A COMPARISON OF TEACHING QUALIFICATIONS IN GRADES 10 THROUGH 12 MATHEMATICS

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Dedication

This thesis is dedicated to Gus, Dolly, and Winston.

It is doubtful I would have made it through this thesis without

the three of you to keep me company.

Abstract

Academic tracking is a standard practice for Grades 10-12 students in Alberta (Alberta Education, n.d.). Schools may also have locally developed enrichment or remedial mathematics programs. The purpose of this study was to determine the relationship between teacher characteristics (years of teaching, mathematics training, and highest education level achieved) and teacher placement within mathematics tracks and mathematics programs. Grades 10-12 mathematics teachers from two Alberta school divisions participated. Data was gathered using an online survey. Data analysis included use of the Pearson product-moment correlation coefficient. Results indicated relationships between several teacher characteristics and mathematics program placement. Most notable findings included a positive relationship between years taught and enriched mathematics placement, and mathematics training and enriched mathematics placement, as well as a negative relationship between highest education level achieved and remedial mathematics placement. Future research is needed to provide a clearer understanding of how teacher characteristics are related to placement in tracked high school mathematics.

Acknowledgements

I would like to begin by thanking Dr. Richelle Marynowski for taking me on as a graduate student. As well, I would like to acknowledge her ongoing support and guidance throughout this research. Furthermore, I would like to thank the other members of my thesis committee, Dr. Sharon Pelech and Dr. Pamela Adams. Each of you brought different strengths and perspectives to the research project, and I greatly appreciate your patience, encouragement, and input throughout the research project.

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Chapter 1: Introduction

Researcher's Experience: Forming the Question

As a high school student in Alberta, my friends and I were sorted into Advanced Placement, Pure Mathematics, and Applied Mathematics (the mathematics options offered at my school at the time). Even then, I was curious about the implications of academic tracking.

As I went through university, this sense of inequity in high school mathematics further developed. I talked to friends from other school divisions about the tracks that existed at their schools. In the rural community where my husband attended school, students chosen for an academic enrichment program received extra spares during the day and were allowed to rewrite their summative assessments. I could not rationalize how academically successful students were given the sole opportunity to rewrite assessments. The students in this track had less apparent learning needs yet benefitted from smaller class sizes. As I broached this topic time and time again, I was disturbed that my friends felt entitled to a better quality of teaching, as though the merit of their privilege had earned them the privilege of richer instruction.

My own experience teaching has contributed to an additional layer of understanding. As a new teacher, I had many exciting and creative ideas in the classroom. I did not find it difficult to assign creative and enriching tasks for students who had achieved curricular outcomes. However, I struggled more with supporting students with additional learning needs. The longer I taught, and the more education/professional development I pursued, the more I understood about assessment, teaching strategies, and academic interventions. Although I have not found data to back this claim, my observation is that students in "non-academic" streams of mathematics tend to have more complex learning needs, such as a diagnosed learning or social emotional conditions, low socioeconomic status, disruption in school due to refugee status, and other

factors. If the experience of other teachers is like my own, new teachers who do not have formal mathematics training may find it challenging to teach a group of learners who have difficulty with math.

As I have history as both a teacher and a student in Alberta, I understand that I have pre-understandings and assumptions. I am aware that my experience with tracked mathematics is not universal. Since entering the teaching profession, I have met many passionate teachers who engage students of all levels in rich mathematical learning. As well, not all students in workforce/trades entry tracks of mathematics are low achieving students. However, I suspect teachers may be sorted inequitably. This is why I chose to complete an exploratory, quantitative research project. The use of a quantitative survey tool will provide insight about teacher sorting in Grades 10 through 12 mathematics. Although I am very interested in the social context of academic tracking, this study will not focus on the various complexities regarding academic tracking, and social implications of doing so. I feel that it is important to gather specific data to ground my research question prior to exploring other questions related to the topic.

Exploring the Research Question

Students enroll in mathematics tracks based on past achievement and future goals, but are teachers "tracked" too? Identifying how teacher experience and training relate to teaching assignment is the first step towards identifying other relationships. For example, investigating the relationship between teacher experience/training and achievement across academic tracks, or the relationship between teacher experience/training and student demographic variables (such as race/ethnicity, socioeconomic status, gender and special education status) across mathematics tracks. The primary research question is "What is the relationship between teacher experience,

training, and math qualification and teacher placement in Grades 10 through 12 mathematics pathways?"

In Alberta, it is not noted whether teachers require a specific amount of semester hours credits of coursework in a core subject area (mathematics, English/French language arts, social studies, sciences) to actively teach that subject (Government of Alberta, n.d.). This indicates that teachers without university coursework specific to a core subject area may teach this subject area. As Alberta does not specifically outline the requirements to teach high school mathematics, it is possible that teacher experience and training vary within schools, divisions, and the province.

Furthermore, the licensing requirements in Alberta do not outline whether additional requirements are needed to teach Grade 12 mathematics. Students write standardized provincial achievement tests worth 30% of their final grade, the results of which influence their post-graduation options (Government of Alberta, 2020a). Provinces differ on their requirements for teaching core subjects with credits that can be used towards high school graduation. For example, in Saskatchewan, in order to teach Grade 12 mathematics, teachers require 24 credits of coursework in the specific subject area being taught, including at least three credits in the area of curriculum, instruction and assessment, two years of teaching experience and attendance to an accreditation seminar (Government of Saskatchewan, n.d.). As requirements for teaching Grade 12 mathematics are not formally outlined in Alberta, students in Alberta may have teachers who lack post-secondary coursework and teaching experience.

Although there is international research on teacher placement, limited Canadian research examines teacher placement within tracked high school programming. The results of this thesis should not be used to make conclusions for teacher sorting on a provincial or national level.

Rather, this thesis explores the existence of mathematics teacher placement relationships at a school division level.

Background and Context

Across Canada, students are divided into tracks of mathematics and other core academic subjects in high school (Krahn & Taylor, 2005). These pathways are similar within Western Canadian provinces, and Northern Canadian territories.

Table 1

Provincial Math Pathway Overview

Alberta Curriculum (includes Nunavut and Northwest Territories)
Starting in Grade 10 there are four math pathways. This includes: • -1: prepare students for programs requiring theoretical calculus • -2: prepare students for programs not requiring theoretical calculus • -3: prepare students for the majority of trades and workforce • -4: build functional math skills (Alberta Education, n.d.).
Saskatchewan Curriculum
Starting in Grade 10 there are three math pathways. This includes: *(table continues)* • Pre-Calculus: prepare students for programs requiring theoretical calculus • Foundations of Mathematics: prepare students for programs not requiring theoretical calculus • Workplace and Apprenticeship Mathematics: prepare students for the majority of trades and workforce (Saskatchewan Ministry of Education, 2010)
British Columbia Curriculum (includes Yukon Territories)
Starting in Grade 10 there are three math pathways. This includes: • Pre-Calculus: prepare students for programs requiring theoretical calculus • Foundations of Mathematics: prepare students for programs not requiring theoretical calculus • Workplace and apprenticeship Mathematics: prepare students for the majority of trades and workforce (British Columbia Ministry of Education, n.d.).

Manitoba Curriculum

Starting in Grade 10 there are three math pathways. This includes:

- Pre-Calculus: prepare students for programs requiring theoretical calculus
- Applied Mathematics: prepare students for programs not requiring theoretical calculus
- Essential Mathematics: prepare students for the majority of trades and workforce (Manitoba Education, 2014).

Ontario Curriculum

Starting in Grade 10, there are two mathematics pathways. This includes:

- Principles of mathematics:
- Foundations of mathematics:

In Grade 11 there are four pathways for mathematics. These include:

- University preparation courses
- University/college preparation courses
- College preparation courses
- Workplace preparation courses

In Grade 12, there are six math course options that correspond with these pathways (Ontario Ministry of Education, 2007).

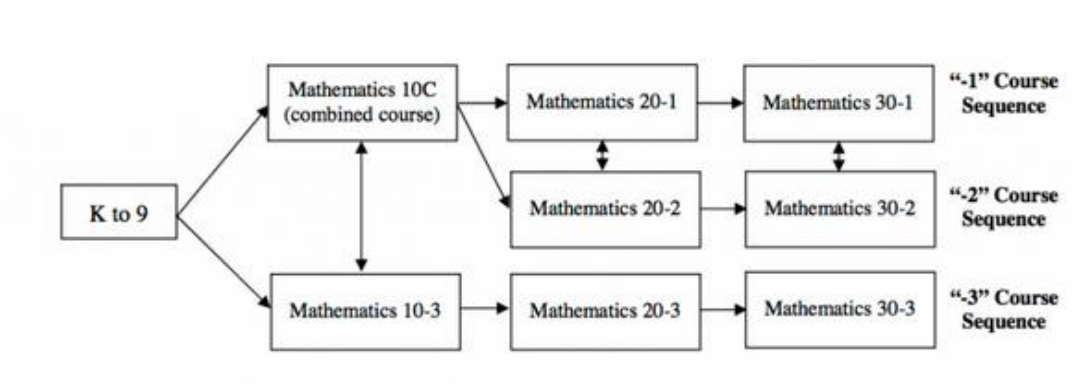
In Alberta, mathematics course options include -1, -2, -3, -4 and 31 (Calculus), and may include alternative or enrichment options (Alberta Education, n.d.). -1 and -2 math programming in Alberta focuses on skills required for students to be admitted and successful in university/college, -3 math programming is intended to fulfill requirements for the majority of trades/some technical schools and direct entry into the workforce, and -4 math programming is intended to build functional skills for students to apply in their daily lives, including direct entry into the workforce (Alberta Education, n.d.). In academic tracking, students and their families have some choice regarding the academic tracks they will complete. Students must meet the criteria to enroll in each track but may choose between tracks that they qualify for. For example, a student must have a prerequisite of 50% in Mathematics 10C to enroll in Mathematics 20-1 or 20-2, and a student with a 70% average may choose to enroll in Mathematics 20-3 (Government of Alberta, 2019). However, the protocol for transferring between tracks (for example from -3 to

-2) is determined on a school division basis, and often at the school level (Government of Alberta, 2019).

Table 2

Alberta Math Curriculum Description

Mathematics-1
"This course sequence is designed to provide students with the mathematical understandings and critical-thinking skills identified for entry into post-secondary programs that require the study of calculus. Topics include algebra and number; measurement; relations and functions; trigonometry; and permutations, combinations and binomial theorem" (Alberta Education, n.d., p. 10).
Mathematics-2
"This course sequence is designed to provide students with the mathematical understandings and critical-thinking skills identified for post-secondary studies in programs that do not require the study of calculus. Topics include geometry, measurement, number and logic, logical reasoning, relations and functions, statistics, and probability" (Alberta Education, n.d., p. 10).
Mathematics-3
"This course sequence is designed to provide students with the mathematical understandings and critical-thinking skills identified for entry into the majority of trades and for direct entry into the work force. Topics include algebra, geometry, measurement, number, statistics and probability" (Alberta Education, n.d., p. 10). *(table continues*)
Mathematics-4
"Knowledge and Employability mathematics courses focus on developing essential mathematics knowledge, skills and attitudes needed for everyday living at home, in the workplace and in the community. This sequence is designed for students whose needs, interests and abilities focus on basic mathematical understanding; e.g., literacy. Emphasis is on the acquisition of practical life skills and competency in using mathematics to solve everyday problems, interpret information and create new knowledge within the contexts of the home, the workplace and the community" (Alberta Education, n.d., p. 3)



Note. Adapted from *Alberta Education, n.d.*

Figure 1. Alberta Mathematics Pathways.

To become certified to teach in Alberta, individuals require a minimum four-year education program, with 48 semester hours of coursework in teacher education coursework and 10 weeks of supervised practicum teaching at either the elementary or secondary level (Government of Alberta, n.d.). Grades 10 through 12 teachers require 24 semester hour credits (the equivalent of eight, three credit courses) in a teachable subject area (Government of Alberta, n.d.). Teacher preparation coursework is expected to prepare pre-service teachers to fulfil specific teacher quality standards (Alberta Education, 2018).

Alberta teachers may receive an increase in pay based on their teaching qualifications, which may include post-secondary education at the undergraduate and graduate level (Teacher Qualifications Service, 2019). In addition, Alberta offers a $1000 bursary for pre-service and current teachers wishing to complete approved mathematics teaching coursework (Government of Alberta, 2020b). Some provinces, such as Saskatchewan, offer incentivization for completing an Additional Qualification Certificate, or other form of additional qualifications (Saskatchewan Professional Teachers Regulatory Board (SPTRB), n.d.). These certificates are intended to train teachers in areas of need, such as mathematics or special education (SPTRB, n.d.). This differs

from the Alberta system, as it is a formal certification in addition to the post-secondary qualification, issued by the SPTRB (SPTRB, n.d.).

The availability of qualified teachers may vary across the province. In Alberta, the universities that offer a secondary mathematics major include the University of Lethbridge (Lethbridge), University of Alberta (Edmonton), and Burman University (Lacombe) (ALIS, n.d.). As well, students with an undergraduate degree may complete an after degree in secondary education through Concordia University (Edmonton), King's University (Edmonton), University of Calgary (Calgary) and University of Alberta (Edmonton). The University of Alberta also offers a combined bachelor's degree in mathematics and secondary education (Alberta Learning Information Service, n.d.) Several rural colleges/universities in the province have secondary education programs affiliated with other universities, including Red Deer College (Red Deer) and Keyano College (Fort McMurray), or general education programs, including Medicine Hat College and Grande Prairie Regional College (ALIS, n.d.) Programs such as the Northern Student Teacher Bursary exist to encourage teachers with specialized or in demand qualifications such as mathematics to work in northern and remote areas of the province (Northern Alberta Development Council, n.d.).

Organization of the Thesis

This thesis is organized in five chapters. The first chapter outlines background and content, the problem, the researcher's perspective and organization of the thesis. The second chapter includes definition of key terms related to the study, the literature review related to relevant topics including academic tracking, teacher sorting, teacher hiring and assignment policy, and the relationship between teacher experience, education and student achievement. Chapter Three outlines the research methodology, research purpose and research questions,

sample, population, and variable information, survey development, and the data collection and analysis process. Chapter Four includes the presentation of findings. Chapter Five expands the findings through the discussion, highlights implications and directions for future research, and summarizes limitations of the study.

Chapter 2: Overview of Related Literature

The purpose of the literature review is to synthesize existing literature and resources related to the topic of teacher assignment in tracked high school education**.** The literature review provides an overview of academic tracking in a Canadian context, highlights teacher sorting on an international level, examines the student characteristics in differing high school tracks, and considers the relationship between teacher characteristics and student academic achievement.

Key Terms and Constructs

In a Canadian context, *academic tracking* typically refers to *course by course tracking*. *Course by course tracking* occurs when courses of varying difficulty are offered, typically in several subject areas (Chmielewski, 2014). *Academic and vocational streaming* occurs when students are separated into separate programs (Chmielewski, 2014).. Academic streaming prepares students for university (Chmielewski, 2014). Vocational streaming prepares students for trades education and direct entry to the workforce (Chmielewski, 2014). With academic streaming, students take all courses at the same level (Chmielewski, 2014). Academic and vocational streaming is not the standard practice in Canada.

As students are sorted between programs, it is important to study the relationship between student sorting on teacher placement.. Within the context of this paper, t*eacher placement* refers to the policy and decisions that guide a teacher's school, subject and grade placement. Another key term that will be used in this study is *teacher sorting. Teacher sorting* refers to patterns associated with teacher placement such as teacher education and experience in relation to student ability (Luschei & Jeong, 2018). *Teacher sorting* examines the overall placement patterns at a school or district level.

There are two common types of teacher sorting. *Between school sorting* describes patterns of teacher sorting between different schools (Luschei & Jeong, 2018) This is most commonly related to school socioeconomic status, with schools in lower socioeconomic status areas having teachers with less experience and lower qualifications (Luschei & Jeong, 2018). *Within school sorting* describes patterns of teacher sorting when teachers have the option to teach students that are sorted into different classrooms on a school level (Luschei & Jeong, 2018).

High schools in Alberta may have different structures and include different grade levels. When *high school teachers* are referenced in this paper, it is referring to high school teachers who teach at least one period of Grades 10 through 12 coursework. Only Grades 10 through 12 teachers will be surveyed for this study. This is because in Alberta, tracking formally begins and students receive credit towards graduation for coursework beginning at the Grade 10 level (Alberta Education, n.d.). In Alberta, there is not separate curriculum for Grade 9 tracked mathematics programming (Alberta Education, n.d.). Some schools may offer locally developed mathematics programming in Grade 9, but this is not a common practice across schools (Alberta Education, n.d.)

Academic Tracking in a Canadian Context

In Alberta, there are four high school mathematics tracks. Between 2010-2012 the Alberta math curriculum tracks changed. Prior to 2010, Alberta offered Pure and Applied mathematics for students in Grades 10 through 12 (Marynowski & Forand, 2017). Pure mathematics was intended to fulfill the requirements for university, whereas applied mathematics was intended to fulfill the requirements for graduation, and some trades and technical programs (Marynowski & Forand, 2017). Applied mathematics was criticized, as it was not accepted by all universities due to its lack of algebraic focus (Marynowski & Forand, 2017). The intention of the

curriculum shift in 2010 was to provide more math pathways that lead to post-secondary (Marynowski & Forand, 2017). As a result, three pathways, or tracks, were developed. Pathway one was intended to satisfy the calculus requirements for most universities. Pathway two was intended to satisfy the university entrance requirements for non-calculus-based programs. Pathway three was intended to satisfy the needs for trades, agriculture, and some technical programs (Marynowski & Forand, 2017). Unfortunately, despite this shift, many non-calculus-based university programs in Alberta still require mathematics 30-1 as an entrance requirement, or requirement for core math coursework (Marynowski & Forand, 2017). Currently, Western Canada (British Columbia, Alberta, Saskatchewan and Manitoba) shares a similar framework for high school mathematics pathways.

Teacher Sorting and Academic Tracking

There are several studies in the United States which examine teacher sorting and student achievement. Kalogrides and Loeb (2013) noted that lower achieving students were more likely to be taught by teachers with less years of teaching experience, and teachers who possess degrees from less competitive universities when compared to higher achieving students in the same school. Kalogrides and Loeb (2013) note that in the United States, teachers are hired on a district level, and able to apply and bargain for more desirable positions.

Luschei and Jeong (2018) identify policies that influence where teachers teach. There are two primary types of student sorting. Cross school student sorting concentrates certain types of students in different schools. Within school student sorting separates students into different classrooms within the school, typically based on academic ability or behavior. Cross school student sorting is related to a reduction of within school-teacher sorting as the population is more homogenous within schools (Luschei & Jeong, 2018).

Within school student sorting is related to a decrease in cross school-teacher sorting, as there is more heterogeneity throughout the school division. However, within school student sorting is correlated with increased within school-teacher sorting. This trend of increased within school-teacher sorting is reflected by the concentration of students with certain needs or advantages into differing classrooms (Luschei & Jeong, 2018). In Alberta, schools with students Grades 10 through 12 formally offer academic tracking, or within school-student sorting. The practice of sorting students into separate schools is uncommon, and typically only occurs for students with multiple, complex special and medical needs.

Teacher sorting occurs within school divisions, and teacher placement is often related to interplay between teacher qualifications/experience and neighbourhood socioeconomic status (Luschei & Jeong, 2018). Qin and Bowen (2019) note that teachers in low-income areas of the United States have less years of education/specialization and less years of teaching when compared to high income areas. Ferrer-Esteban (2016) discusses the concept of social segregation in schools in Italy. As students often attend the school within their community student populations are typically sorted by student residence, resulting in sorting by socioeconomic status (Ferrer-Esteban, 2016). Ferrer-Esteban (2016) notes that parents may choose a school outside of their residential area based on the academic or other enrichment options provided (Ferrer-Esteban, 2016). As access to information is influenced by social background, this also results in social sorting (Ferrer-Esteban, 2016).

Teacher sorting may also occur on a provincial, or national level. Kitchenham and Chastauneuf (2010) studied teacher staffing issues in Northern Canada and found school divisions had difficulty attracting and retaining teachers with specializations in Behaviour Support, Learning Assistance, Resource Room, French, First Nation Language and Culture,

Counselling, and Music. Furthermore, all of the participants (including teachers, principals and human resources personnel) expressed concerns regarding teachers teaching outside their specialization (Kitchenham & Chastauneuf, 2010).

Teacher experience and education are related to student achievement (Bhai & Horoi, 2019). Bhai and Horoi (2019) studied the association between several teacher characteristics and student math and reading achievement as measured by North Carolina standardized test scores. The strongest indicator of student achievement was number of years teaching (teacher experience). As well, teacher certification in the area of teaching math had a statistically significant impact of .10 standard deviations on both math and reading.

Clotfelter, Ladd and Vigdor (2007) also studied the relationship between teacher education and experience, and student achievement in math and reading as measured by North Carolina standardized test scores. Clotfelter, Ladd and Vigdor (2007) found that teachers with additional university training in the area of math had larger effects on student mathematics growth when compared with the impact of additional university training in the area of reading on student achievement in reading. Both teacher experience and specialty are related to student achievement. Identifying if teacher education is related to track placement will help identify if certain tracks are more/less likely to have experienced or specialized teachers.

Currently, there is limited research that examines teacher characteristics (such as education and years of teaching experience) across different academic tracks in a Canadian context. Understanding teacher distribution in relation to division policy will help illuminate what degree teacher choice versus policy have on teacher sorting. Furthermore, identifying a if a relationship exists is the first step towards examining the impact on students. Once teacher

sorting patterns are determined, this creates further opportunity for studying how teacher distribution impacts student achievement.

Overview of Enrichment and Remedial Mathematics Programming

Some schools in Alberta offer special mathematics options at the high school level. These may include enrichment or remedial classes. Both enrichment and remedial mathematics programming may be locally developed. Locally developed courses may be used to "accommodate student needs and interests, encourage and support innovative learning and teaching practices, address unique community priorities, engage students who may be at risk of leaving school early, and promote successful transitions to further education by exposing students to advanced subject matter and learning environments" (Government of Alberta, 2021). Locally developed courses must meet the criteria as outlined by the Government of Alberta (2021), and must be approved prior to implementation.

Within this paper, enriched programming encompasses advanced placement, international baccalaureate, and locally developed enrichment programming. Advanced placement is guided by a program called the College Board, which is an organization that aims to create opportunities to access post-secondary education (Transfer Alberta, n.d.). Advanced placement aims to give students the experience of an introductory level college/university course (Transfer Alberta, n.d.). Students may receive university credit for the course if they pass the advanced placement examination and the coursework meets the requirements of their chosen post-secondary institution (Transfer Alberta, n.d.). International Baccalaureate is an internationally recognized education program which aims to provide students with challenging, interdisciplinary coursework (Transfer Alberta, n.d.). Students may receive credit for International Baccalaureate programming if they receive a specific grade on the International Baccalaureate exam and this

coursework meets the requirements of their post-secondary institution (Transfer Alberta, n.d.). In this paper, locally developed enrichment programming encompasses mathematics programs that offer advanced subject matter and learning environments.

Typically, remedial programming is locally developed. In this paper, remedial mathematics is defined as mathematics programming intended to support students in transferring from one track to another, or mathematics programming intended to support students completion of a mathematics track with additional accommodations for the full class, such as extended time to complete the course or smaller class size. In this paper, I differentiate remedial programming from the -1, -2, -3, and -4 tracks. This is because the schools in this study used remedial programming as an intervention to transition students from a lower track to a higher track. If a student is enrolled in -4, they may have greater learning needs. However, I have not classified it as remedial as the goal of the course is not to transition to -3. When examining teacher sorting across academic tracks, I feel it is important to recognize that some tracked mathematics programming has unique characteristics.

Summary

Students in Alberta have mathematics options to meet the requirements for calculus-based university programs, non-calculus-based university programs, trades and technical programs, and direct entry into the workforce (Alberta Education, n.d.). Teacher sorting varies depending on policy and international context. There is currently limited research that examines teacher sorting within a Canadian context.

Teacher experience and education are correlated with academic achievement. Further research is needed to determine the relationship between student achievement and teacher characteristics across mathematics tracks.

There are many gaps in the current research, and further research is required to understand teacher sorting in Canada, student demographics across mathematics tracks, and the relationship between teacher sorting and student characteristics.

Chapter 3: Research Methodology

This chapter includes the research purpose and research questions, the null hypotheses, and the independent and dependent variables being studied. As well, the population of the study, sample information, survey development process, and data collection information are outlined. The chapter ends with a description of the data analysis procedures.

Research Methodology Rationale

This study used quantitative research to collect data from high school mathematics teachers in Alberta. This research was informed by positivism for the social sciences (Bryman, Teevan, & Bell, 2009). Positivism focuses on observable social realities, in which outcomes may be scientifically verified (Bryman, Teevan, & Bell, 2009). However, positivism for the social sciences recognizes that although there is an objective, shared reality, this reality is influenced by human experiences (Bryman, Teevan, & Bell, 2009). The key purpose of this research was to examine if a relationship exists between teacher experience, qualification and years of education and mathematics track placement. In this study, teacher years of experience, highest university credential received, and math training are shared realities. However, this reality is influenced by cultural norms and values. For example, in this study years of teaching experience is defined as the years spent teaching in a formal school system. Perhaps a teacher privately tutored mathematics for 20 years prior to starting teaching, and this experience was not captured in the research. Mathematics training is defined as a university qualification (major, minor, or additional certificate) in the area of mathematics. But a teacher could have an extensive math understanding from personal professional development that is not reflected in the research. And highest university credential received is defined as the highest level of formal, university education (such as a bachelor's degree, masters degree or doctoral degree). This reflects the

social value of formal, university education and may not capture other educational experiences. When designing the research question, I first wanted to explore what relationship exists. Since relationships can be collected as objective realities through correlational research, positivism felt like a logical framework. As I worked through the research process, I had many questions regarding why these relationships exist, and how they impact teachers and students. Through the positivism for the social sciences framework, I was able to collect data on teacher characteristics across high school mathematics tracks as an objective reality for the teachers in this study.

This project was also quantitative in nature. Quantitative research provides the opportunity to examine the statistical relationship between data sets (Bryman, Teevan, & Bell, 2009). This project used a survey, as this is a simple way to collect data and categorize relationships.. As the aim of this research project is to examine teacher placement, a quantitative method allowed for a correlational analysis of the data. This provided basic information regarding teacher placement, which may be used to guide future research questions.

This is an exploratory research project which aims to explore the research questions, but not to provide any firm conclusions (Dudoviskiy, 2018). As there is limited research examining academic tracking in a Canadian context, this project is intended to explore teacher placement within a specific Canadian context (Dudoviskiy, 2018). The use of exploratory research in the context of this project allows for further understanding of the characteristics of mathematics teachers across high school tracks. This project focuses on two school divisions, and the findings cannot be applied to all schools across the province. However, the findings do illuminate outcomes that exist at the school division level, which may be explored in further detail through future research.

Research Purpose Statement and Research Questions

The intention of this study is to examine the relationship between teacher characteristics and placement in tracked mathematics programming. This research will provide further insight of correlation between teacher education and experience in different math tracks. The primary intention of the research is to answer the question: "What is the relationship between teacher experience/training and teacher placement in Grades 10 through 12 mathematics pathways?"

Relationship refers to a statistically significant correlation as measured by the Pearson product-moment correlation coefficient, *r*. In this study, relationship strength is described using the guide Evans (1996) suggests for the value of *r*, as outlined in Table 3.

Table 3

Correlation Guide

Pearson Correlation Coefficient	Relationship
0.00 - 0.19	very weak
0.20 - 0.39	weak
0.40 - 0.59	moderate
0.60 - 0.79	strong
0.80 - 1.00	very strong

Note. Adapted from Evans (1996).

Independent Variables

The independent variables in this study include years of teaching experience, highest level of university education achieved, and university level mathematics training. *Years of teaching* refers to number of years having formally taught in the Kindergarten to Grade 12 educational system. Teachers reported their years of teaching experience as falling into a range rather than reporting the exact years of teaching. *Highest university credential received* refers to

the most advanced university program completed, Teachers reported their educational attainment. A bachelor's degree was assigned a value of 4, a combined bachelor's degree or two bachelor's degrees was assigned a value of 5, and a master's degree was assigned a value of 6. *Mathematics training* refers to a major, minor, or other post-secondary specialization in mathematics. Teachers reported whether they had a major, minor, or additional qualification in the area of mathematics at the post-secondary level.

Dependent Variables

The dependent variables in this study include track placement (-1, -2, -3, or -4), enriched placement, remedial placement, and grade placement. *Math track placement* refers to teaching placement in tracks -1 through -4 mathematics, *remedial placement* refers to locally developed mathematics programming intended to support low achieving students who may benefit from additional mathematics support and *enriched placement* refers to locally developed mathematics programming intended to support high achieving students who may benefit from additional mathematics enrichment. Teachers self-reported the courses they taught during the 2019/2020 school year. This year was chosen because it had less disruption to teacher workload due to COVID-19. Teachers reported if a course was enriched or remedial. This included a description of the focus and intent of the program.

Population of the Study

This study included two urban school divisions in Alberta. In this study, a high school is any school that includes Grades 10-12. Although most teachers taught other grades and subjects in addition to Grades 10-12 mathematics, only teachers who taught Grades 10-12 mathematics participated in this study.

Sample

Five urban school divisions were invited to participate in this study. Three school divisions approved this research project. In School Division A, seven Grades 10 through 12 math teachers across four schools participated. In School Division B, ten Grades 10 through 12 math teachers across two schools participated. In School Division C, only one eligible teacher across two high schools participated. School Division C was removed from the study.

Development

Teacher background information was collected using a modified Teaching and Learning International Survey (TALIS) Teacher Questionnaire, from the Organization for Economic Cooperation and Development (OECD) Teaching and Learning International Research Survey (OECD, 2018). The survey questions are included in Appendix A. The survey was developed using Qualtrics. The survey questions gathered information regarding teacher years of experience, teacher education and specialty, and what they are currently teaching. There is a mix of selected response questions (years teaching) and open-ended questions (education, courses currently teaching). The survey was reviewed by three members of the thesis committee and modified prior to implementation.

Data Collection

To begin this study, approval was obtained from the University of Lethbridge Human Resources Review Committee. Then, a research application was submitted to five school divisions in Alberta. Following the approval from three school divisions, high school principals received an email and notice to participate. Once approval was granted from the principal, Grades 10 through 12 math teachers received an invitation to participate.

The survey was completed in an online manner to ensure minimal disruption to teacher's day and convenience of data collection. The survey was hosted on the Qualtrics platform. All participants completed an informed consent form at the beginning of the survey, explaining the risks and benefits of participation, voluntary nature of participation, confidentiality, and participant's right to ask questions. Following the study, the research findings will be shared with the participating high schools.

Data Analysis

This study was analyzed using an explanatory approach. Explanatory design is "a correlational design in which the researcher is interested in the extent to which two variables (or more) covary, that is where changes in one variable are reflected in changes in the other" (Creswell, 2015, p. 341). Numerical values were assigned to:

- Each grade, track, and specialty (enriched/remedial)
- Years of teaching based on the median value for each bin
- Years of education based on the highest level of education achieved
- Mathematics specialty.

Data was input from Qualtrics into Microsoft Excel. Each dependent variable was tested to determine the *r* value, or Pearson's correlation coefficient. Findings were examined to determine the direction of the association. A linear relationship indicates variables are related based on high and low scores (Creswell, 2015). Uncorrelated and non-linear relationships indicate that the scores on one variable do not predict or tell any information about scores on another variable (Creswell, 2015). As well, the degree and strength of the association was identified. The degree of association means "the association between two variables or sets of

scores is a correlation coefficient of -1.00 to +1.00, with 0.00 indicating no linear association at all" (Creswell, 2015). The findings are highlighted in Chapter four.

Chapter 4: Summary of Findings

This chapter aims to answer the research question, "What is the relationship between teacher experience/training and teacher placement in Grades 10 through 12 mathematics pathways?". This includes the analysis of non-respondent bias, presentation of findings, including tables to display data. These findings illustrate the relationship between teacher experience and training and placement in Grades 10 through 12 mathematics.

Analysis of Non-Respondent Bias

Two public school divisions in two different communities participated in the study. School Division A had four participating high schools. There were eight eligible high school mathematics teachers, and nine teachers completed the survey. One teacher's data was removed from the survey as they did not teach Grades 10-12 mathematics. This represents a response rate of 100 percent. School Division B had two participating high schools. There were 13 eligible high school mathematics teachers, and 10 teachers completed the survey. This represents a return rate of 77 percent. To encourage response rate, principals were sent a reminder email prior to the conclusion of the study. Several factors interfered with teacher participation in the study. These limitations are discussed in Chapter 5.

Within each school division, the number of teachers who did not participate was recorded. All eligible teachers participated in School Division A, and three eligible teachers did not participate in School Division B. The most notable impact on the data is that in School Division A, calculus was taught during the 2019/2020 year. However, calculus was not represented on the teacher course load in the survey. This is because the survey had to be retroactive due to the impact the COVID-19 pandemic had on course assignments in the 2019/2020 school year. The teacher who had taught calculus during the 2018/2019 school year

was unable to complete the survey retroactively as they no longer worked for the school division. A suggestion for future research is to ask administrators the total number of each high school math course offered during the school year being researched.

Presentation of Findings

Table 4 and Table 5 contain a correlation matrix for School Divisions A and B respectively, showing the correlation coefficients for the three dependent variables and the three independent variables, and the probability level. A two tailed test of significance was used as positive and negative correlations are possible.

Table 4

Pearson Product Moment Correlations for Teacher Characteristics and Teacher Placement in School Division A

	Track	**Remedial**	**Enrichment**
Years Taught	0.0694	0.0777	0.5889
Math Training	0.2636	0.2581	0.400
Years of Ed	0.1817	-0.5477	-0.3535

Table 5

Pearson Product Moment Correlations for Teacher Characteristics and Teacher Placement in School Division B

	Track	**Remedial**	**Enrichment**
Years Taught	0.3589	0.3904	-0.3080
Math Training	0.0468	-0.2182	0.21822
Years of Ed	0.1408	-0.17204	-0.30588

The following section expands the relationship between the independent variables (teacher characteristics) and dependent variables (mathematics track and program).

Relationship Between Years of Teaching and Math Program Placement

Years of teaching and math program placement had variability across school divisions. In School Division A, years of education and math track placement are positively and very weakly correlated, whereas in School Division B these factors are negatively and weakly correlated. This indicates that in School Division A, teachers with more years of experience are slightly more likely to teach less academic mathematics tracks, and in School Division B teachers with more years of experience are slightly more likely to teach more academic mathematics tracks. Both divisions have a similar relationship between years of teaching and remedial mathematics placement. This indicates that teaching remedial mathematics is weakly correlated with greater years of teaching. In School Division A, years of education was positively correlated with enriched mathematics placement. This indicates teachers of enriched mathematics have more years of teaching experience. Interestingly, in School Division B, there is a negative and weak correlation with enriched math placement. Teacher placement is influenced by a range of variables, and future research is required to consider why these differences exist. Overall, there are relationships that exist between years of teaching and mathematics track and program placement. However, these relationships are not consistent across school divisions.

Table 6

Relationship Between Years of Teaching and Math Program Placement

	School Division A	**School Division B**
Relationship Between Years of Teaching and Math Track Placement	Positive and very weak correlation	Negative and very weak correlation
Relationship Between Years of Teaching and Remedial Math Program Placement	Positive and very weak correlation	Positive and weak correlation
Relationship Between Years of Teaching and Enriched Math Program Placement	Positive and moderate correlation	Negative and weak correlation

Relationship Between Mathematics Training and Math Program Placement

There was more consistency across school divisions when examining the relationship between mathematics training and math program placement. This may be because the category was binary; either a teacher is qualified in mathematics, or they are not. Both School Division A and B had a positive and weak correlation between mathematics training and math track placement, indicating that a -4 mathematics class is more likely to have a qualified mathematics teacher than a -1 math class. In School Division A, there is a positive and weak correlation between mathematics qualification and remedial program placement, but in School Division B there is a negative and weak correlation between these two variables. Both School Division A and School Division B had a positive correlation between enriched mathematics and mathematics training. Interestingly, in both School Division A and B, enriched mathematics teachers were more likely to have mathematics training in comparison to remedial mathematics teachers. This may be because enriched mathematics programs typically demand a higher level of mathematical understanding from students.

Table 7

Relationship Between Mathematics Training and Math Program Placement

	School Division A	School Division B
Relationship Between Mathematics Training and Math Track Placement	Positive and weak correlation	Positive and weak correlation
Relationship Between Mathematics Training and Remedial Math Program Placement	Positive and weak correlation	Negative and weak correlation
Relationship Between Mathematics Training and Enriched Math Program Placement	Positive and moderate correlation	Positive and weak correlation

Relationship Between Highest University Credential Received and Math Program Placement

Both school divisions have similar relationships between highest university credential received and mathematics track and program placement. In both School Division A and B, the relationship between highest university credential received and mathematics track placement is positive. Interestingly, in enriched and remedial programming in both School Division A and B the relationship between highest university credential received and program placement is negative. This indicates that teachers are less likely to have a higher university credential than those who teach the regular academic track. This is an unexpected finding, as both remedial and enriched programming have rational for hiring a teacher with advanced training. Perhaps years of education is rated as being less important than years of teaching experience and mathematics training when making placement decisions. This may be because additional years of education are not necessarily in the area of mathematics. Furthermore, none of the teachers have additional qualifications in the area of special education, which may be beneficial when teaching remedial or -4 programming.

Table 8

Relationship Between Highest University Credential Received and Math Program Placement

	School Division A	School Division B
Relationship Between Highest University Credential Received and Math Track Placement	Positive and very weak correlation	Positive and very weak correlation
Relationship Between Highest University Credential Received and Remedial Math Program Placement	Negative and moderate correlation	Negative and weak correlation
Relationship Between Highest University Credential Received and Enriched Math Program Placement	Negative and weak correlation	Negative and weak correlation

This section demonstrated correlations between a range of teacher characteristics and math track placement. The following section positions these findings within existing research.

Chapter 5: Discussions and Conclusions

This study examined the relationship between teacher education/experience and math track placement as illustrated in the research findings. The following section outlines the relationships that exist within each school division and positions the findings within existing research. Limitations of the study and directions for future research are discussed.

The primary aim of this study was to examine whether there was a relationship between teacher education/experience and math track placement. Overall, survey findings from School Division A and School Division B had weak correlations between teacher characteristics and track placement. Although the correlations are weak, they may provide insight into practices in teacher placements.

The relationship between teacher characteristics and placement is most apparent in remedial and enrichment programs. Within School Division A, teaching enriched mathematics was moderately and positively correlated with both years of teaching and mathematics training. Comparatively, teaching remedial mathematics was very weakly and positively correlated with both years of teaching and mathematics training. This is noteworthy as it indicates that higher levels of teaching experience and mathematics training are associated with teaching enriched mathematics. Hill and Dalton (2013) studied the relationship between out of field teaching and mathematics track assignment. Out of field teaching refers to teachers who are teaching a subject without a university subject specialization (Hill & Dalton, 2013). Their study found that high school students in most need of a qualified mathematics teacher were the least likely to have one (Hill & Dalton, 2013). High achieving mathematics students were more likely to have a teacher with mathematics qualifications (Hill & Dalton, 2013). Sixty-four percent of the highest achieving quintile of students had a qualified mathematics teacher, as compared to 49% of the

lowest achieving quintile of students (Hill & Dalton, 2013). Remedial mathematics is intended to support low achieving mathematics learners. However, without strategic teacher placement, low achieving mathematics students, such as those in remedial programming, are at risk of having less qualified mathematics teachers. Within School Division B, mathematics training correlates negatively and very weakly with remedial mathematics placement, and positively and very weakly with enriched mathematics placement. Although the relationship iis not as strong as School Division A, the findings do indicate that remedial students are less likely to have a qualified mathematics teacher in both school divisions. This is problematic, as students in remedial programming require additional mathematics support. Teachers with mathematics training may be better equipped to provide mathematics intervention. My assumption is that students in enriched mathematics will likely achieve regardless of teacher quality. They may not reach their full potential, but they likely have the skills and support to achieve expectations somewhat independently. However, I also have the assumption that students in remedial programming require a high level of teaching quality to move into a higher math track. If students in remedial mathematics had the skills, support, and independence to succeed in math without a qualified teacher, they would likely not require remedial programming.

Within School Division A, teaching remedial mathematics was moderately and negatively correlated with the highest level of university education attained. Teaching enriched mathematics was very weakly negatively correlated with the highest level of university education attained. This indicates that teaching remedial mathematics is related to lower levels of university education when compared to enriched mathematics. Interestingly, teaching both enriched and remedial mathematics is related with a lower level of university education when compared to non-specialized programming. However, in School Division B, enriched

mathematics is negatively and weakly correlated with years of university education, and remedial mathematics is negatively and very weakly correlated with years of university education. No participating teachers reported special education training and qualification. Yet, students with learning disabilities have higher mathematics performance when taught by teachers specialized in both mathematics and special education (Gilmour, 2019). Understanding which mathematics tracks have a higher proportion of students with a learning disability can guide targeted professional development.

Implications

This thesis indicates that there are weak and inconsistent relationships between teacher characteristics and mathematics track placement in both school divisions. Mathematics tracks tend to differ based on curricular outcomes and future vocational pathways. However, there is research which indicates teacher characteristics are related to student achievement. Thus, mathematics track and student achievement should be a determining factor when placing teachers. It is important to note that although teacher characteristics such as subject qualification, years of education, and years of teaching are correlated with student achievement, these characteristics alone are not enough to determine teacher effectiveness.

The Teaching Quality Standard (TQS) is a formal guideline for teacher effectiveness that outlines the professional expectations and competencies expected of practicing teachers in Alberta. The TQS states that teachers should have "a specialized knowledge of the subject areas they teach" (Alberta Education, 2020, p.4). This study found that there are high school mathematics teachers in Alberta who do not have a university specialization in the area of mathematics. Although it is possible the participants had built subject specific knowledge through non-university routes such as professional development, those making hiring and

placement decisions should ensure teachers have the specialized knowledge required to teach an assigned subject.

This study examined the relationship between teacher characteristics and mathematics track placement. However, there are other high school courses that offer tracked programming. Although the research was not statistically significant, it's worth noting that weak relationships did exist between some characteristics and programs within the school divisions. There is a possibility that there are relationships that exist between teacher characteristics and track placement across other subject areas.

I was unable to find a summary of recruitment, hiring, and placement practices in Alberta. However, I am aware that there are differences between the recruitment, hiring and placement practices across Alberta school divisions. The intention of this study was to examine the relationship between teacher characteristics and mathematics track placement. This study did not examine why these relationships exist. The findings of this research were statistically insignificant, and should not be used to inform local hiring policy. However, a relationship could exist between hiring practices and mathematics track placement. School divisions should consider how they are making hiring and placement decisions, and monitor tracked high school programming to determine what relationships exist between teacher characteristics, placement practices and tracked program placement.

Limitations

The purpose of this study was to determine teacher placement within a specific context. This is a correlational study within two specific school divisions. The study demonstrated different outcomes between the two school divisions. Further research is necessary to determine if similar outcomes exist across school divisions. Thus, the findings cannot be generalized

beyond the specific school divisions. As well, the sample size for each division was small. This research study took place during the COVID-19 pandemic. Recruitment was challenging as many school boards were not conducting research during this time. Many high schools modified teaching schedules and course delivery in response to the COVID-19 pandemic. Therefore, data was not collected from the 2020/2021 school year as it was not representative of a typical school year. As well, many teachers experienced a higher-than-average level of stress in response to the challenges associated with the COVID-19 pandemic. To reduce response fatigue, the survey for this project was brief and intended to be completed in five to ten minutes.

There are several key limitations to the survey that may be addressed before conducting future research.

- The survey should have required respondents to record their exact years of teaching. Two of the numerical bins were not the same size as the others on the survey. This only impacted one respondent.
- The survey should have required respondents to record the highest level of education received. The survey categorized years of education into a baccalaureate degree (four years) combined bachelors degree/two bachelor's degrees (five years) and master's degree (six years). None of the respondents had a relevant certificate (one year) or diploma (two years) so this data was not included. This may not be representative of the actual years spent in university. Rather, it is reflective of the highest degree held.
- The survey should record if respondents possess a math qualification (major, minor, or graduate level specialization in mathematics). Respondents described their exact educational attainment. However, this information is not relevant to the study.

These limitations should be addressed before conducting future research in this subject area. This will ensure the data collection tool produces more valid and reliable results.

Recommendations for Future Research

As the relationships between teacher education and experience and mathematics placement differed across school divisions, further research is necessary to determine provincial practices. The findings of this study are not applicable to other school divisions. However, the results provide a preliminary insight into relationships associated with teacher placement and academic tracking.

Overall, there were weak/very weak correlations between teacher variables and tracked mathematics placement. Thus, teacher variables have a limited relationship with tracked mathematics training. Further research is needed to highlight the relationship between teacher variables and student achievement within tracked mathematics. Once this relationship is better understood, future research may determine if the needs of students in a variety of mathematics courses are affected by teacher variables.

The strongest correlations were evident within enrichment and remedial programs. Enrichment and remedial programming is not emphasized throughout the Alberta curriculum, and is determined at the division, or school level. Future research is needed to examine the characteristics of enriched and remedial programming, the purposes and outcomes of enriched and remedial programming and teacher placement practices within these streams.

There is a need for future research focusing on the characteristics and experiences of students across mathematics tracks. As self-concept and math enjoyment are predictors of achievement, future research could explore the relationship between self-concept and math enjoyment across mathematics tracks and programming. Furthermore, future research is needed

to determine the demographic characteristics of students across mathematics tracks. Understanding the relationship between math track placement and variables such as race, socioeconomic status, gender, and disability is critical to inform equitable division of resources. Finally, much of the research focuses on high and low achieving groups of mathematics learners. Further research could provide insight towards the characteristics and placement trends of middle learners across mathematics tracks.

Ultimately, there is a lot to uncover related to teacher and student tracking in Canada. I started my research based on my personal experiences. I believe future research needs to invite the voices of other teachers and students. Recognizing student and teacher perceptions and experiences of academic tracking will provide further insight into the outcomes shared in this study.

Researcher's Experience: Conclusions and Reflections

It has been five years since I drafted a version of this thesis for a research methods course. I was a new teacher and a new researcher. Over time, my philosophy and approach to research has shifted. Five years ago, I did know that I wanted to take a critical, social justice-oriented approach to my research. However, I had a hard time reconciling my beliefs with my perception of a quantitative approach. When I started this study I had worked as a research assistant on quantitative projects informed by positivism. I loved dataand order. I gravitated towards a positivist, quantitative approach in part because of the familiarity.

I have spent the last three years working as a research assistant working on qualitative research projects. Through my research, I have unearthed many questions and identified directions for future research. I feel a qualitative or mixed-methods approach would provide a more nuanced understanding of this topic in future research.

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Appendix A:

Teacher Characteristics Survey

These questions are about you, your education and the time you have spent teaching. In responding to the questions, please mark the appropriate box.

1. What is your employment status as a teacher at this school?
   - ☐ Permanent employment (ongoing contract with no fixed end point before retirement)
   - ☐ Fixed term contract for a period of 1 year or more
   - ☐ Fixed term contract for a period of 1 school year or less

2. Which best describes your formal education? Please list any area of specialization in the box. For example: Bachelor of Education- Major: Biology Minor: Mathematics
   - ☐ Bachelor's degree in education
   - ☐ Bachelor's degree other
   - ☐ Combined Bachelor's degree
   - ☐ Master's degree in education
   - ☐ Master's degree other
   - ☐ University certificate in education
   - ☐ University certificate other
   - ☐ University diploma in education
   - ☐ University diploma other
   - ☐ Doctoral degree in education
   - ☐ Doctoral degree other

3. How long have you been working as a teacher? *Where possible, exclude extended leaves of absence (career breaks)*
   - ☐ 1-2 years
   - ☐ 3-5 years
   - ☐ 6-10 years
   - ☐ 11-15 years
   - ☐ 16-20 years
   - ☐ More than 20 years

4. What courses did you teach in the 2019/2020 school year? Please include all courses taught including grade level and track. Please specify if any of your courses are taught in a language other than English. For example: Math 30-1, Math 20-1 (French) Science 9

   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track
   - ☐ Subject/Grade Level/Track

Thank you!

Appendix B:

Participant Consent Form

You are being invited to participate in a study entitled A Comparison of Teaching Qualifications in Grades 10-12 mathematics. that is being conducted by Juliane Bell. Juliane Bell is a graduate student in the Faculty of Education at the University of Lethbridge, and you may contact her if you have further questions via e-mail at juliane.bell@uleth.ca or via phone at 306-250-9070.

As a Graduate student, I am required to conduct research as part of the requirements for a degree in the Master of Education program. It is being conducted under the supervision of Richelle Marynowski. You may contact my supervisor by email at Richelle.marynowski@uleth.ca or via phone at 403-329-2269.

In Alberta there are different tracks of mathematics. Academic tracks are intended to fulfil the requirements for most university programs and applied tracks are intended to fulfill the requirements for most trades/technical programming or direct entry into the workforce. The purpose of this research project is to investigate the relationship between teacher placement and teacher training/experience in high school mathematics.

Currently, there is limited research that examines the relationship between hiring practice and teacher placement based on teacher training and experience. Research of this type is important because it will increase the understanding of teacher placement trends. The survey questions should not be interpreted as a measure of your ability to fulfill your position.

You are being asked to participate in this study because you are a Grades 10-12 math teacher. If you agree to voluntarily participate in this research, your participation will include the completion of a short, 5 minute anonymous survey. The survey will be hosted through the Qualtrics platform. The privacy policy for Qualtrics is available at https://www.qualtrics.com/privacy-statement/. There are no known or anticipated risks to you by participating in this research. The potential benefits of your participation in this research include providing valuable information that may contribute to enhancing awareness of how teacher experience and education are related to math teacher placement.

Your participation in this research is completely voluntary. You may withdraw at any time prior to completing the survey without consequence by simply exiting the survey and closing your browser. If you do withdraw from the survey prior to completing it, none of your data will be included in the study. Once you click ‘Submit Responses’ your data will no longer be identifiable thus you will not be able to withdraw from the survey.

Your anonymity and confidentiality will be protected; as only the researcher and the faculty supervisor involved will have access to the secure server where the data will be accumulated and stored. This data will be extracted from the server, stored on a secure computer and/or in a locked file cabinet. All print data will be shredded and all electronic data will be completely deleted after five years. Only summary results of this study will be shared through the thesis

publication and defense, scholarly presentations, published in academic journals, or presented at academic conferences; with absolutely no reference to any individual or group.

If you are interested in a summary of the findings, you may contact the researcher at juliane.bell@uleth.ca

Questions regarding your rights as a participant in this research may be addressed to the Office of Research Ethics, University of Lethbridge (Phone: 403-329-2747 or Email: research.services@uleth.ca

By clicking "Begin Survey", you have indicated that you understand and agree to the above conditions.

Thank-you for your submission.