plein ou à temps partiel). Je suis convaincue qu'il y a un grand avantage pour la science et la société de considérer la richesse des parcours atypiques.

**Testimony of Lindsey Tulloch,
Undergraduate student, computing science, Brock University**

Investing the time and money required to complete a Post-Secondary degree in Canada isn't the kind of decision one should make on a whim, and there are extra considerations that need to be considered when one is a single mother with dependants. Firstly, there are extra time commitments, expenses and hurdles that make it that much more challenging to be a mother and a student. Doing well in university classes usually requires a lot of time for courses and assignments and to practice course materials. I went back to school when my son was 11 months old and at the time, my husband hadn't yet been granted his visa to reside in Canada so I was taking care of my son alone. I initially applied as a part-time student because I didn't think I would have enough time to juggle a full course load and caring for my son all by myself. Even as a part-time student, I still had to find a caregiver for my son so I could attend classes, labs and exams. Fortunately I was able to find a reliable sitter very close to my present address and had savings before I went back to school. I went back to live with my parents for extra financial (i.e. Living in their house) and care-giving support. I received money from OSAP to help cover the costs and was able to make it work. However, I think about the women who did not have some of the support network that I did. Caring for a very young child and making ends meet may have been a much more insurmountable challenge, and certainly would put them much more in debt when they finish school. This is a very difficult place to start from, especially as a single mother. Furthermore, being a mature student can be isolating since mature students, by definition, are at a different life phase than most other students.

Another blog on the challenges of mature women in higher education
<http://ryersonian.ca/mature-students-feel-out-of-place-on-campus/>

Appendix E

List of the participants in the three round tables organized to discuss the reflection paper, the data and avenues for potential solutions or strategies.

Name	Organization	E-mail
<i>Ottawa, ON</i>		
Jennifer Houghton	NSERC	Jennifer.Houghton@nserc-crsng.gc.ca
Michelle Thomson	Tech-Access Canada	mthomson@tech-access.ca
Luiza Pereira	Canada Council for the Arts	Luiza.pereira@canadacouncil.ca
Dick Bourgeois-Doyle	National Research Council Canada (NRC)	Dick.Bourgeois-Doyle@nrc-cnrc.gc.ca
Ellie Bennett	CCUNESCO	Eleanor.haine-bennett@ccunesco.ca
Jeanette Southwood	Engineers Canada	Jeanette.southwood@engineerscanada.ca
Mark Shumelda	Colleges & Institutes Canada	mshumelda@collegesinstitutes.ca
<i>Montréal, QC</i>		
Fanny Eugène	FRQ	Fanny.eugene@frq.gouv.qc.ca
Catherine Olivier	FRQ	Catherine.olivier@frq.gouv.qc.ca
Laurence Solar-Pelletier	Polytechnique de Montréal	Laurence.solar-pelletier@polymtl.ca
Tina Gruosso	University McGill	t.gruosso@sp-exchange.ca Tina.gruosso@gmail.com
<i>Halifax, NS</i>		
Tamara Franz-Odendaal	Mount St Vincent Univ.	Tamara.franz-odendaal@msvu.ca
Ulrike Bahr-Gedalia	Digital Nova Scotia	ulrike@digitalnovascotia.com
Emily Boucher		Emily.boucher@techsploration.ca
Denise Pothier	Stantec	Denise.pothier@stantec.com
Angela Siegel	Dalhousie Univ.	siegel@dal.ca
Amanda Cockshutt	Mount Allison Univ.	acockshu@mta.ca
Rosalie Hanlon	Engineers Nova Scotia	rosalie@engineersnovascotia.ca
Cody Paige		Cody.a.paige@gmail.com
Stephanie MacQuarrie	Cape Breton Univ.	Stephanie_macquarrie@cbu.ca
Andrea Winn		Andrea.m.winn@gmail.com
Adrienne Power	Dalhousie Univ.	Adrienne.power@dal.ca
Heather Ternoway	NS Status of Women	Heather.Ternoway@novascotia.ca
Bonnie MacKay	Dalhousie Univ.	bmackay@cs.dal.ca
Arylene Reycraft		Arylene.reycraft@techsploration.ca