

THE INFLUENCE OF SENIOR 4 MATH PROVINCIAL EXAMINATIONS
ON THE ALLOCATION OF RESOURCES

By

Sheeva Harrysingh

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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**The Influence of Senior 4 Math Provincial Examinations
On the Allocation of Resources**

BY

Sheeva Harrysingh

**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of
Manitoba in partial fulfillment of the requirement of the degree
Of
Master of Education**

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Abstract

The role of Manitoba Senior 4 Mathematics provincial assessments may be characterized by the effects they have on resource allocation in high schools. While the literature is rich with studies that indicate resources can affect student achievement (Odden & Archibald, 2001; Odden & Busch, 1998; Hawley-Miles & Darling-Hammond, 1998), little attention has been given to the effects provincial assessments have on resource allocation in other areas (such as staffing or class size) in the school system. Noting the gap in the existing literature, this thesis aims to discern whether provincial assessments influence how resources are allocated at divisional and high school levels.

This study focused on the creation of a typology that extended the existing monetary definition of an educational resource by including the non-monetary issues of: staffing, time, class size, materials, specialist positions and professional development. The influence of provincial assessments on resource allocation was then explored using a case study that assessed how decisions were made concerning the resources included in the typology by individuals within the hierarchy of the school division: i.e., superintendents, principals, consultants and department heads.

This thesis argues that utilising a typology to examine resource allocation exposed variances in resource allocation that might otherwise have not surfaced using a more reductive/traditional conception of resources. While some categories within the typology were not necessarily influenced by the existence of provincial assessments, the rationale for how resources were allocated within categories appeared to be influenced by the participants' hierarchical position within the school division.

Chapter One

Introduction

In Canada, student testing has been an important and sometimes controversial educational issue. Editorials such as *Standardized testing needed in classrooms* (Winnipeg Free Press, May 18, 2004) cry out for accountability in our public education system. *Winnipeg Free Press* editorial opinion pieces demand fiscal responsibility and cite the *FRAME* (Financial Reporting and Accounting in Manitoba Education) report as a tool that “makes it possible for the public to see where money [is] spent and holds school divisions and the provincial government accountable for their financial decisions” (Owens, December 2003b, p. 1).

Through the cries for fiscal accountability, teacher accountability and standards testing, I wonder whether the emphasis on testing is changing the way that high schools and school divisions allocate resources. As a high school Mathematics teacher, all of the courses that I teach have a final provincial assessment, yet little is ever discussed on how these assessments affect resources within the Mathematics department or other areas in the school. Rather, researchers have concerned themselves with how resource allocation affects student achievement. In fact, much of the literature that does exist on school resources references the same study titled, *Rethinking the Allocation of Teaching Resources: Some Lessons from High-Performing Schools* conducted by Hawley-Miles and Darling-Hammond (1998). Consequently, I believe that there is a gap in the existing literature and set out to conduct a study that can begin to discern whether provincial assessments have influenced the manner in which resources are allocated by divisions and high schools.

New Directions

In 1994, the Manitoba government released *NEW DIRECTIONS: A Blueprint for Action*, a plan designed to renew the kindergarten to Senior 4 educational system through a “partnership approach with stakeholders” (*Blueprint for action*, 1994, p. 5). Following a recommendation in *NEW DIRECTIONS* called *Action 2* (as part of Manitoba's educational renewal initiatives), standards were defined in designated subject areas at Grade 3, Grade 6, Senior 1, and Senior 4. These standards were intended to assist teachers in understanding the expected levels of student performance in relation to grade and subject specific outcomes (*Reporting on student progress and achievement*, 1997).

Widespread provincial assessments based on the aforementioned standards were phased-in beginning with Mathematics/Mathématiques 40S and 40G in 1996/1997. In the 1997/1998 school year, additional standards assessments occurred in the following areas: Senior 4 English Language Arts; Senior 4 Français-langue maternelle; Grade 3 English Language-Arts/LA-Immersion; Grade 3 Français/Français-immersion; Grade 3 Mathematics/Mathématiques; Grade 6 English Language-Arts/LA-Immersion/Anglais; and Grade 6 Français/Français-immersion, Mathematics/Mathématiques (*Educational update*, 1997).

Compounding the implementation of provincial standards examinations was a revamped high school Mathematics curriculum which took effect in 1998 beginning at the Senior 2 level (*Educational Update*, 1998). In 2000, the new Senior 4 Mathematics curricula moved from a two-course program (40S and 40G) to one that had three distinct courses (40S Pre-calculus/Pré-calcul, 40S Applied/Appliquées, and 40S Consumer/Consommateur) necessitating three distinct provincial final standards

examinations (*Educational Update*, 2000). Students are allowed to hold credit in more than one of the Mathematics courses and must write a standards examination in each course taken. Currently, all of the Senior 4 provincial assessments count for 30% of the student's final grade (*Overview of assessment program*, 2004).

Historically, all of Manitoba's Senior 4 Mathematics and English assessments were marked in one location by a team of teachers paid an hourly wage (in 1999, I was paid \$22.70/hour). The marking teams were formed through an application process run by the Manitoba Department of Assessment and Evaluation. The teachers required a minimum of two years experience teaching the assessed course and were chosen from all regions of Manitoba. The standards assessments were marked using common rubrics, a "chain-gang"¹ team marking approach and a generic numbering system that masked students' identities. This system required one week to mark the English assessments (which were double marked) and 3 days to mark the Mathematics assessments. Detailed comparative statistics concerning items such as the provincial average, school averages, common student errors, marking rubrics and student answer analysis were provided by the Manitoba Assessment and Evaluation branch to each school division a few months after each marking session. As marking Senior 4 provincial assessments was a voluntary process, teachers had the choice to not participate.

In 2000, the marking of Senior 4 assessments became the responsibility of each local school division. Government policy dictated that "standards tests are [to be] locally marked and individual student results are [to be] reported locally" (*Policies and*

¹ A chain-gang marking approach divides all teachers into different teams. Each team is responsible for the marking of certain questions on the examination (i.e., team #1 would mark only numbers 1, 2, 3). All of the examinations are bundled into random sets of 10. Once a teacher has marked his/her assigned numbers in a

Procedures, 2004, p. 2). As such, “each jurisdiction nominates one or more local marking co-ordinators [per examination] to oversee the marking process” (*Policies and Procedures*, 2004, p. 2). The Assessment and Evaluation unit of Manitoba Education conducts “marker training” sessions for each examination to alleviate concerns about the validity of the local marking process. These one-day workshops detail how to interpret each examination’s answer scoring rubric. School divisions usually provide a different local marking coordinator for each provincial assessment.

Every school division is given \$10 by the government for each provincial assessment written. School divisions are advised that the “purpose of the \$10 is to compensate teachers and/or provide release time for marking standards tests” (*Policies and Procedures*, 2004, p. 2). Each school division has the discretion to conduct the marking process in a manner that best suits its needs. For example, in the Louis Riel school division, teachers from each high school meet in one location during the school day and mark all of the same examinations together. There are separate days allotted for the marking of each Mathematics assessment as many teach more than one stream of Senior 4 Mathematics. Each Senior 4 Mathematics assessment takes approximately two school days to mark while the English assessments take one week. The school division pays for the teachers’ substitutes as well as providing snacks and lunches for markers. The entire process is coordinated by Louis Riel school division’s curriculum/assessment consultant and normally occurs during the last week before high school examinations.

Upon completion of the local marking session, sample examinations are taken from every school to be remarked at a central location as a reliability check. The

pile of 10 examinations, that said pile is passed onto another team to have a different set of questions marked. This process continues until all questions are completed.

Manitoba Department of Education Assessment and Evaluation unit predetermines the list of booklet numbers that need to be remarked but does not disclose the information until all examinations have been marked.

The marking of Grade 3, Grade 6 and Senior 1 provincial assessments has always been local. The Grade 3 standards assessments have changed from separate curricular summative examinations to a formative, teacher-led combined assessment in reading and numeracy/notions de calcul. Occurring over a period of a few weeks, this assessment aids in determining whether a child's skills in reading and numeracy are at the expected level for his/her grade. No marks are awarded for this assessment (*Provincial Report*, 2003).

From the initial implementation of Grade 6 and Senior 1 assessments, there has been a shift from assessing on a mandatory two year rotation to an optional implementation (determined divisionally). Until the end of the 2003-2004 school year, optional standards tests were developed and administered in Grade 6 English Language Arts/Français Langue Première, Français Langue Seconde-Immersion, English LA-Immersion and Senior 1 Mathematics/Mathématiques. However, due to a *participation rate of less than 50%* (which compromises the tests' cost-effectiveness and utility), optional standards testing at Grade 6 and Senior 1 is being phased out beginning in the 2004-2005 school year. As such, there will no longer be any Grade 6 or Senior 1 provincial examinations developed or administered (*Letter*, May 2004).

Changes in Resource Allocation

As a Senior 4 Mathematics teacher of nine years, I have prepared students for provincial assessments under the direction of two different sets of administrators. For the first 6 years of my career, the school administrators were past Mathematics/Science teachers who allotted a great deal of money to ensure that desired supplies, technology and student-teacher contact time was delegated to the area of Mathematics. There was a considerable amount of discussion amongst superintendents and high school administrators surrounding provincial assessment scores as well as energy expended to ensure that teachers knew that the school's assessment scores were important.

For example, in June 1999, I (along with all Senior 1 Math teachers in the St. Boniface School Division) attended a meeting chaired by a member of the superintendent's department. The discussion focussed on perceived anomalies with the Senior 1 Math provincial examination test scores; particularly, that schools that normally had scores above the provincial average (i.e. J. H. Bruns Collegiate) scored lower than expected. Teachers were then asked to strategize on how future Senior 1 provincial Math exam scores could be raised. While the discussion was not accusatory, there was a clear message that provincial assessment scores were important to the school board.

Since then, the administration of the same school has changed, and both administrators disagree with the use of provincial standards tests as an assessment tool. Consequently, the resources that were once effortlessly acquired by the Mathematics department are not as easily available and lengthy discussions concerning assessment scores have subsided. This shift in resource allocation seems to indicate that departmental resource allocation is not a fixed issue.

Compounding my observations is the changing political climate during which the two sets of administrators lead this high school. The first administration dealt with the initial arrival of provincial assessments, a new Mathematics and English curriculum, and a changeover in the provincial government with ensuing changes in government policies. For example, the provincial Progressive-Conservative Party published, in the *Winnipeg Free Press*, the results of the June 1997 final Senior 4 Mathematics assessments by school, thereby creating a heightened awareness of provincial assessments. By 2001, (when the second set of administrators came to J. H. Bruns Collegiate), the New Democrat Party was the provincial government. The New Democrats toned down the effects of provincial assessments by introducing local divisional marking and by changing the format of Grade 3 assessments.

Furthermore, the initial phase-in period of assessments may have necessitated spending in areas that may now be relegated to maintenance. For example, content re-organization within Senior 2 to Senior 4 Mathematics streams, new technological demands and changed pedagogical philosophy were evident in the new Mathematics curricular documents. The most dramatic changes were apparent in the Applied Mathematics stream that incorporated a technological component (e.g., use of spreadsheets, motion sensors, TI-83 graphing calculators) and a project/discovery learning philosophy. These curricular changes necessitated the initial purchase of teaching materials such as: new textbooks, Manitoba Department of Education course worksheets, computer software (e.g., Geometer's Sketchpad, Quicktax), TI-83 graphing calculators, motion sensors, and manipulatives (e.g., dice, spinners, algebra tiles, cube-a-links). Schools were obliged to purchase the materials immediately given that the Senior

4 Applied Mathematics standards assessment emphasized the use of specific technology, and content utilising such technology would be tested.

However, since the initial phase-in period (1998/1999), schools only have to maintain the supplies that were purchased or make minor adjustments/upgrades which no longer necessitates a great deal of spending. In fact, after 7 years, technology such as the TI-83 plus graphing calculator is not only still sufficient but the majority of our student population now purchase their own calculators. As such, the expansion of our school based graphing calculator supply is not necessary.

Furthermore, the initial changes in the mathematics curriculum required a great deal of professional development to acquaint teachers with the new standards. The workshops, developed and conducted by personnel from the Manitoba Department of Education, did not have any registration fees. However, the large scale hiring of substitutes to enable teachers' attendance at the sessions plus the teacher's preparation time for his/her substitute are costs incurred by school divisions. Additionally, the Manitoba Education, Assessment and Evaluation unit initially held teacher preparatory workshops on provincial assessments that also necessitated substitute hiring and teacher preparation time. However, as teachers become more accustomed to the new course content and proficient at instructing with technology (or other Mathematical tools), the spending on curricular-focused professional development has subsided. In fact, the few workshops offered by the department of education are specifically geared to new teachers.

A further expenditure that may now be relegated to maintenance concerns the allocation of more mathematics teachers to facilitate the three new courses at Senior 2,

Senior 3 and Senior 4 (as opposed to the previous two). At the onset, this involved hiring one more mathematics teacher in the school in which I teach despite no significant rise in student enrolment. The increased teacher time can be attributed to students taking more than one mathematics course to ensure proper preparation for post-secondary studies. Conversely, some students realise that the Pre-Calculus or Applied stream is too difficult, and therefore opt for Consumer Mathematics in second semester (see tables 1 and 2).

In tables 1 and 2, the data for the student enrolment in courses was acquired from enrolment statistics gathered by the Manitoba Education, Assessment and Evaluation unit on September 30 of each school year. These data include all students in Manitoba in every type of educational institution and home school (*Finance and Statistics*, 2004). The number of provincial assessments written is tabulated by totalling the returned student demographic forms that are filled out by each student when he/she writes the provincial assessment. Since final examinations are written upon course completion, discrepancies between the number of written final provincial assessments and the total number of Senior 4 students will occur. For example, many students either drop a course or leave high school after the initial school enrolment is tabulated. As well, any student in a modified program is exempted from writing provincial assessments. Moreover, if inclement weather causes a school to close on the official provincial examination day, all written examinations (even if schools use the provincial ones) are not counted. Finally, students who are ill, on vacation or absent for other reasons will also not have their examination (even if they write the provincial one) count in the official total.

Table 1
Type of Exam Written to Total Number of Students in Manitoba

School Year	Applied 40S	Consumer 40S	Pre-Calculus 40S	Total Number of Senior 4 Students
2003 - 2004	2939	4842	4808	16840
2002 - 2003	3070	4775	4605	16995

Table 2
Type of Course Taken and Total Number of Students at J. H. Bruns Collegiate²

School Year	Applied	Consumer	Pre-Calculus	Total Number of Students
2001 - 2002				
Senior 2	70	31	86	172
Senior 3	48	43	89	150
Senior 4	9	36	48	104
2002 - 2003				
Senior 2	69	27	84	153
Senior 3	51	44	77	162
Senior 4	37	59	72	150
2003 - 2004				
Senior 2	66	52	92	172
Senior 3	46	32	77	146
Senior 4	46	38	80	158

² Total enrolment taken on September 30 of each year (*Finance and Statistics*, 2004). Course totals taken at the end of each semester (J. H. Bruns Collegiate records from the Trevlac systems operator).

Now that university officials, counsellors and mathematics teachers have a better understanding of which mathematics courses are needed as prerequisites for post-secondary fields, the number of students taking both Pre-Calculus and Applied Mathematics courses has decreased. However, there are still a number of students who need to take Consumer Mathematics as a second Mathematics choice for a variety of circumstances (e.g., failure in Pre-Calculus or Applied Mathematics, not meeting the minimum University mark requirement, or not enough high school credits).

While stabilization in spending for mathematics materials has occurred since the inception of the current mathematics curriculum, other areas of resource allocation have increased. Every school division receives statistical analysis on the assessment results (even when marked divisionally). As some schools consistently score lower than the divisional average, resources geared towards the increase of test scores have occurred. This allocation takes the form of professional development and increased class-time for Mathematics and English courses. In fact, the school division in which I teach allocates more teaching time for Senior 1 mathematics under the guise of 'transitioning'. Yet, this increase in time occurred after the Senior 1 provincial examinations were implemented. Now that Senior 1 provincial assessments will be discontinued in 2004/2005, my mathematics department has been told that a loss in the extra teaching time will occur.

Additional resources are also spent on the two divisional mathematics consultants (Early years and Senior years) who have been hired to aid with professional development, curriculum and assessment. These are two full time positions that pay a bonus over their teachers' salary. Neither of these positions existed prior to standards assessments. As the

number of standards assessments are decreasing, I wonder if their consultant time allocation will decrease.

As a result of my observations, I am interested in discovering if and how provincial assessments have impacted resource allocation at the high school. In this study, I will examine the effects, if any, that the Manitoban Senior 4 Mathematics provincial examinations have on resource allocation within high-schools and school divisions.

Limitations

This study will be limited to two urban school divisions in Manitoba, 4 high schools and 12 interview respondents. It will focus only on the Senior 4 mathematics provincial assessments (as opposed to all provincially assessed courses) and will involve interviews with mathematics department heads, principals, divisional math/science consultants and superintendents. Each participant will partake in one 1-hour confidential interview.

An area of concern is the potential personal bias of the participants towards provincial assessments. One informant was highly involved with the implementation of Manitoba's provincial assessments and thus may deem any reallocation of resources as a necessity. Additionally, a few of the administrators hold a bias against provincial assessments and may incorrectly attribute losses of existing resources or reallocations of resources on provincial assessments. Finally, my own bias as a mathematics teacher whose resources have been altered may affect how I interpret apparent shifts in resource allocation.

Furthermore, during the interview process, I found that the participants who were close to retirement were the most candid when they answered my questions. Likewise, participants who were just beginning their career seemed most eager to point out what needed to be changed with the education system. Participants in mid-career (15-20 years) took the most time to answer my questions and at times I felt were trying hard to give me the answer that they thought I wanted to hear. Consequently, the differences in level of experience may have added an element of bias.

Finally, the high schools that I visited represented a wide range of socioeconomic backgrounds and academic programming. However, all but one of the schools had a predominantly white population with visible minorities comprising less than 10% of the population.

Chapter 2

Literature Review

In conducting the research for this thesis, I found very little peer-reviewed literature that spoke directly to resource allocation and standards assessment. Exhausting the University of Manitoba's library resources (books, journals), online journals, ERIC, EBSCOhost, Google, and Dr. Benjamin Levin's resources, I e-mailed Dr. Allen Odden. Dr. Odden, a professor at the University of Wisconsin, is an internationally renowned expert on education finance, school-based financing, and resource allocation/use. In my e-mail, I asked Dr. Odden if he knew of any research that had been (or is currently being) conducted on my thesis topic. His reply to my e-mail was that he "is not doing any research in that area and is not aware of any research currently being done. But, good luck!" (Odden, June 2004). Furthermore, Dr. Levin spoke to a colleague at the Ontario Institute for Studies in Education who also confirmed that this form of research on resource allocation has not been previously done.

Information gathered during my pilot study, conducted in a qualitative research methods course from January - April 2004, allowed cursory exploration of what practitioners (superintendents/principals) consider a school resource to be; and how provincial assessments influence resource allocation decisions. Consequently, my literature review aims to inform my conceptual framework which describes a typology for resource allocation in high schools.

Definition of Educational Resources

A general definition of resource is:

something that can be used for support or help; the ability to deal with a difficult or troublesome situation effectively; the total means available for economic and political development; and the total means available to a company for increasing production or profit (Online dictionary, 2004).

As illustrated, the term resource has different meanings depending upon the situation, necessitating a definition specific to an educational context.

Gamoran defines school resources as a composition of the “knowledge required for carrying out tasks, the materials used in organizational work and the operations carried out with the available knowledge and materials” (Gamoran, 1988, p. 209). One interpretation of this definition could include the preparation time teachers need to deliver their lessons, the materials purchased for their courses and the daily tasks performed by teachers using those materials.

In a more technical sense, Monk and Roellke have conceptualized the term resource to “include all types of potentially productive inputs in educational contexts” (Monk & Roellke, 1994, p. 6). Quite similar to Gamoran’s definition of resource, Monk and Roellke do not limit their inputs to only financial concerns. Rather, they categorise resources in terms of “origination, disposition and utilization of resources” (Monk & Roellke, 1994, p. 6).

Origination refers to how resources enter the school system at any level, such as through property taxes, federal funding programs, user fees or business (Monk & Roellke, 1994). For example, the \$10 per written provincial assessment allocation provided by the

Manitoba Department of Education, Assessment and Evaluation unit to school divisions would fall in the origination category.

Disposition pertains to the allocation of materials purchased and teachers/personnel hired (Monk & Roellke, 1994). For example, teachers hired due to an increase of Mathematics courses and/or the increase of course delivery time would be encompassed by the disposition category. Further areas in the disposition category include: the hiring of substitutes for teachers away marking assessments or receiving professional development; the hiring of divisional assessment consultants; and the amount and type of materials purchased for Mathematics courses.

Utilization involves the allocation of pupil and teacher time/effort (Monk & Roellke, 1994). In terms of Senior 4 Mathematics, the utilization category is of particular interest since teacher time is a cost that tends to be overlooked. For example, the time it takes a teacher to prepare for his/her substitute so that he/she can mark provincial assessments is not normally calculated into provincial assessment costs. Furthermore, if pupils are encouraged to take more than one Mathematics course or have Mathematics courses with extended class time, effort measured by time allotment is an area of resource.

Typology of Resources

According to Levin (1994):

although education is essentially a social and psychological process, administrative thinking about resources uses concepts from economics. Our attention is focused almost entirely on money and

numbers of staff, even though all educators know that many other resources are at least as important to schooling. (p. 1)

Consequently, evaluating how Senior 4 provincial assessments impact school resources involves looking at more than simply money. Rather, resource allocation can be examined in terms of purchased items (such as equipment and supplies) or it can focus on hired personnel (Levin & Young, 1998).

In a mathematics classroom, purchased items (such as textbooks, models, or software programs) can be used to teach mathematical concepts. In all three curricular streams (Applied, Consumer and Pre-Calculus), one finds suggested teaching strategies using technology or manipulatives (e.g. algebra-tiles, cube-a-links, dice). However, since budgetary constraints limit the type or number of purchases that a mathematics department can make, the factors that influence how and what materials are purchased is of interest.

Additionally, more than 80% of the money in education is spent on people, particularly teachers and other instructional staff (Levin & Young, 1998). On a macroscopic level across Canada, the roles of people within high schools have remained constant because all have: principals, subject teachers, specialist/resource teachers, instructional assistants, secretaries and caretakers (Levin & Young, 1998). However, how people are utilised in a school or school division can differ. These differences can be as subtle as how teachers are chosen to teach Senior 4 courses, how professional development money is allotted, how courses are scheduled and how much time teachers put in preparing for provincial assessments.

From January to April 2004, I conducted a pilot study in which 6 interview respondents (2 superintendents, 3 principals, and 1 consultant from the Manitoba Department of Education) discussed their interpretation of an educational resource as well as described how they allocate school resources. Based on the refinement of ideas/themes generated from findings in my pilot study, many non-monetary areas emerged as factors to be considered as a resource (such as teacher's time). Furthermore, using Levin and Young's (1998) description of purchased versus hired resources coupled with Monk and Roellke's (1994) monetary/non-monetary definition of resources (origination, disposition and utilization), I developed a typology that categorizes resources in terms of tangible materials and people in a school or division.

The categories within the typology of resources to be considered in this thesis are staffing, time, class size, specialist positions, professional development, materials, and the cost of marking provincial assessments.

Staffing

According to education finance researchers Hawley Miles and Darling-Hammond (1998), focusing on the "assignment and use of teaching staff is the most sizable and the most under-explored area for potential resource reallocation" (p. 10). Analysis of staffing and spending patterns from 1967 to 1991 in nine different American districts found that "few new teachers were deployed to reduce class sizes for regular-education students" (Hawley Miles & Darling-Hammond, 1998, p. 10). Rather, there has been a growth in the staffing for special programs and an addition of a modest amount of instruction-free time for teachers (Hawley Miles & Darling-Hammond, 1998).

For the purpose of this study, analysis of staffing practices will focus specifically on two aspects of staffing. One facet of staffing is whether an increase in staffing to accommodate smaller Senior 4 Mathematics class sizes or increased course delivery time has occurred. In particular, if extra time is allocated to deliver a Senior 4 course, are only certain courses targeted?

The second aspect of staffing concerns the number of teachers allocated to Senior 4 Mathematics and whether particular Mathematics teachers are specifically chosen to teach provincially assessed Mathematics courses. For example, are the teachers considered to be the most skilled delegated to Senior 4 Pre-Calculus as opposed to a non-provincially assessed Mathematics course? During my pilot study, I interviewed a principal, Lisa³, who used discretion when choosing Senior 4 English and Mathematics teachers. The Department of Education has directed that one Senior 4 English examination takes 45 minutes to mark (each examination is double marked). Consequently, Lisa has stated:

that we won't give any one teacher more than two provincially assessed classes. No one person can do that much marking. Even though she is the best English teacher for grade 12, we don't give her that many classes anymore. It's not fair. And so the kids in some ways are not getting the best teachers that we have. That's definitely a reallocation of resources.

(Lisa, March 26, 2004)

³ All names are pseudonyms to protect the confidentiality of the respondents.

For the sake of this study, instructional assistants will not be considered a resource as aides tend to not be deployed in many Senior 4 Mathematics classes and are often assigned based on specific student need as opposed to the course.

Time

Drawing from Monk and Roellke's '*utilization*' categorization of educational resources, time or the overall structure of the school day, the number of hours per day that students are present for instruction and the length of class periods are areas that should be examined for resource reallocation. For the purpose of this study, the analysis of time will be based on discussions with interview participants and timetables gathered from participating high schools. The focus will be to discern whether preferential treatment, such as having mathematics scheduled only in the morning (as opposed to the last period of the day) or given extended time periods, occurs for Senior 4 mathematics.

One reason for examining timetables is that principals consistently manipulate timetables when analyzing school improvement strategies. For example, a principal may implement a:

reduction of specialized programs to provide more individual time in all heterogeneous groups; longer and varied blocks of instructional time; and more common planning time for staff. (Loeb, n.d., p. 12)

Given the diversity of students, communities and curriculum found within high schools, an expectation that schools organize differently based on individual circumstances seems valid. In fact, researchers Hawley Miles and Darling-Hammond (1998) found that longer and more varied blocks of teaching time along with more common teacher preparation time are ways that resources could be better used to enhance student learning.

However, across Canada, the organization of school time tends to follow a standardized framework (Levin & Young, 1998). Even though Loeb (n.d.) regards “time as a precious resource for school communities” (p. 11), it is quite common for school days to be “divided into arbitrary segments, with changes of subject dependent on the clock rather than on the progress of the work” (Levin, 1994, p. 4). The reality that high school timetables typically involve a “fixed number of hours of class time regardless of subject or level of study” (Levin, 1994, p. 4) may be due to the politics of school divisions rather than sound educational practice. For example, the length of the school day, teacher course load, the number of teachers allotted to a school and school catchment/population are constraints imposed by teachers’ collective agreements, the superintendent’s department or the local school board.

For instance, although uniform class times is the norm, high schools in the St. James-Assiniboia School Division in Winnipeg schedule 50% more time in their Senior 4 mathematics and science courses (Mason, 2000). In the report, *St. James-Assiniboia S4 Timetabling Study*, Mason notes that the rationale for increasing the time was attributed to the increasing difficulty of the Senior 4 mathematics and science curriculum, particularly Pre-Calculus mathematics (Mason, 2000). While no direct attribution was made between provincial assessments and increased course time, Mason argues that the Pre-Calculus 40S course is used as a critical filter at the university or college level. He states that

the historical failure rates of Pre-Calculus math coupled with the failure rates of first-year mathematics courses at universities or colleges, make mathematics the most imposing burden that students face. (Mason, 2000, p. 26)

Consequently, all St. James-Assiniboia high schools are semestered, have timetables consisting of five slots for courses per semester, and Senior 4 mathematics and science courses receive 9 periods on a 6-day cycle rather than 6 (Mason, 2000, p. 6).

Thus, if Senior 4 Mathematics is afforded more class time than other Senior 4 courses or is given preferential treatment on the timetable, then a reallocation of resources may be occurring. As such, the critical point is to “think of time as a resource so that its use becomes a considered rather than a conventional one” (Levin, 1994, p. 4).

Class Size

A primary decision that affects overall school costs, and the context within which instruction will be delivered, is regular class size, or the number of students that are assigned to each classroom teacher (Odden & Archibald, 2001). In the United States and Canada, school divisions use formulas to assign students to classrooms in a regularized fashion by age, subject and program. Coupled with school board policies, teachers' collective agreement provisions also impact class size. These practices are costly because the uneven allocation of teachers over grades, small programs and undersubscribed subjects contributes to unplanned difference in class size that do not reflect educational strategies (Hawley Miles & Darling-Hammond, 1997). For example, Boston Public schools cap elementary class sizes at 28. When the “29th student enters, a new teacher must be added which changes the average class size from 28 to 14.5” (Hawley Miles & Darling-Hammond, 1997, p. 11).

As can be expected, there has been considerable research and debate concerning the effects class size may have on student learning. However, for the purpose of this study, I am interested in ascertaining if secondary Mathematics class sizes have been

made significantly smaller in comparison to other subject areas; especially if the change is in order to improve results on Senior 4 provincial assessments.

Specialist Positions

Monk and Roellke's (1994) '*disposition*' category of resources pertains to the hiring practices of school divisions. Hiring practices tend to vary when it comes to specialist positions within different school divisions. For example, the Louis Riel school division has two Curriculum and Assessment consultants to coordinate items such as curriculum changes, local marking of provincial assessments and professional development. Each consultant is paid a full-time teaching salary plus a consultant bonus. For this study, I will investigate how much time specialists put into provincial assessment activities as well as get their perspective on resource allocation within their school divisions.

Professional Development

A comprehensive professional development strategy helps teachers acquire the professional expertise they need for successful teaching. Most teachers need to deploy "authentic new curriculum and instructional knowledge and skills if they are to establish authentic pedagogy and successfully teach a high standards curriculum to diverse students" (Odden & Busch, 1998, p. 35). In Manitoba, the Senior 4 provincial Mathematics standards assessments necessitate learning about both curricular content and pedagogy. As standards have been established in three mathematics streams (Pre-Calculus, Applied and Consumer), differing teaching methods, content and final summative assessments call for extensive professional development.

According to Odden, Archibald, Fermanich and Gross (2002), professional development expenditures could include the costs of “teacher time for professional development; trainers and coaches; professional development administration; materials, equipment and facilities; travel and transportation; and tuition and conference fees” (p. 10). In the 2003/2004 *FRAME* report, a total of \$11, 352, 736.00 (not including teachers’ time) was allocated to professional and staff development in Manitoba (*Finance and Statistics*, 2004). Every time a teacher is out of the classroom engaged in a professional development activity, $\frac{1}{200\text{th}}$ of a teacher’s salary (average salary is $\$65,000/200 = \325) is being spent. If the added cost of the substitute (average salary of \$140.00 per day) and the workshop (registration fees, the paid facilitator, and materials) are factored in, the costs of professional development quickly increases.

Calculating the time that teachers need to prepare for substitutes to allow for participation in a professional development session plus teachers’ salary costs must also be factored in as an added cost. Professional development specific to curricular outcomes, i.e., how to teach Statistics with the TI-83 graphing calculator for 40S Applied Mathematics, as opposed to a generic workshop on TI-83 graphing calculators are common for Senior 4 Mathematics teachers. Moreover, professional development on differentiated instruction and standards assessments also occur to aid in Senior 4 provincial assessment preparation.

Materials

Monk and Roellke’s (1994) ‘*disposition*’ category encompasses all instructional materials and equipment such as books, instructional supplies, materials, equipment, and computer hardware and software for all instructional programs. If provincially assessed

courses have larger budgets for materials within a school compared to other courses, then a shift in resource allocation may be occurring to ensure student success in these particular subjects.

The Costs of Marking

In Manitoba, Senior 4 provincial assessments are collectively marked within each division by the teachers of each course. There are three Senior 4 Mathematics provincial assessments (Pre-Calculus, Applied and Consumer) and one general Senior 4 English assessment. The marking sessions occur during the last week of regularly scheduled classes since provincial assessments are written earlier than school-based final examinations. On average, each Senior 4 mathematics course requires two full days (8:30 am – 4:00 pm) to mark one semester's examinations in one school division. As high school teachers do not solely teach Senior 4 courses, Monk and Roellke's 'disposition' category can also be extended to include the substitute costs, marker training time, classroom disruption and teacher preparation time that occur to facilitate the marking of provincial assessments.

Resource Allocation

In 1984, Manitoba's Department of Education implemented a system to account for spending on public schools called the Financial Reporting and Accounting in Manitoba Education (*FRAME*) report (Owens, 2003b). Largely patterned on reporting systems in Alberta and Minnesota, *FRAME* requires school divisions to utilize the same format in reporting revenues and expenditures. All Manitoba schools currently utilize the *FRAME* reporting format which divides expenditures into operating funds and capital

funds, with operating funds further sub-divided into a number of categories (Owens, 2003b).

Manitoba's thirty-eight school divisions vary widely in size, from under 1000 students up to more than 30,000 with operating budgets per pupil ranging from \$5000 to slightly over \$12, 000 (*FRAME*, 2003/2004). Located in different regions, these school divisions serve vastly different student populations. Therefore, one might assume that different school divisions would have different priorities and spending patterns in educational programming. However, researchers Hawley-Miles and Darling-Hammond (1998) observe a "striking similarity, across districts and over time, in the organization of schools and distribution of resources, despite increases in funding and changes in school expectations" (p. 2).

In fact, according to Odden et al. (2002), across states and districts with widely varying characteristics and spending levels, functional resource use patterns are quite consistent. Schools tend to allocate educational expenditures per pupil across functional categories in the following proportions:

about 60 percent for instruction; about 5 percent for each of instructional and student support; about 8 percent for administration, with the bulk of administrative costs at the site and not central office level; about 8-10 percent for operations and maintenance; about 5-7 percent for transportation; and about 5 percent for debt service, food and miscellaneous.

(Odden, Archibald, Fermanich & Gross, 2002, p. 4)

Though variations exist in all of these patterns, the central tendencies for the allocation of the education dollar are remarkably similar for high, low and average spending districts

both within and across states, and tend to hold true across other geographic, size and demographic variables (Odden, Archibald, Fermanich & Gross, 2002).

Odden's observations on resource allocation are echoed in Manitoba schools. According to the 2003-2004 *FRAME* report, Manitoba distributes its expenditures by function as follows:

...58.3% regular instruction, 14.3% exceptional, 0.2% adult learning centers, 0.7% community education, 3.5% divisional administration, 5.2% instructional & pupil support services, 4% transportation of pupils, 12.1% operational & maintenance and 1.8% fiscal. (p. 14)

Furthermore, studies also indicate that these expenditure patterns change little over time. In the middle of the 20th century, most instructional expenditures were for licensed classroom teachers who taught a classroom of students the regular curriculum for most of the day in core subjects such as mathematics, science, social studies and English (Odden, Archibald, Fermanich & Gross, 2002). By the end of the 20th century, researchers Odden and Picus, state that the functional uses of the education dollar

...closely resembled the expenditure patterns of the middle of the century despite large real (inflation adjusted) increases in education dollars per pupil, dramatic changes in student socio-demographic characteristics, and the proliferation of categorical programs focused on a variety of special needs of students. (Odden, Archibald, Fermanich & Gross, 2002, p. 4)

The method utilized to report school finances, such as the Manitoban *FRAME* report, raises questions amongst school finance researchers and practitioners. Rather than lump all monies into large categories, the prevailing response is to categorize

expenditures within the instructional category by program. Programs are typically defined as “regular education, special education and sometimes gifted and talented education” (Odden, Archibald, Fermanich & Gross, 2002, p. 4). Detailing the expenditures shift by program, Rothstein and Hawley-Miles (1995) state that the composition of instructional expenditures changed dramatically from 1960 to 1995. In fact, “special education’s share of all expenditures rose from 4% in 1967 to 17% in 1991 [with] special education receiving 38% of the net new money spent in 1991” (Rothstein & Hawley-Miles, 1995, p. 8).

School systems used the largest portion of new dollars to hire specialist teachers and instructional aides catering to the wide variety of special student needs. By the end of the century, the portion of classroom teachers as a percentage of the instructional budget declined significantly and the portion of specialist teachers instructing students with special needs, largely in resource rooms separate from the regular classroom, increased. Thus, although expenditures for instruction maintain a constant percentage of overall expenditures, the pattern of spending within instruction changed (Odden, Archibald, Fermanich & Gross, 2002).

Resource Allocation Decisions

A number of American surveys suggest that public schools rarely engage in major reallocations of resources. The basic structure of schools has remained essentially the same across districts and over time; new resources have been added around the regular classroom rather than into it (Hawley Miles & Darling-Hammond, 1998). According to Levin and Young (1994), the decision on how school resources are to be distributed can

be thought of as a combination of student needs and external factors such as: government funding, government policies, community/parental pressures, and administrators' views.

Student Needs

High school programming is driven by the diverse needs of its student population, including: race relations, socio-economic backgrounds, academic needs, special needs or transient behaviour. In Manitoba, there are three levels of student funding; each corresponding to the degree of needed individualised attention/instruction by the student. How an administrator distributes the funding is dependent on any constraints placed by the grant in regard to the student population in the school.

For example, all students receive level I funding which was approximately \$7,792.00 per pupil in 2003/2004 (FRAME Report 2003/2004). Level I funding has little restrictions on its school usage, thus allowing administrators discretion in its spending. Special needs students qualify for level II funding which provides an additional \$8,780 per pupil. However, this funding is delegated to students who are: severely psychotic; moderately autistic; deaf or hard of hearing; visually impaired; or have an emotional/behavioural disorder (FRAME Report 2003/2004). Further, Level III funding provides an additional \$19,530 per student but is designated for profound disabilities and emotional disorders (FRAME Report 2003/2004). Even though this funding is given as a block sum of money (not necessarily tied to a specific student), it is deemed for specific usage (e.g., instructional assistants or special materials). As such, principals are afforded little discretion in its allocation.

However, while administrators may be pressed to allocate some resources in a specified manner, deciding the number of sections and types of courses offered within

their building is their domain. For example, glancing at a school's timetable will quickly give an impression as to the type of population within that school. If a school has 10 sections of Senior 4 mathematics and 6 of those sections is Consumer math, there is a good chance that the population is vocationally driven. Since a high school's timetable is driven by the choices of the student body, recommendations from the teaching staff, and provincial graduation requirements, administrators tailor their programming to ensure they are providing a variety of opportunities for their students.

Government Funding

There are many bureaucratic policies within the school system that affect how principals can allocate resources. The most fundamental area concerns how funding is allotted to school divisions. There are three basic formula elements through which most provinces provide funding to school divisions: block grants; categorical grants; and equalization funding. In most cases, the "largest amount of money takes the form of a block grant, which is based on the number of students in the division" (Levin & Young, 1994, 150). In situations where students may be taught in more expensive settings (remote schools) or enrolled in expensive programs (vocational), the province will provide differentiated values in the overall count.

Categorical funding is another means in which a province provides funding for particular programs or services. Categorical grants are based on the assumption that "school boards would not spend enough money on certain activities on their own accord - hence the province ties its money to the activities it wishes to support" (Levin & Young, 1994, p. 151). These could include money for special education, language education, or technology purchases. Furthermore, a province may recognize that the costs of certain

services, such as transportation, will vary between divisions and thus ties the grant to the actual divisional costs.

Since Manitoba's school boards raise a significant share of their revenue through taxes levied on local property, equalization funding is provided. As school divisions with large homes or big business receive more money than those in poorer neighborhoods, the province provides funding to ensure that spending is determined by political choices and not by location (Levin & Young, 1994).

Government Policies

According to Levin & Young (1994), "provincial governments have several means – varying in their degrees of coerciveness – with which to influence what school boards do" (p. 80). For example, the provincial government in Manitoba requires that high school students complete 28 credits (15 compulsory and 13 optional) to attain their high school diploma (*Educational Update*, 2005). Of the compulsory courses, Mathematics and English are required at every level beginning at Senior 1. The fact that these two courses are singled out for graduation and for provincial assessments tends to elevate their level of importance within a high school. As such, the heightened attention afforded to these two subject areas may influence how resources are allocated. For instance, Mathematics and English departments tend to have the largest teaching staffs since all students must take at least one Senior 4 math and English course whereas all other Senior 4 subjects are optional.

Government Incentives

A less formal procedure (than changing legislation) that influences resource allocation occurs in the form of government incentives to school boards. The Department

of Education might provide grants to start new programs, train teachers in a particular area (technology), require that schools purchase certain materials or prescribe particular vendors (Levin & Young, 1994). Recently in Manitoba, policies have been implemented that restrict the manner in which money can be spent. For example, as of September 2004, all books, educational materials and curricular supplies must be purchased through the Manitoba Textbook Bureau (even if a better price can be found through another vendor). According to the School's Finance Branch, school divisions are allotted \$50 per pupil for curricular materials. Of the \$50, "\$30 must be expended through the Manitoba Textbook Bureau. Any unexpended balance of the \$30 per pupil remains as a credit at the bureau" (Funding of Schools, 2004, p. 4). Restricting the manner in which materials can be purchased is one way to decrease the decision making power of teachers and/or principals in schools.

Community/Parental Pressures

In most school divisions, school boards serve as the voice for various segments of the community. However, the composition of parents within a school's community can sometimes influence the allocation of resources within a school:

"Most commonly, parents or community members have direct influence only when they organize themselves and insist on being heard" (Levin & Young, 1994, p. 72).

For example, J. H. Bruns Collegiate is situated in an upper middle class neighbourhood with a parent population that strongly supports a music program. Compared with the 10 parents on the Parent Council, the Parent Music Association has approximately 125 parents participating in events and meetings. Their interest influences the frequency of

band trips, the number of sections of music as well as the placement of music courses on the timetable. For instance, throughout Senior 1 to Senior 4, J. H. Bruns Collegiate offers a guitar program (classical, jazz), a band program (concert, jazz, honour), a vocal program (choral, jazz), and a technical music composition program. Undoubtedly, students who partake in music are also involved with other optional courses throughout their high school career. However, to ensure that the music program remains robust, students are placed into their music choice first during the timetabling process and then into their other optional choices second. One observable consequence is that the allocation of optional course teachers has increased in the Music department (from 1.5 teachers to 3) but decreased in the French department (from 1.5 teachers to .86).

Furthermore, J. H. Bruns Collegiate's Music department has traditionally organized an 8-day music trip every two years to another city. As of 2003/2004, music trips will occur every year affecting approximately 150 students (this is in addition to the Brandon Jazz festival, the Optimist Festival, Divisional Honour Band/Choir, and other local commitments). No other program is afforded such a large amount of dedicated time during (and outside) structured school hours. However, all of these trips are possible due to the parents' fundraising efforts and additional fees that help pay for music teachers' substitutes and needed equipment.

As discussed, a strong parent group can collectively work to bring forth changes within a school by providing some of the resources themselves (fees, fundraising, volunteering time). During my pilot study, I interviewed a principal from another high school in the Louis Riel school division whose community's demographics, in the last 10 years, has shifted from a middle class neighbourhood to one with predominantly lower

income families. There is relatively no parent voice; rather the community is becoming reliant on the school system for resources that are allocated to the high school. According to Homer:

...one thing that has happened because of poverty in the community [is that] we have seen more and more families unable to pay school fees, unable to afford basic things for their kids. I've been able to tap into a grant from a charitable foundation in order to help these families (Homer, March 12, 2004).

Furthermore, the community's demographics have affected how teachers are allocated within Homer's high school. As teaching time is a sizable cost, the decisions on how to best utilise this resource transforms with the changes occurring within a community. As such, accommodations such as decreasing class sizes in Senior 1 Mathematics classes were done:

...because of the demographics in the community and the nature of our clientele. We've got an aging population and the younger people coming in tend to come from the core area [to buy their first home]. We're finding a very needy population of kids. The Aboriginal population is growing in this catchment as are the ESL⁴ clientele. So, for smoother transitioning from middle school as well, we've tried to keep Senior 1 [Math] classes lower and use a team teaching approach (Homer, March 12, 2004).

As schools are allotted teachers based mainly on student population, the decision to lower class sizes is not only costly but could impact the ability to offer different courses due to

a staffing shortage. For example, schools may have been allotted their teachers based on a formula that allows 30 students in a classroom. If a principal wished to limit the class size of Senior 1 Mathematics to 24 students (rather than 30), an additional section of that course may be needed. Since the total allotment of teachers to that school would not necessarily increase, a decision to not offer one section of a non-compulsory course may occur (as compulsory courses must be offered to fulfill provincial graduation requirements).

Administration Views

Principals and superintendents are responsible for supervising the operation of schools since

“[it] is their job to ensure that the organization’s goals are being met, and that its policies and procedures are being followed” (Levin & Young, 1994, p. 181).

However, as superintendents cannot be part of every decision made, the individual belief system of a school’s principal has some influence on how resources allocation decisions are made.

According to Drucker, there are two basic kinds of decisions, generic or unique.

“Generic decisions arise from established principles, policies or rules.

Recurring problems are routinely solved by formulaic rules and regulations”

(cited in Hoy & Miskel, 2001, p. 323).

One principal, whom I interviewed during my pilot study, seemed to allocate resources in a generic, fixed manner. The principal, Lisa stated:

⁴ ESL – students for whom English is a Second Language

...I don't believe in that [differentiating different funds to departments].

It causes animosity among the staff. So, when I get X number of dollars for textbooks, I allocate it by department equally. It happens that the major departments, Math, Science, Social and LA get the same amount.

That way, they [teachers] can't quibble (Lisa, March 26, 2004).

Unlike generic decisions, unique decisions are "creative decisions that require going beyond established procedures for a solution" (Hoy & Miskel, 2001, p. 322). In some schools, principals allocate resources to departments based on specific needs or project ideas, and not on a fixed formula. Marge, a principal I interviewed in my pilot study, described the way in which she distributed resources as follows:

...here we have what you call flexible and inflexible amounts. Inflexible means exactly what it says, those I can't move, I have to spend what it is categorized as. On the flexible side, I [can] move things around. As long as my bottom line is covered, I come out ok (Marge, March 4, 2004).

In this sense, if a department does not need new equipment or textbooks in one year, those funds are allocated as needed in another area.

Additionally, administrators' decisions are not value free.

"When administrators pursue actions that they believe will attain a valued outcome, they are making judgements of value between competing goods or the lesser of evils" (Hoy & Miskel, 2001, p. 320).

In high schools, departments tend to compete for the scarce resources allotted to their school. If a principal believes that the outcomes of the Senior 4 Mathematics provincial assessments are affected by access to materials, technology, time or the "best teachers",

then he/she will try to accommodate the needs of the Mathematics department. Unfortunately, by fully aiding the Mathematics department, another area may be neglected. In my pilot study, Lisa allotted 165 hours for Senior 2 Pre-Calculus, Senior 4 Pre-Calculus Mathematics and Senior 4 English. According to Lisa, since

...the students are only getting one credit but are getting time and a half instruction time, that's extra resources for that department (Lisa, March 26, 2004).

As increased instructional time for provincially assessed courses is not a divisional policy within Lisa's school division, her views have determined this course of action.

In conclusion, examination of the FRAME report (2004), the work of Hawley Miles and Darling-Hammond (1998) and Odden et al. (2002) indicate that resource distribution on a macro level has remained constant. However, the work of Levin and Young (1998) coupled with my pilot study reveals that resource distribution varies at the school level depending on the local circumstances.

Further, while Monk and Roellke's (1994) monetary/non-monetary definition of resources (origination, disposition, and utilization) expands the financial definition of resources, their definition is too general for practical use. As such, drawing from the results from my pilot study, the work of Monk and Roellke (1994) and Levin and Young (1998), there is a need to create a typology that not only expands the current definition of resources but also details specific monetary and non-monetary areas in the school system. In this thesis, I will use my typology of resources to discern if Senior 4 provincial mathematics assessments influences how resources are distributed within a high school.

Chapter Three

Methodology

The purpose of this study is to examine whether Senior 4 provincial mathematics examinations in Manitoba influence resource allocation in school divisions and high schools. As such, this section will outline the methodology used to gather information for this study.

Choice of Methodology

This research aims to understand resource allocation issues by using a typology of resources that extends beyond only budgetary allocations. As this topic has received very little attention in the literature, I worked with a small number of schools using a case study methodology to inform this thesis.

A case study was appropriate because it allowed for “a detailed examination of one setting, or a single subject, a single depository of documents, or one particular event” (Bogdan & Biklen, 2003, p. 54). Although a standardized survey/questionnaire could have been used to gather data, its use was inappropriate in this study because the issue of interest has not been well enough studied to allow construction of instruments without the likelihood of errors or misunderstandings. Instead, the flexibility of a person-to-person conversation triggered unexpected responses, allowed for clarification of responses, and captured the nuances of answers through body language. In total, I interviewed 12 people from two Winnipeg school divisions including (from each division): 1 assistant superintendent, 1 divisional math/science consultant, 2 principals and 2 mathematics department heads (within the same school as the principal).

In order to gather data concerning time as a resource, I collected documents in the form of timetables. A document refers to:

...materials such as photographs, videos, files, memos, letters, diaries, clinical case records, and memorabilia of all sorts that can be used as supplemental information as part of a case study whose main source of data is participant observation or interviewing. (Bogdan & Biklen, 2003, 57)

A high school master timetable revealed the number of sections of all courses, when particular courses are timetabled within a day and the duration of a course. The analysis of timetables gave some indication as to how Senior 4 provincial assessment courses are prioritized in a high school compared to other courses. For example, I looked at whether all Senior 4 Mathematics classes were scheduled in the morning as opposed to last period of the day.

Pilot Study

In January – April 2004, I conducted a pilot study within a qualitative research methods course. The purpose of the pilot study was to inform my conceptual framework, hone my interview skills and test my interview questions. I conducted 6 one-hour interviews with two superintendents (from different school divisions), three high school principals (from 3 different school divisions) and one person from the Manitoba Department of Assessment and Evaluation branch.

The superintendents and principals were from different school divisions in Winnipeg. The school divisions that these superintendents headed were comparable in student population and number of schools. However, the principals worked in 3

completely different settings. One principal's school operates on a 10 month system with a predominantly white middle class student population approximating 1600. A second principal heads a semestered school of approximately 400 students with a population consisting of high needs, low income, ESL and Aboriginal students. The third semestered high school consists of approximately 1500 diverse ethnic middle class students. As such, each principal provided a different perspective on how resources are allocated to meet student needs, which enabled me to develop a refined understanding of resources that led to the development of the typology used in this study.

Even with the diverse student populations of each high school, there were many consistent themes derived from the conversations with each principal. First of all, it became apparent that the degree of discretion in resource allocation depended on many factors such as: government policies, superintendent directives, the school board as well as the principals' belief system. Secondly, there was a belief that provincial assessment, whether considered good or bad, incited dialogue on assessment. The principals believed that this dialogue fostered the creation (in some divisions) of assessment consultants as well as led to increased professional development resources on assessment. Finally, there was a belief that provincial assessments diverted resources from programs to assessments. Once divisions became responsible for the marking of provincial assessments, the time needed to prepare for substitutes and number of days teachers were removed from the classroom were seen as a burden and diversion of resources.

Superintendents and principals were able to provide insight on how resources enter the school system and how resource allocation decisions are made. However, the conversations with superintendents revealed how little they knew about how provincial

assessments affected their teachers' time, materials in a school, consultants' time or other areas of resource allocation in a high school. Upon reading and reflecting on the field notes gathered from the interviews, I realized that divisional consultants and math department heads should be included in this study as they are directly affected by resource allocation decisions.

Research Process

Choice of Participants

Based on the interviews that I conducted with superintendents and high school principals during my pilot study, I realized that I needed to speak to a few people who were directly involved in resource allocation decisions. Thus, in this study, I spoke with math department heads since they have closer experience with Senior 4 math assessments and have a voice in how departmental resources are allotted. I also spoke to divisional consultants as they had insight on how resources are distributed divisionally to accommodate Senior 4 math assessment marking and also have a professional development budget. Using a cross-section of practitioners allowed for a wider breadth of knowledge on how resources are allocated. As well, each informant had a varying degree of power in deciding how the resources were allocated within a school.

The participants in this study were from 2 large school divisions that had recently been amalgamated. One division has 8 high schools while the other has 6. Their high schools offer a wide variety of programming (Advanced Placement, Vocational, French Immersion, Music, etc...) and have divisional consultants and department heads. Furthermore, the high schools that I chose within each division were different in significant ways. For example, in the Mountain School Division, one high school is

vocational with a large predominantly working class community. The other high school has a mainly white upper middle class community and offers a full Advanced Placement program. In the Plains school division, one high school works on a 10 month system and caters to extreme socio-economic communities (either upper middle class or poverty) while the second high school offers a full Advanced Placement program to a middle class community.

The participants included (all names of schools and people have been changed):

Mountain School Division	Name of Participant
Superintendent	Johnny Big-Hill
Principal – Cliff Collegiate	Hillary Plank
Department Head – Cliff Collegiate	Devon Depth
Principal – Summit Collegiate	Jordan Jump
Department Head – Summit Collegiate	Andy Apex
Math/Science Divisional Consultant	Peter Pinnacle
Plains School Division	Name of Participant
Assistant Superintendent (personnel)	Thomas Thresher
Principal – Wheat Collegiate	Colleen Combine
Department Head – Wheat Collegiate	Dean Durham
Principal – Barley Collegiate	Helen Hops
Department Head – Barley Collegiate	Bill Cracker
Math/Science Divisional Consultant	Stephanie Stalk

Thus, in total (including my pilot study), I interviewed 16 people whose experience within the teaching profession ranged from 6 to 40 years. The breakdown of the participants' job classification was as follows: 3 superintendents (or assistants), 6 principals, 4 mathematics department heads, 2 divisional math/science consultants and 1 consultant from the Manitoba Department of Assessment & Evaluation.

Initial Contact

I contacted superintendents and asked for permission to contact principals, consultants and Math department heads to be interviewed. I then faxed a permission form that was signed by each superintendent (included in Appendix A). Upon receipt of the permission form, I proceeded to phone each principal, math department head and divisional consultant to obtain an interview. During the telephone conversation, the interview candidates were informed about the study and their potential role in it. There was no deception in this study and all names (persons, schools) were changed to protect the confidentiality of the informant.

Interviews

Each session began with a confirmation that recording the interview was acceptable. As well, each participant was asked to sign an informed consent form (included in Appendix B) explaining that all of the information collected was confidential. Participants were told that I would not be using any of their names or names of their schools in any of the documentation. On the consent form, subjects were given the opportunity to request a summary of the results of this study.

I tape-recorded each confidential interview. From each high school that I visited, I collected timetables but deleted all school and teacher names. Upon completion of the

study, all of the taped interviews and interview transcripts will be destroyed and the timetables will be shredded.

I interviewed each subject for 45 minutes to 1 hour using a few closed and open-ended questions, only changing the questions to suit the subject's professional position. I used the interview template (included in Appendix C) to keep the questions consistent beginning with some background information about myself and the study.

Data Analysis

Interviews

According to Neuman (1997), qualitative research is analyzed by organizing data into categories on the basis of themes, concepts or similar features. Following the preparation of the transcripts of each interview, the data was coded to aid in the organization of the data. The goal of coding was to organize the specific details of the data into a set of interlocked concepts (Neuman, 1997).

Coding consists of two simultaneous activities in qualitative research: mechanical data reduction and analytic categorization of data (Neuman, 1997). Mechanical data reduction used both open and axial coding; the former located themes/categories while the latter created linkages/interactions of the themes/categories within the data. The analytical categorization of the data occurred during the selective coding process; which sought cases to illustrate themes and compared/contrasted core generalizations (Neuman, 1997). The research process therefore moved from broad ideas and concrete details to a comprehensive analysis with generalizations.

The collected data was passed through three times using different types of coding in sequence. The first pass used open coding which "locates themes and assigns initial

labels in a first attempt to condense the mass data into categories” (Neuman, 1997, p. 422). In open coding, the themes are at a low level of abstraction and come from the researcher’s initial research question, concepts in literature, terms used by members in the social setting or new thoughts stimulated by immersion in the data (Neuman, 1997). In this thesis, this involved placing each informant with the same professional position into categories and discerning which questions they could or could not answer due to limitations of their jobs. For example, the math department heads tended to not know how money was distributed from the school division to the high schools.

The second pass through the data used axial coding whereby “the researcher begins with an organized set of initial codes or preliminary concepts” (Neuman, 1997, p. 423). The focus is on the initial themes with the researcher looking for causes and consequences, conditions and interactions, strategies and processes and concepts that cluster together (Neuman, 1997). Axial coding stimulates thinking about linkages between themes and can suggest dropping some themes or examining others in more depth. Essentially, it reinforces the connections between evidence and concepts (Neuman, 1997). For example, the concept of time as a resource overlaps into many domains as all participants’ time is affected in some form when they are dealing with provincial assessments.

The last pass through the data used selective coding which “involves scanning data and previous codes” (Neuman, 1997, p. 424). At this point, the researcher looks selectively for cases that illustrate themes and make comparisons and contrasts after most or all data collection is complete (Neuman, 1997). Since I completed a pilot study, I was able to categorise my questions into themes prior to embarking on the interview process.

Consequently, the categories that I used to code the data are based on the typology developed in the literature review which included: staffing, time, class size, specialist positions, professional development, materials, and the cost of marking.

Timetables

Based on a coding system, the first pass through the timetables was to discern whether Senior 4 mathematics courses received more time than other Senior 4 courses. Analysing a high school block schedule quickly revealed any courses that were given more than one section of time. The second pass was to see if there existed any patterns on the time of the day Senior 4 math courses were scheduled. This was done by tallying the number of Consumer 40S, Applied 40S and Pre-calculus 40S courses in each time slot. The final pass was to see if there existed a disproportionate number of Senior 4 mathematics courses compared to other Senior 4 courses (i.e. is the number of sections of English 40S the same as Mathematics 40S?).

In conclusion, by interviewing 16 participants (including my pilot study) and collecting high school master timetables, sufficient data was gathered to analyse whether Senior 4 provincial mathematics assessments influence resource allocation in a high school. In Chapter Four, the results of the data were explored using the typology of resources (developed in the literature review) as an organizational framework.

Chapter Four

Results

Resource Allocation

When I began each interview, I first asked each participant to describe what they believed constituted an educational resource. Of particular interest was that all participants described an educational resource in monetary terms. Realising that thinking about educational resources in a non-monetary manner is not common, I began to question each subject using the typology developed within the literature review. This questioning brought about a much wider range of answers relating to resources and changed the nature of the conversation as new ideas seemed to develop from the participants.

As I progressed through a division's hierarchy, starting from the superintendent's department down to the mathematics department heads, the degree of knowledge about resource allocation decreased dramatically. The superintendents knew how resources entered the system and had a rationale for how and why they were distributed within their division. Both superintendents stated that distribution was based on a combination of student population formulas and at-risk needs. When asked how "at-risk" was determined, each superintendent named the most at-risk high school in their division as an example (both high schools named were located in the poorest neighbourhood in each division). They then proceeded to discuss factors such as: dropout rates, poverty, teen pregnancy programming, suspensions and provincial assessment scores, as indicators used to determine whether more resources needed to be diverted to those schools. According to one superintendent,

...in every one of our six high school plans, which we must submit to the department of education, every one of them has a piece in there that talks about what are we going to do to improve outcomes for less successful learners. And in that context, we are making use of some standard test results, from either senior 1 or senior 4. (Johnny Big-Hill)

Both superintendents indicated that they try to be as equitable as possible when distributing resources and indicated that with smaller schools, some “top-up” of staffing was needed to ensure that a variety of courses could be offered.

The math/science consultants were aware of the variety of divisional budgets that exist but were mainly concerned with their own budget and how it could best be used to aid teachers within their jurisdiction.

The mathematics department heads did not know how money was allocated throughout the division but did know how it was distributed within their school and how it affected their department. The size of a mathematics department budget varied from school to school. In one high school, every core curricular department received the same amount of money per year (approximately \$6000 in total dollars) regardless of need or external pressures. This high school did not have department heads, so each department decided as a group how they spent their allotment. At this high school, the math department budget included items such as: Textbooks/Teacher’s Manuals, Curriculum Guides, graphing calculators (for teacher and/or student class sets), mathematics software or technology (e.g., motion sensors), manipulatives (e.g., dice, spinners, cube-a-links), mathematics competitions (e.g., Pascal, Fermat, Euclid) and other incidentals (M&M’s for Applied Math 10, etc...).

Since they receive a set amount each year, the departments are told to plan ahead so that larger purchases (such as technology) can be made over a number of years (however, any unused monies could not be rolled over to future years).

In 4 high schools, the mathematics department heads indicated that their budgets were quite small (approximately \$500 - \$1000) and in one school, there was no specific mathematics budget line. However, unlike the aforementioned school that received substantially more money, these departments do not have to make textbook and technology purchases from their current budget. Instead, they are only responsible for manipulatives, mathematics competitions and other incidentals. Textbooks are purchased from the school's textbook budget and technology needs are dealt with at a divisional level. The department head with the non-existent budget line indicated that he had never been turned down by his administration for needed materials. Consequently, having a large formally set budget was not a concern for these department heads.

The most informed about budgets were the principals which could probably be attributed to their constant interactions with all levels in the school division. When I asked the principals how they distributed their resources, the one that gave each core curriculum department \$6000 stated that it was to diminish animosity between departments. The administrators that gave \$500 - \$1000 used a formula based on the number of course sections a department has as well as any special fees that a department may impose (i.e., science lab fees). The principal whose mathematics department had no set budget line stated that he spent based on need which was determined by the requests made by each department head within his school.

When I asked if the provincial assessments have ever influenced how their budget was determined, they all stated no. However, all indicated that in years of new curriculum implementation, regardless of the course, budgets have to be set to ensure that new materials could be acquired if needed.

Resource Typology Results

Staffing

All participants discussed people as one of the most important resources in the school system. However, there were two distinct opinions concerning how the provincial assessments influenced the use of a division's personnel. The superintendents and the mathematics department heads discussed the need to find the best or most appropriate teachers to deliver the 40S mathematics courses. Yet, their rationale for how and why certain staff members were chosen to teach 40S mathematics courses differed.

Both superintendents believed that the provincial assessments gave some indication of the quality of teaching that occurred within a school and revealed that the scores were examined and discussed. For example, when asked if provincial assessments influence staffing decisions, one superintendent stated:

... Oh there's the politically correct answer and then there's the real answer.

The provincial exams, some people will say that the outcomes really don't matter, kids will do what they can and it's not a huge issue. Anyone who says that is probably not being totally truthful. In my view, you want your kids to have the best opportunity possible for getting a good grade. Because this is a mandated test, typically they are worth 30% of a student's mark and you as an administrator want to put somebody in place that can, if not

ensure, maximize the ability of the students in your building to do well. From a political sense, it is certainly nice to have your students do well provincially. Rightly or wrongly, people would look at them, though they are not published like they used to be, people are still quite aware of how divisions are doing. So, it does have an impact. My primary concern in choosing teachers is making sure that the kids have a chance to do well.

(Thomas Thresher)

Mathematics department heads also discussed the need to find the best teachers to teach provincially assessed courses since it is their responsibility to determine teacher course loads. However, the department heads were more concerned with the teacher's knowledge of the curriculum within a stream of mathematics (Applied, Consumer, Pre-Calculus) as well as the teacher's desire and readiness to teach a 40S course. All of the department heads indicated that they have teachers begin at the Senior 1 and Senior 2 level of mathematics and work their way up to the Senior 4 level courses. The department heads believe that this practice helps acquaint teachers with the differing curricular outcomes of each mathematics stream. For example, an Applied Math 20S teacher must teach using a TI-83 graphing calculator and spreadsheets, do group projects, and draw on both discovery learning and direct lecturing techniques to satisfy all of the curricular outcomes. As curricular outcomes in all mathematics streams progressively build upon themselves, it is important that teachers acquire needed skills in senior 2 before teaching the next level. Since this process takes a few years to cycle through, all of the department heads currently teach at least 2 sections of 40S mathematics. When asked if all teachers eventually teach a 40S course, all department heads indicated no.

When pursued, department heads indicated that readiness was not just the knowledge of the curriculum but also the ability to handle the pressure of preparing students for a provincial assessment. A common sentiment was that the external pressure of provincial assessments was viewed as a hindrance, if not a frightening prospect, to some teachers, thereby causing them to choose not to teach a 40S mathematics course. As stated by one department head:

... the pressure, by the time you get to the last month of the course, you think why am I even teaching the grade 12 course. Why? Because the pressure is immense. So, anyways it is to give them [teachers] some time to get there. But I would love to move out of the grade 12 entirely because I have been doing, I don't know, I had 2 Applied 40's last semester, 2 Pre-Calc 40's this semester and the Calculus. Well, I think it's time that I move back and let someone else do some of those. (Devon Depth)

When asked if the pressure was due to the environment created within the school division or by the administration, all department heads emphatically discussed how supportive their administrators were towards the results (whether good or bad). However, the department heads did indicate that when the results were not very good, the teachers become disheartened and some are suspicious that the marks could be used as a way to judge them. Consequently, many department heads said that their teachers are comfortable with teaching at the Senior 2 and Senior 3 level.

Conversely, the principals indicated that they believed that all of the members of their mathematics departments could handle teaching 40S mathematics courses. Yet, they pointed out that department heads make the course load staffing decisions and believed

that course loads were based on a range of criteria; thus downplaying the effects of the existence of the provincial assessments. The only administrator who differed from the others was one whom I interviewed during my pilot study. As her school division did not employ department heads, it was her responsibility to determine each teacher's course load. This administrator indicated that she could not give one teacher too many provincially assessed courses as the marking, preparation time and pressure was more than a non-provincially assessed course. As such, she believed that the best Senior 4 teachers were not necessarily being utilised because of the provincial assessments.

Time

None of the high schools allotted more than the 110 hours of instructional time for any of the Senior 4 mathematics courses. Most of the math department heads indicated that when the 40S Pre-Calculus curriculum was first implemented, there was some discussion concerning its length and the ability to complete the course. However, now that the teachers are familiar with the curriculum, the discussion around increase of time has subsided.

Mathematics department heads had the most to say about the time being spent preparing for provincial assessments. In all of the high schools, the mathematics teachers who have a provincially assessed course usually spent more time preparing their students for the provincial assessments than they would for a school based final examination. This entailed either holding extra classes during the last week prior to the exam or having students write old provincial examinations for practice. One department head indicated that their extra time was formalized and usually occurred on:

... an afternoon on a weekend and some evenings and during the course of the regular term, extra help is offered regularly. I know that my extra help is 8:00 am in the morning Monday, Wednesday and Friday. Other people offer help after school or at noon or whenever the student needs to meet. But as we are getting closer to the exam, there are some extra times allotted. I think another teacher and I split it. I know that another teacher and I did five evenings. (Dean Durham)

When asked if they do this for any of the non-provincially assessed courses, the answer was no. Further, it is interesting to note that the extra time tended to occur for the 40S Pre-Calculus course as opposed to the 40S Applied or 40S Consumer courses. This occurrence was attributed to the length and level of difficulty of the 40S Pre-Calculus curriculum and provincial assessment.

For example, this semester (February – June 2005), I taught both Applied Math 40S and Pre-Calculus Math 40S. I completed the Applied Math 40S course with 8 classes remaining before the provincial assessment while I finished the Pre-Calculus 40S Math course with 3 classes left before the provincial assessment. My colleague teaching Consumer Math 40S has three parts to her provincial assessment (project, portfolio and written). She completed the project and portfolio portion of the provincial assessment in May and finished teaching the content needed for the final written portion with 5 classes left before the June provincial and was therefore able to review during the allotted class time. As teachers do not have much time during regular class time to properly review for the 40S Pre-Calculus provincial assessment, much of the extra help must occur outside of class time.

Furthermore, since Senior 4 mathematics is also a graduation requirement, teachers working with the 40S Consumer mathematics students have the increased pressure of motivating these students to care about an external assessment as well as ensure they are successful. Since these students are struggling learners (in mathematics), teachers tend to work with these students during their lunch hours for the entire semester. Even with the extra tutoring, Consumer 40S provincial assessment results tend to be very low, causing teachers to feel defeated. Again, most high schools have only one to two teachers out of seven who accept the challenge of teaching 40S Consumer mathematics.

While the extra time is voluntary, there is definitely a shift in resources once the teachers accept a Senior 4 mathematics course. Teachers have implicitly agreed to give up many lunch hours and preparation time to help support the students in these courses. In fact, department heads relayed that besides preparedness and pressure, time was another factor contributing to their staff not wanting to teach 40S mathematics courses. As students in 40S Pre-Calculus tend to seek out a lot of extra help, department heads alluded that some teachers have no desire to give up their personal time to provide extra help. Consequently, in most high schools, as few as two teachers out of seven teach 40S Pre-Calculus mathematics.

Additionally, as of September 2004, Applied Math 40S students are allowed to create an 8 x 10 two-sided hand written study sheet to bring into the provincial examination (*Policies and Procedures for Standards Tests*, 2004). This has helped to decrease the students' anxiety over the provincial examination since most students take advantage of the new process. However, as of September 2003, the Pre-Calculus 40S provincial assessment decreased the time allocated for calculator use from 2 hours to 1

hour of the 3 hour exam; thereby heightening the anxiety of the students (*Policies and Procedures for Standards Tests*, 2004). Had there not been a provincial assessment, most department heads indicated that they would eliminate one or two topics in the Pre-Calculus 40S course and assess accordingly.

Furthermore, when school divisions are looking at provincial assessments, 40S Pre-Calculus mathematics tends to be regarded as the elite mathematics course with the high school's best mathematics students. As such, the class average and pass/fail rates of 40S Pre-Calculus provincial assessments tend to be scrutinized more closely than the results of the 40S Applied or 40S Consumer provincial mathematics assessments. Thus, regardless of how emphatically an administrator states that provincial examination results do not matter, department heads indicated that the Pre-Calculus results are important at some level to them and the administrators.

In terms of timetables, there were some emergent patterns for mathematics courses, but I must argue that these patterns seem to have more to do with the type of student in the course than the existence of a provincial examination. First of all, not one school schedules their 40S Consumer in the first or last block of the day. When I asked the principals why this is, they indicated that these at-risk students tend to have attendance problems. As stated by one administrator:

...the only two courses that I would look at when I timetable are Consumer 40S and ELA Comprehensive focus. I probably am not going to timetable a Consumer course in first or fifth period because they are the more at-risk students. They won't get here in the morning and by fifth period, they disappear. (Hillary Plank)

All other mathematics classes were scheduled based on a need to balance the timetable. For example, if there were 4 sections of Applied 40S mathematics, then the administrator strove to have 2 sections per semester. The larger the school, the less impact individual mathematics courses have on the timetable as there tends to be at least one of the same mathematics course in every slot. According to one administrator:

...we're so big that we have to make sure, especially in math, that we are offering one in every slot of the day. We have to, there's no way around it with 1300 kids here. Because half of my population, the 650 kids are taking math in the first semester and half are taking math in the second semester.

(Hillary Plank)

The one course that tends to not be balanced is the 40S Pre-Calculus course. If a school offers Advanced Placement Calculus, then Senior 3 Pre-Calculus students need to complete their Senior 4 Pre-Calculus one year early. According to one administrator:

...the one course that tends to be looked at is the Pre-Calculus 40S. It tends to be heavily weighted in second semester and that's because of the AP the following year. And that's because the grade 11's will take Pre-Cal 30 in first semester and Pre-Cal 40 in second semester so that in their grade 12 year they can take AP Calculus. So that becomes a factor and the Pre-Cal becomes very full. (Colleen Combine)

Thus, based on the timetables collected and the interviews with the high school administrators, when and how senior 4 mathematics classes are timetabled is based on student choices, special programming, and at-risk student needs. The existence of

provincial assessments seems to have little to no influence on the timetable in these high schools.

Class size

The provincial assessments seem to have no affect on the size of mathematics classes. The majority of mathematics classes ranged from 28 – 34 students with the exception of Consumer Math 40S which was held to 25 students in most high schools (but could still be as high as 30). As Consumer mathematics is geared for learners who do not intend to pursue mathematics at the post-secondary level, this class is kept smaller to facilitate their graduation. None of the participants seemed to worry about how these students fared on a provincial assessment. Rather, keeping class sizes smaller than the 40S Pre-Calculus and 40S Applied was seen as method to help these particular learners succeed. Interestingly, all of the high schools tried to keep all levels of their Consumer classes smaller but none of them kept any formal records that would indicate whether this strategy helped. Therefore, it was the nature of the course rather than the provincial assessment that impacted this aspect of resource allocation.

Specialist positions

Both math/science consultants said that they did not spend a lot of their time directly working with the provincial assessments. Rather, provincial assessments were something they dealt with twice a year and probably spent 2 weeks a semester on it. They each described their role as a curriculum or assessment consultant and saw the provincial assessments as an adjunct to their assessment duties.

Interestingly, both superintendents discussed the consultants' salary as an expenditure related to provincial assessments. According to one superintendent:

... the fact that we have a full time assessment consultant shows that resources are being expended. But I know that I may be splitting hairs because her job function is not just dealing with standards assessments, in fact I'd say that it was a small part of her job as she assists teachers to improve their assessment. However, her salary still comes into play.

(Johnny Big-Hill)

Professional Development

When the new mathematics curriculum and provincial assessments were first implemented, professional development sessions were highly attended by all members of a mathematics department. Department heads indicated that Y.A.G. (year at a glance) sessions from the Manitoba Department of Education and S.A.G. (special area groups) sessions related to exam preparation, information or types of questions were heavily attended because

...when they first came out, we were worried about them, teachers were worried about what was in them, about covering everything, what slant would they take, there were lots more questions about what to do. (Dean Durham)

Within the school divisions, the costs to attend these sessions were either paid through a divisional professional development fund (Plains School Division) or a school based fund (Mountain School Division). Neither mathematics departments had to pay for professional development out of their budget.

Currently, mathematics department heads indicated that since the majority of their staff is familiar with both curriculum outcomes and the provincial assessments, most

professional development occurs in-house. All of the department heads indicated that new teachers use material from the veteran teachers within their department and are more inclined to attend sessions concerning the technology used in the Applied mathematics stream. One department head stated that

...a lot of pd was spent on the Applied course when it first came in - learning the new technology. And when any new teacher comes in, we try to send them to any Applied pd sessions that are offered. (Andy Apex)

As such, most department heads no longer see provincial assessments as an influence on their professional development needs.

Interestingly, all participants indicated that there is a belief that provincial assessment, whether considered good or bad, has incited dialogue on assessment. This dialogue has created, in some divisions, resources allocated for assessment consultants as well as resources for teachers to attend professional development workshops. Furthermore, there has been a creation of a high level of dialogue concerning assessment in mathematics and English when teachers mark provincial assessments as a group at the divisional level. An unexpected positive professional development situation has emerged from the concentrated gathering of subject area teachers for the marking task. For example, one superintendent stated:

...our teachers will tell us that being involved in marking is one of the greatest professional development exercises that they will ever go through.

... I believe that it makes them better teachers that are better able to understand the strengths and weaknesses of kids, better able to see what is

an excellent question, a fairly done question and a poor question that will make them better at judging. (Johnny Big-Hill)

Furthermore, an administrator indicated that:

...it gives the teachers who are working directly with the students and with the tests a better appreciation for the tests and for how their students performed and puts them in a better position to understand what the results mean and to be able to use that information when dealing with students and parents and also for evaluating their own instructional practice. (Helen Hops)

Finally, even the math/science consultants did not see their time coordinating provincial assessment marking sessions as a negative shift from other pressing issues. They both believed that having many teachers marking in a central location brought about a fantastic dialogue about assessment. As stated by one consultant:

... I also must look at the collegial contact that arises from these exams. If I am going to pay all this money to mark and administer these exams, then I expect that there has to be some conversation that goes along with it. Because if there can't be some professional collegiality or learning that takes place then it would be a waste – at least there is some time for teachers to confer about expectations or what practices are done in their classrooms, if it just becomes a scoring marathon, then what's the benefit of that? (Stephanie Stalk)

Even though professional development for teachers has emerged as a positive outcome from divisional marking and the overall implementation of provincial assessments, very

little impact on resource allocation currently occurs. While there was a general surge of professional development needed when provincial assessments and the mathematics curriculum were initially implemented, today, most new teachers are provided with “in-house” training. Thus, resources expended to prepare for provincial assessments are no longer needed in these mathematics departments.

Materials

All mathematics department heads indicated a decrease in spending starting from the onset of the new senior high mathematics curriculum and provincial assessments to current spending in their departments. When the current mathematics curriculum was in its implementation stage, a surge in need emerged, causing the purchase of new textbooks, class sets of TI-83 graphing calculators, dice/calipers/manipulatives or software programs. In order to offset the initial costs, the government of Manitoba provided each school with a one-time \$5000 grant to purchase the materials needed for the Applied mathematics stream (Dean Durham).

In 1998, the unit cost of a TI-83 graphing calculator was \$145.00 and the culture of students purchasing their own was not yet the norm. So, schools purchased class sets of 30 TI-83 graphing calculators from Radio Shack at a school rate of \$114.95/calculator. Interestingly, at Wheat Collegiate, the mathematics department rented the TI-83 graphing calculators to their students for \$20 a year. The extra windfall of money allowed this mathematics department to make necessary purchases without needing to always go through administration. In 2000, the Plains School Division stipulated that all rentals must be \$50. Given that the retail price of the TI-83 graphing calculator has decreased

(\$89 -\$99) coupled with the increased rental price, most students now purchase their own calculator, thereby diminishing the rental income for Wheat Collegiate.

Using data from Wheat Collegiate, tables 3, 4, 5, and 6 outline the purchases made by the mathematics department in 1998, 1999, 2000 and 2004. These tables show the progression of needed materials during the implementation years of the mathematics curriculum and the provincial assessments. During the first three years (tables 3, 4, and 5), there is a large onset of purchases which may have occurred regardless of the existence of provincial assessments. However, Durham has indicated that his mathematics department tended to use worksheets rather than textbooks prior to the implementation of the new curriculum and provincial assessments. Furthermore, table 6 shows a decline in spending indicating that this mathematics department is now in a maintenance mode with regards to material purchases.

Wheat Collegiate generally had 3 classes of the same course per semester with approximately 90 students per semester. According to Durham, 100 textbooks were purchased per course to allow for imbalances of class sizes that can occur in a semester. As Wheat Collegiate was participating in the pilot phase-in period of the new curriculum, the new senior 2 curriculum was taught in 1998. The former 30S/30G and 40S/40G mathematics programs were still in place in senior 3 and senior 4 (provincial assessments were in 40S/40G).

Table 3 – 1998

All textbooks (in all tables) were purchased from the general school textbook budget.

Course	Name of Item	Number of Items	*Unit Cost	Total Cost
Applied 20S	Cumulative Exercises	100	\$7.95	\$795
Applied 20S	TI-83 graphing calculators	60	\$114.95	\$6897
Applied 20S	TI-83 Teacher's View Screen	2	\$414.95	\$829.90
Applied 20S	Vernier Calipers	30	\$3.85	\$115.50
Applied 20S	Vernier Micrometers	30	\$21.95	\$658.50
Applied 20S	CBL's	5	\$234.95	\$1174.75
Applied 20S	Motion Sensors	3	\$113.35	\$340.05
Applied 20S	Box Cars & 1-Eyed Jacks manipulatives set	1	\$34.40	\$34.40
Applied 20S	M&M's, oranges			\$50.00
Consumer 20S	Cumulative Exercises I	100	\$5.60	\$560
Consumer 20S	Cumulative Exercises II	100	\$5.10	\$510
Pre-Calculus 20S	Addison Wesley Textbook	100	\$54.35	\$5435
Pre-Calculus 20S	Cumulative exercises	100	\$5.30	\$530
Pre-Calculus 20S	Solutions to Cumulative Exercises	100	\$3.65	\$365
Math Competitions	Pascal, Cayley, Fermat, Euclid	100	\$2.00	\$200
Total				\$18495.10

*Source for Unit Prices: Manitoba Textbook Bureau Catalogue – 1998/1999 and Dean Durham

In 1999, Wheat Collegiate was in the pilot phase for the senior 3 curriculums and mathematics 40S and 40G were still being taught (and provincially assessed). If a school was not piloting the new curriculum, then 1999 would have been their implementation year of the new senior 2 curriculum.

Table 4 - 1999

Course	Name of Item	Number of Items	*Unit Cost	Total Cost
Applied 20S	Pre-Print Textbook Addison Wesley Applied Math 10	100	*No cost until final print (2000)	\$0
Applied 20S Applied 30S	M&M's, oranges Cumulative Exercises	100	\$8.70	\$870
Consumer 30S	Cumulative Exercises I	100	\$4.80	\$480
Consumer 30S	Cumulative Exercises II	100	\$4.55	\$455
Pre-Calculus 30S	Addison Wesley Textbook	100	\$59.80	\$5980
Pre-Calculus 30S	Cumulative exercises	100	\$5.30	\$530
Pre-Calculus 30S	Solutions to Cumulative Exercises	100	\$4.10	\$410
Math Competitions	Pascal, Cayley, Fermat, Euclid	100	\$2.00	\$200
Total				\$8975

*Source for Unit Prices: Manitoba Textbook Bureau Catalogue – 1999/2000 and Dean Durham

*Note: Addison Wesley allowed schools to use their pre-print textbooks (which were black & white and still in the revision stage) for free as long as the school agreed to purchase the same number of completed textbooks the next school year.

In 2000, Wheat Collegiate was in the pilot stage of the senior 4 curriculum. All schools who were piloting the new 40S curriculum were given a one year voluntary reprieve from the provincial assessments (Wheat collegiate participated in the pilot provincial assessments).

Table 5 – 2000

Course	Name of Item	Number of Items	*Unit Cost	Total Cost
Applied 20S	Addison Wesley Applied Math 10 text	100	\$56.50	\$5650
Applied 20S	Teacher's Edition to Addison Wesley	1	\$132.25	\$132.25
Applied 20S	M&M's, oranges			\$50
Applied 30S	TI-83 plus	30	\$129	\$3870
Applied 30S	Ti-83 plus View Screen	1	\$414.95	\$414.95
Applied 30S	Pre-Print Textbook Addison Wesley Applied Math 10	100	No charge until 2001	\$0
Applied 40S	Cumulative Exercises	100	\$9.45	\$945
Consumer 40S	Cumulative Exercises I	100	\$7.95	\$795
Consumer 40S	Cumulative Exercises II	100	\$5.35	\$535
Pre-Calculus 40S	Addison Wesley Textbook	100	\$59.50	\$5950
Pre-Calculus 40S	Cumulative exercises	100	\$5.85	\$585
Pre-Calculus 40S	Solutions to Cumulative Exercises	100	\$3.65	\$365
Math Competitions	Pascal, Cayley, Fermat, Euclid	100	\$2.00	\$200
Total				\$19492.20

*Source for Unit Prices: Manitoba Textbook Bureau Catalogue – 2000/2001 and Dean Durham

As the curriculum progressed from Senior 2 to Senior 4, the spending continued on a steady basis to facilitate the new curriculum. Currently, high school spending in mathematics has progressed to a steady state where costs are at a maintenance level to replace missing text books and maintain the condition of equipment. The budget of Wheat Collegiate is now \$500 and covers small incidentals. However, due to the accumulation of income from the rental of TI-83 graphing calculators, Durham has indicated that he has recently used the funds to purchase a mathematics departmental laptop and a smart-board.

Table 6 – 2004

Course	Name of Item	Number of Items	Unit Cost	Total Cost
Applied 20S Math Competitions Other	M&M's, oranges Pascal, Cayley, Fermat, Euclid Rulers, replaced calculators, etc...	100	\$2.00	\$50 \$200 Varies
Total				\$500.00

*Source for Unit Prices: Manitoba Textbook Bureau Catalogue – 2000/2001 and Dean Durham

Examination of the financial outlays of a mathematics department does not give a clear indication of whether the provincial assessments influenced the purchases. As senior 4 provincial assessments existed prior to the implementation of the new mathematics curriculum, it could be argued that the purchases would have occurred regardless of the existence of the provincial assessments. However, upon speaking to mathematics department heads, it is clear that the items were purchased with a sense of urgency to ensure proper preparation for the provincial assessments. All department heads discussed the extra pressure of needing to simultaneously prepare their students for

the provincial assessments while learning and implementing the new curriculum. In fact, department heads stated that the provincial assessments were sometimes used as a leverage point to obtain more material or funds from their administrators. One department head indicated that it was:

... easier to get what you want from the administration if you could claim that it is a provincial exam requirement. (Bill Cracker)

This seems to indicate that had provincial assessments not existed, the amount of money afforded to the mathematics department may have been less.

Furthermore, had the provincial assessments not have been in place so quickly, the department heads indicated that they would not have necessarily purchased more than one class set of graphing calculators. In fact, all of the participating schools require their students to purchase their own TI-83 graphing calculator and will only loan a calculator to students who cannot afford it.

The Cost of Marking

The Manitoba Department of Assessment pushed back the provincial mathematics examination dates in the 2004-2005 school year which resulted in teachers marking during the week of their school based examinations. Previously, divisional provincial mathematics marking sessions occurred during the last week of regularly scheduled classes in a semester. This caused a need to hire many substitutes as well as forced teachers to prepare a few days worth of material that a substitute could handle.

Superintendents and administrators indicated that when their classroom teachers are out of the building, there is a rise in disciplinary problems and the students suffer as a

substitute teacher cannot replace the work that the regular classroom teacher does.

According to one superintendent:

... there's a cost to our students, in that over a 4 or 5 day period, their regular classroom teacher isn't there. And I think that if someone was idealistic they would think that the substitute could perform the same function as the classroom teacher. In theory that's true, in practicality, that's not true at all. So, I think our students pay dearly for the classroom teachers being out. (Thomas Thresher)

Now that the divisional marking session occurs within the school based examination week, the need for substitutes has decreased; yet the burden on 40S mathematics teachers has remained constant. Mathematics department heads indicated that 40S mathematics teachers have no school time to prepare for their second semester courses (referring to the January examination session) nor are they allotted any additional school time to mark their school based final examinations. In comparison, those teaching non-provincially assessed courses mark their school based exams or prepare for the upcoming semester during school hours. Since the 40S mathematics teachers are spending their school days marking provincial assessments, they are left to mark their school based exams at home. What two department heads indicated was that provincial marking should occur in the evening to create the least disruption to their other classes.

These findings are carried forward to form the basis of the conclusions presented in Chapter Five.

Chapter Five

Conclusions

Overview

In this thesis, I explored the influence of Senior 4 provincial mathematics assessments on resource allocation using a typology of resources developed from the refinement of themes generated from findings in my pilot study, Levin and Young's (1998) description of purchased versus hired resources and Monk and Roellke's (1994) monetary/non-monetary definition of resources (origination, disposition and utilization). The typology of resources expanded the reductive/traditional concept of resources by categorizing resources in terms of tangible materials and people in a school or division. The categories within the typology of resources were staffing, time, class size, specialist positions, professional development, materials, and the cost of marking provincial assessments.

In total (including my pilot study), I interviewed 16 people whose experience within the teaching profession ranged from 6 to 40 years. The breakdown of the participants' job classification was as follows: 3 superintendents (or assistants), 6 principals, 4 Mathematics department heads, 2 divisional Math/Science consultants and 1 consultant from the Manitoba Department of Assessment & Evaluation.

All data was passed through a three-tiered system of coding (open, axial and selective). In the open coding phase, the participants' concept of what constituted an educational resource as well as how resources were distributed at the divisional and high school level were examined. As well, timetables were examined to discern whether more time than the provincially allotted 110 hours was given to any Senior 4 mathematics

course. During the axial coding phase, all data was organized according to the typology of resources and areas where provincial assessments did (or did not) influence resource allocation was discerned. In terms of timetables, any Senior 4 mathematics scheduling patterns were observed. In the final selective coding phase, hierarchical differences of the participants' job classification brought about distinct patterns in how questions were interpreted as well as how resources were distributed. Furthermore, a difference between what participants said and what was actually practiced was observed. As for timetables, an analysis of why apparent scheduling patterns of certain Senior 4 mathematics courses was conducted.

Definition of an Educational Resource

All participants first interpreted a resource as a monetary value. However, once pursued using the typology of resources, a much wider definition of resources was described, including: people, materials, time and money.

Resource Distribution

Although each participant provided their interpretation of what constituted an educational resource, many consistent patterns emerged among those within the same job classification. Superintendents were versed in how and why resources were distributed within their school division but gave little insight as to what transpired at the high school level. Principals had a detailed understanding of how resources were distributed at both the divisional and high school level but left many of the departmental decisions to their department heads. Mathematics department heads knew how resources were distributed within their school and departments and divisional Math/Science consultants were only knowledgeable about their budgets.

Typology of Resources

When I embarked on this study, I assumed that provincial assessments would impact all areas within the typology of resources. However, upon completion of this study, I realised that there were some categories within the typology where a direct correlation between resource allocation and provincial assessments cannot be drawn from my data. At the same time, there were areas in which the participants' practices demonstrated that Senior 4 provincial mathematics assessments influenced how they allocated resources.

Areas Influenced By Provincial Assessments

Although none of the participants discussed a direct correlation between resource allocation and Senior 4 provincial mathematics assessments, their statements alone may not be conclusive in discounting such a relationship. Rather, analysing their practises surrounding resource allocation illuminated instances where resources appeared to be influenced by provincial assessments. These areas included: the cost of marking, materials, staffing, time (teachers' personal time) and professional development (implementation years).

Cost of Marking

The cost of marking exists only because provincial assessments exist. The cost associated with the marking of provincial assessments is an expenditure that does not occur with school based assessments. While there were numerous citings of the positive impact collective/team marking has on the professional development of the teachers participating in the process, there has yet to be any use of such an approach with other non-provincially assessed high school courses within a school division. Given that this is

not a widespread practice; resources are definitely being used to mark the provincial assessments.

Materials

Furthermore, when administrators and department heads discussed mathematics budgets, all recalled the changes in spending that occurred from the implementation stage of the new curriculum to the current situation. All but one principal discussed their resource allocation decision making in terms of need. Yet, not one principal would acknowledge that the existence of the provincial assessments had any influence on how need was determined. Even if all of the materials purchased were due solely to the onset of the new curriculum, spending approximately \$20,000 in one school year in the mathematics department seems exorbitant. As school budgets are finite, there must have been another department whose requests were not fulfilled during the mass purchases in the mathematics department. Consequently, the spending practice leads me to believe that factors (of which provincial assessments may be a part) other than curriculum influenced the resource allocation decisions of these principals.

Moreover, department heads' indication that provincial assessments were used as a leverage to gain access to materials appear to validate my view that principals did not fully disclose how need was determined. As department heads revealed that materials may not have been purchased as quickly had provincial assessments not existed, it seems that provincial assessments did influence spending on materials. While I would agree that spending in years of curriculum implementation will always be higher than years of maintenance, going from a peak budget of \$20,000 to \$500 seems extreme.

Consequently, the wide variation of yearly budgets lends credence to provincial assessments having some influence on material purchases.

Staffing

Additionally, the categories, staffing and time, are areas where practice exemplified the influence of provincial assessments. While principals stated that all mathematics teachers were able to teach any course, in practice, not all teachers were deemed capable of teaching a senior 4 mathematics course (even if they had taught senior 3). Interestingly, it was department heads that illuminated the conflicts with deciding who was best suited to teach a provincially assessed course. Discussions around pressure, fear and willingness to take on a provincially assessed course were described by department heads as mitigating factors surrounding staffing allocations decisions. Consequently, only select teachers were given senior 4 course loads. As such, practices within high schools contradict the responses given by principals with regards to influence of provincial assessments on staffing.

Time – Teachers' Personal Time

Moreover, time, in the form of teachers' personal time, emerged as a resource that was greatly influenced by provincial assessments. Personal time, either formalized or voluntary, dedicated to a mathematics course increased when it was provincially assessed. This is interesting since department heads lamented that few teachers are willing to teach a senior 4 course. If giving up personal time is a deterrent for teachers, then staffing again is affected by provincial assessments.

Professional Development - Implementation Years

Finally, professional development was cited as a source of resource allocation when provincial assessments were first implemented. As teachers were uncertain about the format and content of the provincial assessments, time was spent attending workshops geared to provincial assessment preparation. While it could be argued that the concurrent implementation of the new curriculum inspired the professional development, teachers could have attended only curriculum workshops and not provincial assessment workshops.

Areas Not Influenced By Provincial Assessments

There were three areas within the typology of resources whereby a correlation between provincial assessments and resource allocation could not be ascertained. These areas included: class size, time (timetables) and professional development (current years).

Class Size

The inability to draw a clear correlation in the area of class size and time (timetabling) stems from the fact that there were many external mitigating variables that influenced spending in these categories. While class sizes were deliberately kept smaller in Consumer Math 40S compared to other senior 4 courses, reasons for the variance were attributed to the type of student in the course rather than the existence of a provincial assessment. As students in Consumer mathematics tend to be at-risk learners (in mathematics), creating an environment conducive to their particular needs was viewed as a pedagogical adaptation that would occur regardless of a provincial assessment. Since schools tended to keep small class sizes in all levels of Consumer mathematics, their practice corroborated their reasoning.

Time - Timetables

Furthermore, the manner in which Consumer Math 40S was timetabled seemed to indicate that provincial assessments were factored in as a constraint. While all other senior 4 mathematics courses could be located in any time slot during the school day, Consumer Math 40S rarely occurred in periods 1 or 6. Even though emergent patterns gave the impression that Consumer Math 40S was given special scheduling consideration in the timetabling process, attributing these patterns to provincial assessments would not be accurate. Based on the rationale of the participants, it was the truant behaviour of many of these particular types of learners that influenced the timetable and not the provincial assessments.

Professional Development - Current Years

As teachers have become familiar with the format and content of Senior 4 provincial mathematics assessments, the need to attend professional development geared toward provincial assessments has subsided. When new mathematics teachers are hired, much of their provincial assessment preparation/training comes from other teachers within their department. Consequently, resources are no longer expended in this area.

Areas Which the Influence of Provincial Assessments is Uncertain

One area within the typology of resources where no clear distinction could be made was in the category of specialist positions.

Specialist Positions

There was conflicting ideas regarding the relationship between divisional Math/Science consultant time to Senior 4 provincial mathematics assessments based on perceptions regarding the role of the consultant. First of all, the specialists described

themselves as Math/Science curriculum consultants whose time dedicated to provincial assessments was limited to two weeks per semester. On the contrary, superintendents believed that Math/Science consultants spent a large amount of their time on assessment, indicating a belief that the costs associated with specialist positions was due to provincial assessments. At the same time, 3 of the 4 mathematics department heads could not describe their Math/Science consultant's role and stated that they rarely used their services. These findings resulted in a confused picture that revealed very little in terms of the influence provincial assessments have on consultant time.

Furthermore, while Math/Science consultants do spend time working with teachers on assessment strategies, the influence that the provincial assessments have on the type of work they do is debatable. Provincial assessments may help generate discussions around assessments and may cause teachers to seek out resources from the consultants. However, as assessment occurs in many forms, consultants' work in this area would occur regardless of provincial assessments. As such, due to the conflicting results, there needs to be more studies done in this area before any correlations (positive or negative) between specialist positions and provincial assessments can be made.

Differing Perspectives

Direct evidence of the link between provincial assessments and resource allocation may be partially obscured by hierarchies within the system. In particular, this study demonstrated that status within the school system is closely associated with particular notions of resource allocation. As the hierarchy of the school division moved up to the superintendents department, the focus shifted from a micro to a macro perspective in the interpretation of resources as described in the typology. For example,

the broadened definition of 'resource' in the typology allowed non-monetary staffing issues, such as pressure and time, to surface. Yet, the superintendents' concern about staffing issues hinged on overall expenditures with little concern about the daily repercussions of the provincial assessments. Furthermore, while both superintendents assumed that the most capable teachers handled provincially assessed courses, principals maintained that all teachers were capable of handling a senior 4 course. In comparison, it was the mathematics department heads who detailed a much different scenario. This seems to signify a disjoint in the lines of communication with senior administration as well as indicate the principals' desire to remain as neutral as possible.

The aforementioned neutrality of principals emerged in every category within the typology. Principals would not differentiate between the skills of their teachers, tried to frame all answers in terms of curricular pedagogy, and did not ascribe any of their spending decisions to provincial assessments. This behaviour may be attributed to the buffering role principals assume between superintendents, who view provincial assessments as a valid source of information, and teachers, who are more apt to view provincial assessments with scepticism. Consequently, the hierarchical position of principals in the school system may have influenced how questions were answered.

Moreover, while superintendents' perspectives framed an understanding of divisional resource distribution, the discussions with mathematics department heads had a more specific focus on the influence of provincial assessments. Consequently, the experience the department heads have with allocating resources provided the most detailed description of the areas influenced by provincial assessments.

Implications

Typology – Further Studies

Linking the conventional monetary definition of resources with non-monetary concepts allowed new relationships pertaining to resource allocation to be established. This was evident in the shift in dialogue that occurred during the interview process as my broader concept of resources was revealed to the participants. Since mapping resources in this context does not appear to have been done before, using the typology revealed the inherent complexity of resource allocation as perspectives of each participant added a new layer of information about resource allocation. Consequently, I would definitely use the typology developed within this study in a subsequent study.

While all participants indicated that some categories within the typology were not necessarily influenced by the existence of provincial assessments, they all offered valuable insights on the dimensions of resource allocation in a school division. In terms of conducting a follow-up study, I would recommend using the resource typology without the areas of class size and timetables as these areas seem to be influenced by too many external mitigating factors. As well, though no conclusive data was discerned regarding the category specialist positions, inclusion of Math/Science consultants is necessary because their role and responsibilities are evolving (as it is a relatively new position in many school divisions). Lastly, I would add personal time (that of teachers or students) as a category in the typology of resources as personal time is a non-monetary resource that tends to be ignored yet holds a vital role in the daily operations of the school system. In this study, the personal time teachers dedicate to preparing students for assessments emerged not only as a non-monetary resource but in some cases, as a departmental

expectation. As such, personal time needs to be regarded as an important non-monetary resource.

The Need to Cross Reference Data

The ability to differentiate the areas where provincial assessments did (or did not) influence resource allocation within the typology of resources was facilitated by the ability to cross reference information garnered from interviewing participants as well as observing the practices within the high schools. For example, interviewing the principal and mathematics department head within the same high school allowed congruencies to emerge as well as highlighted contradictions. Had I relied solely on one viewpoint, differences in resource allocation in relation to the hierarchical job classification of the participants would not have emerged.

More importantly, in three areas within the typology of resources (cost of materials, time and staffing), the practices in the high school contradicted what was expressed in the interviews by the participants. For example, when principals were asked whether the provincial assessments influenced staffing decisions, they stated no. Yet, the practice in the high schools showed that only certain teachers taught provincially assessed courses. Had interviews not been supplemented by noting the actual practices in the high schools, incorrect attributions could have been made.

Moreover, the broadened definition of resources in the typology required participants to reflect on how they allocated resources in a non-traditional manner. Confronted with the new situation, participants may not have been aware of why their practices exist, may not have properly explained their practices or may not have known the implications of their decisions. Thus, participants may have inadvertently provided

answers that did not correspond to the practices within their schools. Consequently, had there not been other methods to cross reference what was said in the interviews, contradictions would not have surfaced. As such, I would strongly recommend that any future studies have many different sources of information.

Finally, given the influence of the differing hierarchical perspectives, I would recommend that follow-up studies employ a second round of interviews to clarify areas within the typology that seem to be polarized by political stature within the school system. As well, using a political framework to augment the economic framework used in this thesis may be beneficial as school politics have surfaced in many unexpected areas of resource allocation.

Recommendations

There are a number of areas within the school system that could benefit from the data generated in this study. First of all, Mathematics department heads need to distribute provincially assessed courses to many teachers within their department to alleviate some of the time and pressure issues expressed by the few teachers teaching those courses. Furthermore, when new teachers are hired to teach high school mathematics, an expectation should be that they are capable and willing to teach the Senior 4 curriculum. As the fear and pressure subsides as teachers become experienced with provincial assessments, the only way for more teachers to become comfortable with the system is through experience.

Secondly, school boards and superintendents should evaluate the role of Math/Science consultants in their school divisions as it was apparent that confusion currently exists in terms these consultants. As few participants used the Math/Science

consultants as a resource and had little idea as to how the consultant's position contributed to the school system, it appears that wastage of a resource is occurring. Since Math/Science consultants are a cost to a school division, maximizing their potential should be a concern to the school board and senior administration.

Third, there needs to be more open lines of communication between each level of the hierarchy in the school system. Not only were there conflicting interpretations concerning how/why resources were distributed but some participants were given no information. If each level in the hierarchy is responsible for their budget but is not cognisant of what is occurring at other levels, then how can one ensure that redundancy is not occurring?

Fourth, the Department of Education should examine the amount of extra time currently expended to finish a curriculum in time to prepare for their provincial assessments. As extra time is voluntary and thus varies from high school to high school, not all students are guaranteed the same opportunities to have teacher guided provincial assessment preparation time. Furthermore, if the extra time needed to prepare for provincial assessments is a deterrent for teachers, then students may not be receiving the most capable teachers as their instructors. Consequently, a need to shorten the Senior 4 curriculum or change the assessment (i.e., assess 8 out of 10 units) may be necessary to ensure that all students are receiving the same amount of instruction and preparation time.

Finally, as the non-monetary categories within the typology of resources has surfaced as a necessity that enables the school system to function smoothly, future studies concerning educational finance would be limited if only traditional, measurable monetary resources were included.

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Appendix A

Permission Letter for Superintendents for Interview

Appendix A

Permission Letter for Superintendents for Interview

Sheeva Harrysingh

December 1, 2004

Dear (name of superintendent):

I am a graduate student in Educational Administration at the University of Manitoba. One of the requirements of this program is to complete a thesis. I have chosen to undertake a study assessing whether Senior 4 provincial standards examinations have an impact on the distribution of resources in a high school.

I am writing to gain permission to interview you; and to approach your assistant superintendents, principals, consultants and Math department heads in your school division to also be participants my study. If you agree, my study will involve one 1-hour interview with each participant. I will also like permission to gather data (high school timetables) from you on the amount of hours allocated to Senior 4 Mathematics courses in your division.

I will be tape-recording the interview to be used primarily by myself to help me make detailed notes about what I hear. However, since this study is for a thesis, I may also share the tapes with members of my research advisory committee (Dr. Benjamin Levin (chair), Dr. Ralph Mason (external), and Dr. Dawn Wallin) at the University of Manitoba in case further clarification of what I have written is needed.

I want to assure you that although I will be publishing my study, I will not be using any names or names of schools in any of the documentation. All of the information I collect will be strictly confidential. Participation in the interview is voluntary and participants have the right to withdraw at any time. Upon completion of the study, I will shred all of the interview transcripts and data collected as well as destroy the tape-recordings.

If you would like information about the results of my study when it is completed, I will be happy to discuss it with you or give you a written report.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to

withdraw from this study at any time, and/or refrain from answering any questions that you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

You can reach me, Sheeva Harrysingh, at : _____, or you can contact the chair of my thesis committee, Dr. Benjamin Levin at 474- 8285.

This research has been approved by the Education and Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-4122. A copy of this consent form has been given to you to keep for your records and reference.

Participant's Signature

Date

Researcher and/or Delegate's Signature

Date

Would you like a copy of the results of this study?

Subject's Name: _____

Yes

No

Appendix B
Informed Consent Letter for Subjects

Appendix B

Informed Consent Letter for Subjects

Sheeva Harrysingh

December 1, 2004

Dear (name of primary participant):

I am a graduate student in Educational Administration at the University of Manitoba. One of the requirements of this program is to complete a thesis. I have chosen to undertake a study assessing whether Senior 4 provincial standards examinations have an impact on the distribution of resources in a high school.

I am writing to ask you to be a participant in the study. If you agree, my study will involve one 1-hour interview.

I will be tape-recording the interview to be used primarily by myself to help me make detailed notes about what I observe. However, since this study is for a thesis, the results may be made available to the members of my research advisory committee (Dr. Benjamin Levin (chair), Dr. Ralph Mason (external), and Dr. Dawn Wallin) at the University of Manitoba in case further clarification of what I have written is needed.

I want to assure you that although I will be publishing my study, I will not be using any names or names of your schools in any of the documentation. All of the information I collect will be strictly confidential. Your participation in the interview is voluntary and you have the right to withdraw at any time. Upon completion of the study, I will shred all of the interview transcripts and data collected as well as destroy the tape-recordings.

If you would like information about the results of my study when it is completed, I will be happy to discuss it with you or give you a written report.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this study at any time, and/or refrain from answering any questions that you prefer to omit, without prejudice or consequence. Your continued participation

should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

You can reach me, Sheeva Harrysingh, at _____, or you can contact the chair of my thesis committee, Dr. Benjamin Levin at 474- 8285.

This research has been approved by the Education and Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-4122. A copy of this consent form has been given to you to keep for your records and reference.

Participant's Signature

Date

Researcher and/or Delegate's Signature

Date

Would you like a copy of the results of this study?

Subject's Name: _____

Yes

No

Appendix C
Interview Schedule

Appendix C

Interview Schedule

1. I'd like to begin with a few background questions about you. How many years have you been in education? How long have you been in your current role?
2. Can you tell me a bit about this school/division in terms of the kinds of students and community, particularly as that may relate to mathematics?
3. This study is looking at educational resources by looking at items that are not necessarily money. Thinking in that vein, how would you define educational resources? {i.e., staffing, time, class size, specialist positions, professional development, materials, provincial marking costs}
4. How are resources distributed to high schools in your school division?
5. How are resources distributed within your high school? {If not evenly, then what factors influence how resources are allocated to the math department?}
6. Does your school (division) allocate more time for provincially assessed courses? {If yes, expand on rationale for increased time. If no, has the discussion ever occurred?}
7. Does your school (division) have a cap on high school class sizes? {If not widespread, are particular classes kept smaller?}
8. Does your school division have curriculum or assessment consultants? {How long have they been a part of divisional staffing? What is their role in the division? Do they coordinate divisional marking? How are they paid?}
9. How is professional development money distributed in the division? {Do teachers have access to a professional development fund? How have provincial assessments affected professional development? }

10. How is money allocated to departments in a high school? {Is it on a needs basis or an even fixed amount? Do provincially assessed courses take precedence over other courses? Over the last 5 years, has there been a change to the amount of money allocated to the Mathematics department?}
11. Now that school divisions are responsible for the marking of provincial assessments, how are the marking sessions coordinated in this division? {How many days are the Senior 4 Math teachers out of the classroom? How much money is spent on substitute costs? Are there any other expenditures to facilitate the marking sessions?}
12. How are teachers chosen to teach Senior 4 Math courses? {Is it the most experienced? Are there other considerations?}
13. Who does the timetabling in a school? {Is it a committee or a single person? What decisions influence where courses are placed on the timetable? Is there any preferential consideration given to provincially assessed courses?}
14. Do you believe that provincial assessments influence how resources are allocated in a school?
15. In your opinion, how are provincial assessments viewed by the parents in your community? {Is there a high level of parental concern?}