Student Cohort Tracking Studies: Impacts of Gender, SES and Early Achievement on Students’ EQAO Performance

Samuel M. Zheng

Research and Evaluation Services
York Region District School Board

August 2006
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>2</td>
</tr>
<tr>
<td>1. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. Methodology</td>
<td>3</td>
</tr>
<tr>
<td>3. SK Student Cohort Tracking Study</td>
<td>5</td>
</tr>
<tr>
<td>3.1 Types of Kindergarten Programs and Students’ Grade 3 EQAO Achievement</td>
<td>6</td>
</tr>
<tr>
<td>3.2 Correlation of Students’ Grade 1 Achievement with Grade 3 EQAO Outcomes</td>
<td>7</td>
</tr>
<tr>
<td>3.3 Correlation of Students’ Grade 2 Achievement with Grade 3 EQAO Outcomes</td>
<td>10</td>
</tr>
<tr>
<td>3.4 Correlation of Students’ Grade 3 Achievement with Grade 3 EQAO Outcomes</td>
<td>13</td>
</tr>
<tr>
<td>3.5 Impact of Gender on Students’ Grade 3 EQAO Performance</td>
<td>15</td>
</tr>
<tr>
<td>3.6 Impact of Socioeconomic Status on Students’ Grade 3 EQAO Performance</td>
<td>16</td>
</tr>
<tr>
<td>3.7 Grade 3 EQAO Performance of Students with Special Needs</td>
<td>17</td>
</tr>
<tr>
<td>3.8 Summary of Findings from the SK Cohort Study</td>
<td>18</td>
</tr>
<tr>
<td>4. Grade 3 Student Cohort Tracking Study</td>
<td>19</td>
</tr>
<tr>
<td>4.1 Correlation of Students’ Gr. 3 EQAO Achievement with Gr. 6 EQAO Outcomes</td>
<td>20</td>
</tr>
<tr>
<td>4.2 Correlation of Students’ Gr. 5 Report Card Achievement with Gr. 6 EQAO Outcomes</td>
<td>22</td>
</tr>
<tr>
<td>4.3 Correlation of Students’ Gr. 6 Report Card Achievement with Gr. 6 EQAO Outcomes</td>
<td>23</td>
</tr>
<tr>
<td>4.4 Impact of Gender on Students’ Grade 6 EQAO Performance</td>
<td>25</td>
</tr>
<tr>
<td>4.5 Impact of Socioeconomic Status on Students’ Grade 6 EQAO Performance</td>
<td>26</td>
</tr>
<tr>
<td>4.6 Summary of Findings from the Grade 3 Cohort Study</td>
<td>27</td>
</tr>
<tr>
<td>5. Grade 6 Cohort Tracking Study</td>
<td>28</td>
</tr>
<tr>
<td>5.1 Correlation of Students’ Grade 6 EQAO Achievement with OSSLT Outcomes</td>
<td>29</td>
</tr>
<tr>
<td>5.2 Correlation of Students’ Grade 8 Report Card Achievement with OSSLT Outcomes</td>
<td>31</td>
</tr>
<tr>
<td>5.3 Correlation of Students’ Grade 9 Achievement with OSSLT Outcomes</td>
<td>32</td>
</tr>
<tr>
<td>5.4 Impact of Gender on Students’ OSSLT Performance</td>
<td>36</td>
</tr>
<tr>
<td>5.5 Impact of Socioeconomic Status on Students’ OSSLT Performance</td>
<td>38</td>
</tr>
<tr>
<td>5.6 Summary of Findings from the Grade 6 Cohort Study</td>
<td>40</td>
</tr>
<tr>
<td>6. Implications of the SK, Grade 3 and Grade 6 Cohort Studies</td>
<td>40</td>
</tr>
<tr>
<td>7. Summary of Findings</td>
<td>43</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>44</td>
</tr>
<tr>
<td>References</td>
<td>45</td>
</tr>
</tbody>
</table>
Executive Summary

To facilitate the Board’s Managing Information for Student Achievement (MISA) and Student Success initiatives, three student cohort tracking studies were conducted in an effort to define at-risk criteria and thereby identify at-risk students in the early grades so that interventions and supports can be provided at their early stages of schooling.

By linking Senior Kindergarten, Grade 3 and Grade 6 student achievement on the PM Benchmark, report card and credit accumulation to the provincial Grade 3, 6 and 9 EQAO assessments and the Ontario Secondary School Literacy Test (OSSLT), the studies applied binary and multinomial logistic regression models to investigate the correlations between students’ early achievement and their performance in provincial assessments. Impacts of gender, socioeconomic status on students’ performance on EQAO assessments were also included in the studies.

The studies found that students with low achievement in the earlier grades tend to struggle in the later grades when taking the provincial EQAO assessments. Male students face more challenges to meet EQAO standards than female students if they have low achievement in the earlier grades. Students from low SES communities face more challenges than their peers from high SES communities when having low achievement in the earlier grades. Students receiving special education support at or before Grade 3 are less likely to meet the Grade 3 EQAO standard than other students when achieving below expectations on the PM Benchmark or the report card.

Students’ EQAO achievement and credit accumulation are better indicators than the report card results in terms of predicting EQAO outcomes in later grades. Although PM Benchmark standards are not expected to align with EQAO standards as it assesses students’ fundamental reading skills, PM Benchmark can be used to identify at-risk students who are achieving below grade expectations.

Intervention programs should be designed to support at-risk students, especially those students with “Triple Jeopardy” – male students from low SES communities and with low achievement in the early grades. If the intervention programs can address the at-risk students’ needs and help them to improve their achievement from Level 1 to Level 2 on EQAO assessments or report card, the probability of meeting the EQAO standards in later grades would be dramatically increased.
1. Introduction

The York Region District School Board (YRDSB) is the fourth largest school board in Ontario. It is also the fastest growing board, with a student population increasing at a steady rate of four to five percent per year throughout the past two decades. The Board has opened 46 new schools since 2000 to meet the rapidly increasing demand for classroom space – about 108,000 students were enrolled in the Board’s 145 elementary and 28 secondary schools in 2005-2006 school year. School communities in York Region include suburban, small town and rural neighbourhoods, with a wide array of racial, ethnic and cultural groups. The Board is committed to the principles of equity to enable all students to learn and grow to their full potential, in environments that welcome differences and are free from discrimination.

The Ontario Ministry of Education mandated Managing Information for Student Achievement (MISA) initiative supports the Board’s commitment to evidence-based decision-making. In the Board’s MISA plan for 2005-2006 and the following two years, identifying potential at-risk students in their early school years has been identified as one of the key research projects.

Student Success is another Ministry initiative aimed at improving education for at-risk learners. This initiative envisions a school system that effectively responds to the needs of all learners with particular focus on those deemed to be at-risk. This vision is gleaned from the Board’s commitment to high achievement for all students and to instructional excellence for all teachers. The vision is also informed by the Ontario Ministry of Education’s efforts to support students who are at risk of not completing their Ontario Secondary School Diploma (OSSD).

To facilitate the MISA and the Student Success initiatives, three student cohort tracking studies were conducted to define at-risk criteria and thereby identify at-risk students in the early grades. Identification was based on assessment results and other factors such as student gender, socioeconomic status (SES) and with special needs.

2. Methodology

The three cohort tracking studies, conducted in 2004-2006, examined the following student groups in the York Region District School Board:

- **SK Student Cohort**: students who enrolled in Senior Kindergarten in 2001-2002 and participated in the Grade 3 provincial assessments in May 2005
- **Grade 3 Student Cohorts**: students who enrolled in Grade 3 during the 1998-1999 and 1999-2000 school years and participated in the Grade 6 provincial assessments in May 2002 and May 2003
- **Grade 6 Student Cohorts**: students who enrolled in Grade 6 during the 1998-1999 and 1999-2000 school years and participated in the Ontario Secondary School Literacy Tests in October 2002 and October 2003 for the first time

---

For tracking purposes, students who participated in the provincial assessments were assigned a Board student identification number by matching student name, date of birth and school identification number with the student enrollment information from the Board’s student administration system. Students’ results on report card and their achievement on board-mandated assessments, such as PM Benchmark, were linked to the Provincial Grade 3 and 6 Assessments of Reading, Writing and Mathematics, the Provincial Grade 9 Assessment of Mathematics, and the Ontario Secondary School Literacy Test (OSSLT). Conducted annually in publicly-funded schools under the auspices of the province’s Education Quality and Accountability Office (EQAO), these provincial assessments are based on the Ontario curriculum and measure how well students have met the provincial expectations in reading, writing and mathematics.

The studies also used student contextual data – student gender, socioeconomic status (SES), types of kindergarten programs, and with special needs – to evaluate their impacts on student performance on EQAO assessments. The SES values were derived from the following variables from the 2001 Census data:

- Parental education – less than Grade 9
- Parental education – university degree or above
- Median family income
- Rented dwellings
- Immigration (1996-2001)
- Lone parent
- Not speaking official languages

The above variables at the dissemination area (DA) level were statistically combined into one variable, SES. The DA-level SES values were then classified into three categories – low, average and high – representing the bottom 25th percentile, middle 50th percentile and the top 25th percentile, respectively. Each student was then assigned a categorized SES value by linking his or her postal code to the corresponding DA.

Logistic regression analysis was used as the main analytical method in these studies in an effort to identify the impacts of gender, SES and early achievement on students’ performance on EQAO assessments. The logistic regression models, built from the data analyses, can be used to predict students’ EQAO outcomes based on their achievement in previous grades and their contextual factors.

The following binary logistic regression model was used in the three cohort tracking studies:

\[
\text{Probability (event will occur)} = \frac{1}{1 + e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n)}}
\]

Where \(X_i\) is the \(i^{th}\) independent variable and \(\beta_i\) is the coefficient for \(X_i\).

For Grade 1/2 students, the event would be meeting the Grade 3 EQAO reading standard (Level 3 or above). The input variables would be the students’ reading results in Grade 1 or 2 on the
report card and PM Benchmark, student gender and socioeconomic status, previous kindergarten programs, and status of receiving special education support. For example, if a Grade 1 male student from a low SES community and not receiving special education support achieves a grade of C in reading on the term 3 report card and Level 15 on the June PM Benchmark, the probability of this student meeting the Grade 3 EQAO reading standard is estimated to be 21%.

For Grade 3-5 students, the event would be meeting the Grade 6 EQAO standards. The input would be students’ achievement results on the Grade 3 EQAO assessment, Grade 4/5 report card results, student gender and socioeconomic status.

For Grade 6-9 students, the event would be passing the OSSLT for the first time. The input would be students’ achievement results on Grade 6/9 EQAO assessments, Grade 7/8 report card results, average of Grade 9 course marks, credits accumulated by the end of Grade 9, student gender and socioeconomic status.

Multinomial logistic regression analysis was used to connect the three cohort tracking studies in an effort to identify how students’ early achievement in Grade 1 and Grade 3 can possibly impact their performance on the OSSLT, assuming that students are in similar learning environment, follow the same trajectory, and there are no major educational reforms or new intervention programs introduced in their schooling.

3. SK Student Cohort Tracking Study

The 2001-2002 SK student cohort tracking study was conducted in 2005-2006 to define at-risk criteria and thereby identify at-risk students in primary grades. Identification was based on student achievement on the PM Benchmark and report card, and contextual factors such as student gender and socioeconomic status. This cohort study used the group of students who enrolled in Senior Kindergarten in 2001-2002 school year and took the Grade 3 EQAO reading assessment in May 2005 (Table 3.1).

![Table 3.1 2001–02 SK Student Cohort (N=4493)]

<table>
<thead>
<tr>
<th>Grade</th>
<th>School Year</th>
<th>Reading Achievement Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK</td>
<td>2001–2002</td>
<td>-</td>
</tr>
</tbody>
</table>
| Grade 1 | 2002–2003 | • Report card (June 2003)  
• PM Benchmark (September 2003<sup>2</sup>) |
| Grade 2 | 2003–2004 | • Report card (June 2004)  
• PM Benchmark (June 2004) |
| Grade 3 | 2004–2005 | • EQAO (May 2005)  
• Report card (June 2005)  
• PM Benchmark (June 2005) |

<sup>2</sup> The Board mandated PM Benchmark assessment started during the 2003-2004 school year. All SK-Grade 3 students were assessed in September 2003 and in June 2004. Since there was no assessment data for the 2002-2003 Grade 1 student cohort, their results in September 2003 (when they were in Grade 2) were used as their Grade 1 performance for the “June 2003” assessment.
The study linked the students’ Grade 1-3 reading results from the term 3 report card and June PM Benchmark results to their achievement on the Grade 3 EQAO reading assessment. The students’ work on the Grade 3 EQAO assessments was marked according to four main achievement levels (Levels 1-4) based on the provincial curriculum expectations. Level 3 represents the expected standard. For statistical purposes in this study, students’ Grade 3 EQAO reading results were classified into two categories: meeting the standard (Level 3 or above) and not meeting the standard (Level 2 or below). Students who were exempted or achieved “Not Enough Information to Score” or “Not Enough Evidence for Level 1” were considered as not meeting the Grade 3 EQAO standard, based on EQAO’s guidelines and definitions of these categories.

3.1 Types of Kindergarten Programs and Students’ Grade 3 EQAO Achievement

The Board has four types of junior/senior kindergarten programs available for students:

- Morning on each school day (AM)
- Afternoon on each school day (PM)
- Full day on Monday, Wednesday and alternate Fridays (MWF)
- Full day on Tuesday, Thursday and alternate Fridays (TTF)

Not all schools provide all four types of kindergarten programs to their students; schools decide which programs to offer based on local factors such as student enrollment, staff resources and the socioeconomic status of school communities. Figure 3.1 and 3.2 show the reading results of 4493 students on the May 2005 Grade 3 EQAO reading assessment, by the types of junior and senior kindergarten programs they attended in 2000-2001 and 2001-2002 school years.
For junior and senior kindergarten programs, the results are very similar: there are more students from half-day kindergarten programs meeting the Grade 3 EQAO reading standard than from full-day programs (70% vs. 67%). However, the impact of kindergarten programs (half-day vs. full-day) on individual student’s Grade 3 EQAO performance is statistically insignificant based on the logistic regression analysis. This may be due to the fact that there are more students from high socioeconomic (SES) communities enrolled in half-day kindergarten programs (26%) than in full-day kindergarten programs (19%). SES does have a significant impact on students’ Grade 3 EQAO achievement (see Section 3.6).

3.2 Correlation of Students’ Grade 1 Achievement with Grade 3 EQAO Outcomes

PM Benchmark, an assessment tool which measures SK-Grade 3 students’ reading skills on a scale of 0-30 in September and June, has been mandated by the Board since 2003-2004. The student cohort included in the study were first assessed in September 2003 when they were beginning Grade 2. This September 2003 assessment was used as their Grade 1 June results, although the results might be slightly different from their actual levels in June 2003 due to the summer lags observed by other researchers3,4,5.

Figure 3.3 shows the May 2005 Grade 3 EQAO reading results for this student cohort in correlation to their Grade 1 PM Benchmark achievement: of the 857 students who achieved below the Grade 1 PM Benchmark expectation (Level 16), only 32% met the Grade 3 EQAO

---

standard. Of the 3612 students who achieved at or above the PM Benchmark Grade 1 expectation, 77% met the Grade 3 EQAO standard.

Figure 3.3 Correlation of Students’ Results in Grade 1 PM Benchmark with Grade 3 EQAO Reading

Figure 3.4 shows the probabilities (smooth line, predicted by regression model) and actual results (dots) of meeting the Grade 3 EQAO reading standard based on achievement on the Grade 1 PM Benchmark. Overall, the predicted Grade 3 EQAO outcomes fit well with actual results, except at the lower PM Benchmark reading levels (≤3) due to small student counts in these levels (16, 5, 5 and 8 students in Level 0, 1, 2 and 3, respectively).
From the logistic regression analysis, the probability of meeting the Grade 3 EQAO standard for students who achieve the Grade 1 expectation for PM Benchmark (Level 16) is estimated to be 57%. The results indicate that although PM Benchmark standards are not expected to align with EQAO standards as it assesses students’ fundamental reading skills, PM Benchmark can be used to identify at-risk students who achieve below grade expectations. In other words, PM Benchmark standards can be viewed as minimum requirements of primary students’ reading skills. For students to meet the Grade 3 EQAO reading standard, they need to achieve a higher level on the PM Benchmark than the grade expectations. For example, the probability of meeting the Grade 3 EQAO standard increases to 79% when students achieve Level 21 on the Grade 1 PM Benchmark.

The provincial report card for grades 1 to 8 ensures that all students attending publicly-funded elementary schools in Ontario receive a standard report card based on the Ontario curriculum expectations. According to the Ontario Ministry, the report card provides clear, detailed, straightforward information to parents about how their child is achieving and progressing in school in relation to provincial curriculum expectations and standards. For students in grades 1 to 6, student achievement is reported as a letter grade with a plus or minus sign as required. Level 3, which corresponds to B- to B+, is the provincial standard.

Figure 3.5 shows the May 2005 Grade 3 EQAO reading results for this student cohort in correlation to their Grade 1 report card achievement: of the 615 students who achieved Level 2 or below on Grade 1 report card, only 31% met the Grade 3 EQAO standard. Of the 3854 students who achieved at or above Level 3 on Grade 1 report card, 74% met the Grade 3 EQAO standard.

---

Figure 3.6 shows the probabilities (based on logistic regression analysis) and actual results of meeting the Grade 3 EQAO reading standard based on student achievement in each reading level on the Grade 1 June report card.

Although both EQAO and report card standards have been set according to the provincial curriculum expectations, they do not seem to align well. For students who achieve Level 3 (B-, B or B+) on the Grade 1 report card, the probability of meeting the Grade 3 EQAO standard is estimated to be between 55% and 69%. For students achieving Level 2 (C-, C or C+) on the Grade 1 report card, the probability of meeting the Grade 3 EQAO standard two years later is estimated to be between 31% and 45%.

### 3.3 Correlation of Students’ Grade 2 Achievement with Grade 3 EQAO Outcomes

Level 21 has been set as the Grade 2 expectation for the PM Benchmark June assessment. Figure 3.7 shows the May 2005 Grade 3 EQAO reading results for this student cohort in correlation to their Grade 2 PM Benchmark achievement: of the 734 students who achieved below this expectation, only 27% of them met the Grade 3 EQAO reading standard. Of the 3735 students who achieved at or above the Grade 2 expectation, 76% met the Grade 3 EQAO standard.

Figure 3.8 shows the probabilities and actual results of meeting the Grade 3 EQAO reading standard based on student achievement on the Grade 2 PM Benchmark. From the regression analysis, the probability of meeting the Grade 3 EQAO standard for students who achieve the Grade 2 expectation (Level 21) on the PM Benchmark is 52%. Again, for students to meet the Grade 3 EQAO reading standard, they need to achieve a higher level on the Grade 2 PM Benchmark than the grade expectation. For example, the probability of meeting the Grade 3 EQAO standard increases to 72% when students achieve Level 24 on the Grade 2 PM Benchmark assessment.
It has been noticed that for the student cohort studied here, a relatively high proportion of students achieved Level 3 or 4 in reading on the Grade 1/2 report card: 87% in Grade 1 and 82% in Grade 2. Figure 3.9 shows the May 2005 Grade 3 EQAO reading results for this student cohort in correlation to their Grade 2 report card achievement: of the 594 students who achieved Level 2 or below on Grade 2 report card, only 24% met the Grade 3 EQAO standard. Of the
3875 students who achieved at or above Level 3 on Grade 2 report card, 75% met the Grade 3 EQAO standard.

Figure 3.9 Correlation of Students’ Results in Grade 2 Report Card with Grade 3 EQAO Reading

Figure 3.10 Correlation of Students’ Grade 2 Report Card Achievement with Grade 3 EQAO Reading Outcomes

Figure 3.10 shows the probability and actual results of meeting the Grade 3 EQAO reading standard based on students’ achievement in reading on the Grade 2 report card. Similar to Grade 1, the EQAO and Grade 2 report card standards seem to not align well. For students who achieve Level 3 on the Grade 2 report card, the probability of meeting the Grade 3 EQAO standard is
estimated to be 52%-69%. For students who achieve Level 2 in reading on the Grade 2 report card, the probability of meeting the Grade 3 EQAO standard is estimated to be between 24% and 40%.

### 3.4 Correlation of Students’ Grade 3 Achievement with Grade 3 EQAO Outcomes

Level 24 has been set as the Grade 3 expectation for the PM Benchmark June assessment. Figure 3.11 shows the May 2005 Grade 3 EQAO reading results for this student cohort in correlation to their Grade 3 PM Benchmark achievement: of the 720 students who achieved below the Grade 3 PM Benchmark expectation, only 22% met the Grade 3 EQAO standard. Of the 3749 students who achieved at or above the PM Benchmark Grade 3 expectation, 77% met the Grade 3 EQAO standard.

![Figure 3.11 Correlation of Students’ Results in Grade 3 PM Benchmark with Grade 3 EQAO Reading](image)

It makes no practical sense to use students’ results on the Grade 3 PM Benchmark or report card to predict their outcomes on the Grade 3 EQAO assessment, since all of these assessments happen at almost the same time. However, it is still useful to examine the correlations between these assessments by establishing the logistic regression analysis.

Figure 3.12 shows the “probability” and actual results of meeting the Grade 3 EQAO reading standard based on student achievement on the Grade 3 PM Benchmark. The regression analysis indicates that for students who achieve the Grade 3 expectation on the PM Benchmark, the “probability” of meeting the Grade 3 EQAO standard is estimated to be 49%. Students are likely to have a better chance to meet the Grade 3 EQAO reading standard when achieving higher levels than the grade expectation on the Grade 3 PM Benchmark. For example, the “probability” of meeting the Grade 3 EQAO standard increases to 74% when students achieve Level 27 on the Grade 3 PM Benchmark assessment.
Figure 3.12 Correlation of Students’ Grade 3 PM Benchmark Achievement with Grade 3 EQAO Reading Outcomes

Figure 3.13 shows the May 2005 Grade 3 EQAO reading results for this student cohort in correlation to their Grade 3 report card achievement: of the 790 students who achieved Level 2 or below on Grade 3 report card reading, only 26% met the Grade 3 EQAO standard. Of the 3679 students who achieved at or above Level 3 on Grade 2 report card, 77% met the Grade 3 EQAO standard.

Figure 3.14 shows the “probability” and actual results of meeting the Grade 3 EQAO standard based on students’ Grade 3 report card achievement at each level.
For students who achieve Level 2 in reading on the Grade 3 report card, the “probability” of meeting the Grade 3 EQAO reading standard is estimated to be between 21% and 41%. For students who achieve Level 3 on the Grade 3 report card, the “probability” of meeting the Grade 3 EQAO standard is estimated to be 56%-76%.

### 3.5 Impact of Gender on Students’ Grade 3 EQAO Performance

For the 4493 students in this cohort, 72% of girls and 64% of boys met the Grade 3 EQAO reading standard (Level 3 or above). Gender gaps in reading have been consistent on all Grade 3 EQAO assessments and other board-mandated reading assessments such as PM Benchmark and report card results.

Figure 3.15 shows the probability of meeting the Grade 3 EQAO reading standard for boys and girls based on their Grade 1 PM Benchmark achievement.

Girls tend to have a better chance of meeting the Grade 3 EQAO standard than boys when they achieve the same levels on the Grade 1 PM Benchmark. For example, when achieving Level 16 on the Grade 1 PM Benchmark, the probability of meeting the Grade 3 EQAO standard for girls is estimated to be 60%, while the probability for boys is estimated to be 54%. This gender gap occurs mostly in the middle ranges of achievement, and narrows toward both ends of low and high achievement.

Similar patterns are observed in other assessments, such as the Grade 2-3 PM Benchmark and Grade 1-3 report card results in reading.
3.6 Impact of Socioeconomic Status on Students’ Grade 3 EQAO Performance

For the 4493 students in this cohort, 767, 1525 and 640 students live in the categorized low, average and high socioeconomic status (SES) communities. A total of 62%, 67% and 77% of the students from the three SES groups (low, average and high, respectively) met the Grade 3 EQAO reading standard (Figure 3.16).
Figure 3.17 shows the probability of meeting the Grade 3 EQAO standard for students from different socioeconomic backgrounds, based on their achievement on the Grade 1 PM Benchmark.

From the logistic regression analysis, students from high SES communities have a higher likelihood than students from low SES communities of meeting the Grade 3 EQAO reading standard when they achieve the same reading levels on the Grade 1 PM Benchmark. For example, when achieving Level 16 on the Grade 1 PM Benchmark, the probability of high SES students meeting the Grade 3 EQAO standard is estimated to be 65%, while for medium and low SES students, the probabilities are 57% and 51% respectively. Again, similar patterns are observed in other assessments, such as Grade 2-3 PM Benchmark and reading results from the Grade 1-3 report card.

### 3.7 Grade 3 EQAO Performance of Students with Special Needs

In this student cohort, a total of 388 students, or 9% of the 4493 students, were identified as students with special needs (excluding gifted) at or before Grade 3. Students are normally not identified as students with special needs until Grade 4, unless the disabilities are severe (as is the case for these 388 students). It is obvious that these students with special needs faced more challenges than other students: only 27% of them met the Grade 3 EQAO standard, compared with 72% of other students.

Figure 3.18 shows the probability of meeting the Grade 3 EQAO reading standard for students with special needs and for other students, based on their achievement on the Grade 1 PM Benchmark.
In general, students with special needs are less likely to meet the Grade 3 EQAO standard than other students when they achieve same levels in Grade 1 or 2. For example, when achieving Level 16 on the Grade 1 PM Benchmark, the probability of meeting the Grade 3 EQAO standard for students with special needs is estimated to be 34%, while for other students the probability is 59%. Again, similar patterns are observed in other assessments, such as the Grade 2-3 PM Benchmark and reading results from the Grade 1-3 report card.

3.8 Summary of Findings from the SK Cohort Study

The SK cohort tracking study included 4493 students who were enrolled in senior kindergarten in the 2001-2002 school year. Their academic results in grades 1-3 were tracked using their student identification numbers. The impacts of gender, socioeconomic status, special education status, types of kindergarten programs, and Grade 1-2 achievement on the PM Benchmark and the report card on students’ Grade 3 EQAO performance were investigated.

Students with low achievement in the earlier grades tend to continue to struggle in Grade 3 when taking the provincial assessments. The logistic regression analysis suggests that students are likely to be at-risk when achieving Level 2 or below on the Grade 1/2 report card: the probability of these students meeting the Grade 3 EQAO standard is estimated to be \( \leq 45\% \) or \( \leq 40\% \), respectively.

Although PM Benchmark standards are not expected to align with EQAO standards as it assesses students’ fundamental reading skills, PM Benchmark can be used to identify at-risk students when achieving below grade expectations. Based on the logistic regression analysis, the probability of meeting the Grade 3 EQAO standard for students who achieve below Grade 1-3 PM Benchmark grade expectations are \( \leq 52\% \), 45% and 41%, respectively.
Although more students from half-day kindergarten programs met the Grade 3 EQAO standard than students from full-day programs, the impact of types of kindergarten programs (half-day vs. full-day) on individual student’s Grade 3 EQAO performance is statistically insignificant.

Boys face more challenges than girls to meet the Grade 3 EQAO standard if they achieve below expectations in earlier grades. The significant gender difference occurs at levels 1-3 on the term 3 report card, while the difference narrows at Level 4 or below Level 1. The gender gaps repeat similar patterns in all Grade 1-3 PM Benchmark assessments.

Students from low socioeconomic status (SES) communities face more challenges with meeting the Grade 3 EQAO reading standard than their peers from high SES communities. Similar to gender gaps, the SES gaps occur mostly at levels 1-3 on the term 3 report card, and narrow at Level 4 or below Level 1. Similar SES patterns were observed in the Grade 1-3 PM Benchmark assessments.

Overall, students with special needs (excluding gifted) are less likely to meet the Grade 3 EQAO standard than other students when achieving below expectations on the PM Benchmark or report card. For example, when achieving Level 16 on the Grade 1 PM Benchmark, the probability of meeting the Grade 3 EQAO standard for students with special needs is 34%, while the probability for other students is 59%.

The logistic regression model based on the data of the student cohort can be used to identify potential at-risk students in Kindergarten – Grade 3 who achieve:

- Level 2 or below on the report card
- Below grade expectations on the PM Benchmark assessment

Intervention programs should be designed to support at-risk students, especially those students with “Triple Jeopardy” – male students from low SES communities and with low achievement in the early grades. If the intervention programs can address the at-risk students’ needs and help them to improve their achievement on the Grade 1 report card from Level 1 to Level 2, the probability of meeting the Grade 3 EQAO standard later would increase from 23% to 45%. If they can achieve Level 3 on the Grade 1 report card, the probability of meeting the Grade 3 EQAO standard would increase to 69%.

4. Grade 3 Student Cohort Tracking Study

This study included two cohorts of students: students in Grade 3 during the 1998-1999 and 1999-2000 school years and who took the Grade 3 EQAO assessments in May 1999 and May 2000. These students also took the Grade 6 EQAO assessments in May 2002 and May 2003 while they were in Grade 6 (Table 4.1). To include both cohorts of students in the analysis would minimize the impacts of assessments themselves which might slightly vary from year to year.

Students’ results on the EQAO assessments and on the Grade 5/6 report card were linked by their unique student identification numbers. After matching, 8146 students from the two cohorts were included. The study also included a logistic regression analysis to investigate the impacts of
students’ Grade 3-5 achievement, gender and socioeconomic status on their performance on the Grade 6 EQAO assessments.

### Table 4.1 May 2002 and 2003 Grade 6 Student Cohorts

<table>
<thead>
<tr>
<th>Grade</th>
<th>School Year</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
<th>Achievement Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(N=3910)</td>
<td>(N=4236)</td>
<td></td>
</tr>
<tr>
<td>Grade 3</td>
<td>1998–1999</td>
<td>1999–2000</td>
<td></td>
<td>• Provincial assessments of reading, writing and mathematics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Report card: reading, writing and mathematics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Report card: reading, writing and mathematics</td>
</tr>
</tbody>
</table>

#### 4.1 Correlation of Students’ Grade 3 EQAO Achievement with Grade 6 EQAO Outcomes

In this study, students’ Grade 6 EQAO outcomes were classified into two categories: meeting the standard (Level 3 or above) and not meeting the standard (Level 2 or below). Figure 4.1 shows the Grade 6 EQAO reading outcomes for students at each level on the Grade 3 EQAO reading assessment (analyses were also conducted for EQAO writing and mathematics, and the results are similar to reading).
In summary, only a small proportion of students who achieved Level 1 or below on the Grade 3 EQAO met the Grade 6 EQAO standards: 19% for reading, 17% for writing and 19% for mathematics. Less than half of the students who achieved Level 2 on the Grade 3 EQAO met the Grade 6 EQAO standards: 48% for reading, 42% for writing and 40% for mathematics. Most of the students who achieved Level 3 or above on the Grade 3 EQAO met the Grade 6 EQAO standards: 85% for reading, 79% for writing and 82% for mathematics.

To better understand the impact of students’ Grade 3 EQAO results on Grade 6 EQAO achievement, a logistic regression analysis was conducted using students’ Grade 3 EQAO results, gender and socioeconomic status (SES) as independent variables, and students’ Grade 6 EQAO results as dependent variables. Students’ Grade 6 results in reading, writing and mathematics were calculated into one single result as indicated below (the weighting factors for each subject were determined by statistical factor analysis):

\[
\text{Overall} = 0.895 \times \text{Reading} + 0.866 \times \text{Writing} + 0.832 \times \text{Mathematics}
\]

The logistic regression model can be used to predict the probability of meeting Grade 6 EQAO standards based on students’ Grade 3 achievements. For example, if a Grade 3 male student from a low SES community achieves Level 1 on EQAO reading, Level 1 on EQAO writing and Level 2 on EQAO mathematics, the probability of this student achieving Level 3 or 4 on the Grade 6 EQAO is estimated to be 25%.

Figure 4.2 shows the correlation of students’ Grade 3 EQAO achievements with their Grade 6 EQAO outcomes.

Based on the regression analysis, the probability of meeting the Grade 6 EQAO standards for students who achieve Level 1 on the Grade 3 EQAO is estimated to be 19%. For students who
achieve Level 2 and Level 3 on the Grade 3 EQAO, the probability of meeting the Grade 6 EQAO standards are estimated to be 58% and 93%, respectively. Therefore, for potential at-risk students, if their achievement in Grade 3 can be improved from Level 1 to Level 2 or Level 3, through effective intervention programs, they will have a far better chance of being successful on the Grade 6 EQAO assessments.

### 4.2 Correlation of Students’ Gr. 5 Report Card Achievement with Gr. 6 EQAO Outcomes

In addition to Grade 3 EQAO results, students’ achievement on the Grade 5 report card – term 3 reading, term 3 writing and the average of terms 1-3 mathematics strands (there are five strands in mathematics but not all strands were necessarily taught in each term) – were linked to their Grade 6 EQAO achievements.

Figure 4.3 shows the Grade 6 EQAO reading outcomes for students at each level in reading on the Grade 5 report card. Analyses were also conducted for writing and mathematics, and the results are similar to reading.

![Figure 4.3 Reading Results of Grade 5 Report Card and Grade 6 EQAO for Students Who Participated in the Grade 6 EQAO Assessment (N=8146)](image)

In summary, only a small proportion of the students who achieved Level 1 or below on the Grade 5 report card met the Grade 6 EQAO standards: 23% for reading, 20% for writing and 23% for mathematics. Less than half of the students who achieved Level 2 on the Grade 5 report card met the Grade 6 EQAO standards: 42% for reading, 38% for writing and 33% for mathematics. The majority of the students who achieved Level 3 or above on the Grade 5 report card met the Grade 6 EQAO standards: 77% for reading, 78% for writing and 78% for mathematics.

A similar logistic regression analysis was conducted using students’ Grade 5 report card results in reading, writing and mathematics, students’ gender and socioeconomic status (SES) as independent variables and their Grade 6 EQAO results as dependent variables. Figure 4.4 shows...
the overall correlation of students’ Grade 5 report card results with their Grade 6 EQAO outcomes.

Based on the regression analysis, the probability of meeting the Grade 6 EQAO standards for students who achieve Level 1 or below (R, D-, D, or D+) on the Grade 5 report card is estimated to be 19% or less. For students who achieve Level 2 (C-, C or C+) on the Grade 5 report card, the probability of meeting the Grade 6 EQAO standards is estimated to be between 34% and 62%. For students who achieve Level 3 (B-, B or B+) on the Grade 5 report card, the probability is between 79% and 92%.

4.3 Correlation of Students’ Gr. 6 Report Card Achievement with Gr. 6 EQAO Outcomes

In addition to Grade 3 EQAO and Grade 5 report card results, students’ results on the Grade 6 report card – term 3 reading, term 3 writing and the average of terms 1-3 mathematics strands – were linked to their achievement on the Grade 6 EQAO assessments. Figure 4.5 shows the Grade 6 EQAO reading outcomes for students at each level in reading on the Grade 6 report card. Again, analyses were conducted for writing and mathematics, and the results are similar to reading.

Only a small proportion of the students who achieved Level 1 or below on the Grade 6 report card met the Grade 6 EQAO standards: 26% for reading, 17% for writing and 15% for mathematics. Less than half of the students who achieved Level 2 on the Grade 6 report card met the Grade 6 EQAO standards: 40% for reading, 36% for writing and 34% for mathematics. The majority of the students who achieved Level 3 or above on the Grade 6 report card met the grade 6 EQAO standards: 78% for reading, 77% for writing and 79% for mathematics.
Although there is no practical sense in “predicting” students’ Grade 6 EQAO outcomes based on their achievement on the Grade 6 report card, a logistic regression analysis was conducted to examine the alignment of the two assessments, using students’ Grade 6 report card results, gender and socioeconomic status (SES) as independent variables and Grade 6 EQAO results as dependent variables. Figure 4.6 shows the overall correlation of students’ Grade 6 report card results with their Grade 6 EQAO achievement.

Based on the regression analysis, the “probability” of meeting the Grade 6 EQAO standards is estimated to be 20% or less for students who achieve Level 1 or below on the Grade 6 report
card. For students who achieve Level 2 on the Grade 6 report card, the “probability” is between 35% and 64%. For students who achieve Level 3 on the Grade 6 report card, the “probability” is between 80% and 93%. These results are very similar to the Grade 5 report card results.

4.4 Impact of Gender on Students’ Grade 6 EQAO Performance

Figure 4.7 shows the probability of girls and boys meeting the Grade 6 EQAO standards, based on their Grade 3 EQAO results.

Based on the logistic regression analysis, the gender gap occurs mostly at Level 2 on the Grade 3 EQAO. Girls and boys have a 63% and 52% chance to meet the Grade 6 EQAO standards when achieving Level 2 on the Grade 3 EQAO. The gender gap narrows at Level 3 and there is no significant difference at Level 4.

Figure 4.8 shows the probability of meeting the Grade 6 EQAO standards for boys and girls based on their Grade 5 report card results. Similar to Grade 3 EQAO, the gender gap occurs mostly in levels 1-3 on the Grade 5 report card. For example, boys have a 59%, and girls have a 66% chance of meeting the Grade 6 EQAO standards when achieving a C+ (Level 2) on the Grade 5 report card. There are no significant differences for students who either achieve very poorly or achieve very well on the Grade 5 report card.
4.5 Impact of Socioeconomic Status on Students’ Grade 6 EQAO Performance

Similar to the gender analysis, there are differences for students from different socioeconomic status (SES) communities in meeting the Grade 6 EQAO standards. Figure 4.9 shows the probability of meeting the Grade 6 EQAO standards based on students’ achievement on the Grade 3 EQAO.
Based on the logistic regression analysis, the biggest difference happens at Level 2 on the Grade 3 EQAO: the probabilities of meeting the Grade 6 EQAO standards are 61%, 58% and 49%, respectively, for students who come from high, average and low SES communities and achieve Level 2 on Grade 3 EQAO assessments. Again the SES gaps narrow at Level 3 and there are no significant SES differences at Level 4.

Figure 4.10 shows the differences in meeting the Grade 6 EQAO standards for students from different SES communities based on their achievement on the Grade 5 report card. Again, the differences are mostly at levels 1-3 on the Grade 5 report card: the probability of meeting the Grade 6 EQAO standards is estimated to be 68%, 62% and 56% for students from high, average and low SES communities, and who achieve C+ on the Grade 5 report card. There are no significant SES differences for students who either achieve very poorly or achieve very well on the Grade 5 report card.

4.6 Summary of Findings from the Grade 3 Cohort Study

The Grade 3 cohort tracking study included 8146 students who were enrolled in Grade 6 during the 1998-1999 or 1999-2000 school years. Their academic results in grades 3-6 were tracked using their student identification numbers. The impacts of student gender, socioeconomic status, and Grade 3-5 achievement on EQAO assessments and the report card on students’ Grade 6 EQAO performance were investigated.

Students with low achievement in the earlier grades tend to continue to struggle in Grade 6 when taking the provincial assessments. The logistic regression analysis suggests that the probability of meeting the Grade 6 EQAO standards for students who achieve Level 1 or below on the Grade 3 EQAO assessments is 19% or less. For students who achieve Level 1 or below on the Grade 5 report card, the probability of meeting the Grade 6 EQAO standards is 25% or less.
Male students face more challenges in meeting the Grade 6 EQAO standards than female students if they have low achievement levels in the earlier grades. The significant gender difference occurs at Level 2 and below for students who take the Grade 3 EQAO assessments, while the difference narrows at Level 3 and there is no significant gender difference at Level 4 on Grade 3 EQAO assessments.

Students from low socioeconomic status (SES) communities face more challenges in meeting the Grade 6 EQAO standards than their peers from high SES communities. Similar to gender gaps, the SES gaps occur mostly for those who achieve Level 2 or below on the Grade 3 EQAO, and have the same pattern for Grade 5 report card results. Again, the SES differences narrow at Level 3 and there is no significant difference at Level 4.

The logistic regression model based on the data of the two student cohorts can be used to identify potential at-risk students in Grade 3-5 who achieve:

- Level 2 or below on the Grade 3 EQAO assessments
- Level 2 or below on the report card

Intervention programs should be designed to support at-risk students, especially those students with “Triple Jeopardy” – male students from low SES communities and with low achievement in the early grades. If the early intervention programs can address the at-risk students’ needs and help them to improve their Grade 3 EQAO achievement from Level 1 to Level 2, the probability of them later meeting the Grade 6 EQAO standards would increase from 19% to 59%. If they can achieve Level 3 on the Grade 3 EQAO assessment, the probability of meeting the Grade 6 EQAO standards would be 93%.

Currently, students’ Grade 3 EQAO achievement is a better indicator than report card results in terms of predicting students’ Grade 6 EQAO outcomes. There are notable differences at Level 1 or Level 3 in the Grade 5 report card results: 23% of the students who achieved Level 1 in reading on the Grade 5 report card met the Grade 6 EQAO standards, while 28% of the students who achieved Level 3 in reading on the Grade 5 report card failed to meet Grade 6 EQAO standards. Similar observations happened in other Grade 5 subjects (writing and mathematics) and in all Grade 6 report card subjects (reading, writing and mathematics).

5. Grade 6 Cohort Tracking Study

The student groups in this cohort tracking study are those students who attended Grade 6 in the 1998-1999 and 1999-2000 school years and who wrote the Grade 10 Ontario Secondary School Literacy Tests (OSSLT) for the first time in October 2002 and October 2003. The OSSLT is administered in October of each school year under the auspices of the province’s Education Quality and Accountability Office (EQAO). The OSSLT was designed to assess the reading and writing skills that students are expected to have learned across all subjects by the end of Grade 9, as outlined in the Ontario Curriculum. Students must pass both the reading and writing components to successfully complete the test. In reading, this means that students’ work shows that most of the time, they can read and understand information in various formats. In writing,

7 Starting 2005–2006, EQAO has changed the test date from October to March.
this means that students' work shows that most of the time, they can communicate ideas in writing clearly and without errors in punctuation, spelling, grammar and organization that may prevent someone from understanding their writing. Successful completion of the OSSLT is a graduation requirement for the Ontario Secondary School Diploma.

The October 2002/2003 OSSLT also included students who failed in the previous administration of the OSSLT. However, at the time of the tests, most of these students had started Grade 11 and had accumulated more credits than those who took the October 2002/2003 OSSLT for the first time. For the purpose of the cohort tracking study, the OSSLT repeaters were not included in this study, and neither were those students who were absent or deferred from the OSSLT.

For the students included in the study, their OSSLT results, accumulated credits by the end of Grade 9, the average of their Grade 9 course marks, achievement results on the provincial Grade 9 assessment of mathematics, the Grade 8 report card and the Grade 6 provincial assessments of reading, writing and mathematics, were tracked based on their student identification numbers. After matching, 8604 students were included in the study by combining the two student cohorts (Table 5.1).

<table>
<thead>
<tr>
<th>Grade</th>
<th>School Year</th>
<th>Achievement Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 6</td>
<td>1998–1999 1999–2000</td>
<td>• Provincial assessments of reading, writing and mathematics</td>
</tr>
<tr>
<td>Grade 9</td>
<td>2001–2002 2002–2003</td>
<td>• Provincial assessments of mathematics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Accumulated credits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Average course marks</td>
</tr>
</tbody>
</table>

The study also used the students’ contextual data such as gender and socioeconomic status (SES), calculated from the 2001 Census.

5.1 Correlation of Students’ Grade 6 EQAO Achievement with OSSLT Outcomes

In this study, students’ OSSLT outcomes have been classified into two categories: successful (passed both reading and writing components) and not successful (failed reading or writing or both). Figure 5.1 shows the OSSLT success rates for students who achieved levels 1-4 on the Grade 6 EQAO reading assessment (analyses were also conducted for Grade 6 EQAO writing and mathematics assessments, and the results are similar to reading).

Only 39% of the students who achieved Level 1 or below on the Grade 6 EQAO reading assessment passed the OSSLT for the first time. Of students who achieved Level 2 or Level 3 on...
the Grade 6 EQAO reading assessment, 72% and 93% passed the OSSLT for the first time. On the other hand, students who failed the OSSLT were more likely to have achieved Level 2 or below in the Grade 6 EQAO assessments of reading (75%), writing (71%) and mathematics (69%).

In order to get a better understanding of the correlation of students’ Grade 6 EQAO results with their OSSLT outcomes, a logistic regression analysis was conducted using students’ Grade 6 EQAO results, gender and socioeconomic status (SES) as independent variables, and OSSLT
results as dependent variables. The logistic regression model established can be used to predict the probability of passing the OSSLT based on students’ Grade 6 EQAO achievements. For example, if a male student from a low SES community achieves Level 1 in Grade 6 EQAO reading and writing and Level 2 in mathematics, the probability for this student to pass the OSSLT is estimated to be 28%.

Figure 5.2 shows the overall correlation of students’ Grade 6 EQAO achievement with their OSSLT outcomes. Based on the regression analysis, the probability of passing the OSSLT for students who achieve Level 1 on the Grade 6 EQAO is estimated to be only 20%. For students who achieve Level 2 and Level 3 on the Grade 6 EQAO assessments, the probability of passing the OSSLT are 66% and 96% respectively.

5.2 Correlation of Students’ Grade 8 Report Card Achievement with OSSLT Outcomes

In addition to Grade 6 EQAO results, students’ achievement on the Grade 8 report card – term 3 reading, term 3 writing and the average of terms 1-3 mathematics strands (there are five strands in mathematics but not all strands were taught in each term) – was linked to their OSSLT results. Figure 5.3 shows the OSSLT success rates for students who achieved at various levels in reading on the Grade 8 report card (analyses were also conducted for writing and mathematics assessments, and the results are similar to reading).

In summary, about half of the students who achieved Level 1 or below on the Grade 8 report card passed the OSSLT: 57% for reading, 58% for writing and 61% for mathematics. About three quarters of the students who achieved Level 2 on the Grade 8 report card passed the OSSLT: 74% for reading, 73% for writing and 75% for mathematics. The majority of the students who achieved Level 3 or above on the Grade 8 report card passed the OSSLT: 91% for reading, 92% for writing and 92% for mathematics.
A logistic regression analysis was conducted using students’ Grade 8 report card results, gender and socioeconomic status (SES) as independent variables and OSSLT results as dependent variables. The logistic regression model can be used to predict the probability of passing the OSSLT based on the students’ achievements in Grade 8. For example, if a male student from an average SES community achieves the following on the Grade 8 report card: 65 in term 3 reading, 62 in term 3 writing and an average of 68 in terms 1-3 mathematics strands, the probability that this student will pass the OSSLT is estimated to be 76%.

Figure 5.4 shows the overall correlation of students’ Grade 8 report card achievement with their OSSLT outcomes. Based on the regression analysis, the probability of passing the OSSLT for students who achieve below Level 1 on the Grade 8 report card is estimated to be less than 38%. For students who achieve Level 1 on the Grade 8 report card, the probability of passing the OSSLT is between 38% and 65%. For students who achieve Level 2 on the Grade 8 report card, the probability is between 65% and 85%.

5.3 Correlation of Students’ Grade 9 Achievement with OSSLT Outcomes

The Provincial Grade 9 Assessment of Mathematics provides individual and system data on students' knowledge and skills, based on the expectations for students in Grade 9 applied and academic mathematics programs. All students in these programs are required to participate in the assessment. Similar to the Grade 6 EQAO assessments, students’ results in this assessment are classified in five main categories: below Level 1 and levels 1 to 4. Other categories include Exempted, No Data and Not Enough Information to Score. Although Level 3 represents the provincial standard, Level 1 represents a passable level of achievement.
Students’ accumulated credits by the end of Grade 9 (including summer school) and an average of their Grade 9 course marks were used together with their Grade 9 EQAO results in an attempt to understand the correlations between these different assessments.

Figure 5.5 shows the OSSLT success rates for students who achieved levels 1-4 in the Grade 9 EQAO assessment of mathematics: 26% of the students who achieved below Level 1 on the Grade 9 EQAO assessment passed the OSSLT; 64% of students who achieved Level 1 and 76% of students who achieved Level 2 passed the OSSLT. On the other hand, students who failed the OSSLT were more likely to achieve Level 2 or below on the Grade 9 EQAO assessment of mathematics (75%).

Students are expected to accumulate eight credits by the end of Grade 9. A recent study shows the best indicators of dropout are the loss of key credits in grades 9 and 10. Figure 5.6 shows students’ OSSLT results by accumulated credits at the end of Grade 9 (including summer school).

For students who accumulated six credits or less, the OSSLT passing rate was 45%. Of students who were one credit behind (i.e., seven credits), 63% passed the OSSLT. For students who accumulated eight or more credits, the OSSLT passing rate was 89%.

Figure 5.7 shows the OSSLT success rates for students with different average levels on their Grade 9 course marks. For students who failed Grade 9 courses (course averages below 50), the OSSLT passing rate was only 8% (62% failed the OSSLT and 30% were either exempted, deferred or absent from the OSSLT). For students who achieved Level 1 or Level 2 (course averages of 50-59 and 60-69), the OSSLT passing rates were 55% and 74%, respectively.

---

Similar logistic regression analysis was conducted using students’ Grade 9 EQAO results, accumulated credits by the end of Grade 9, the average of Grade 9 course marks, gender and socioeconomic status (SES) as independent variables, and OSSLT results as dependent variables.

The model can be used to predict students’ OSSLT outcomes based on their academic performance in Grade 9. For example, if a female student from a high SES community achieves Level 3 in the Grade 9 EQAO assessment, accumulates eight credits by end of Grade 9 and achieves 80 as the average of her Grade 9 courses, the probability this student will pass the OSSLT is estimated to be 98%.
Figure 5.8 shows the correlation of students’ achievement on the Grade 9 EQAO assessment with their OSSLT performance. The probability of passing the OSSLT is estimated to be 28% for students who achieve below Level 1 on the Grade 9 EQAO assessment. For students who achieved Level 1 on the Grade 9 EQAO assessment, the probability of passing the OSSLT is 67%, a significant increase from below Level 1. This might be largely due to the fact that EQAO identifies Level 1 in its Grade 9 assessment as “a passable level of achievement.”
Figure 5.9 shows the correlation of students’ accumulated credits by the end of Grade 9 with their OSSLT performance. Based on the regression analysis, the probability of passing the OSSLT for the first time is estimated to be 40% for students who accumulate only four credits by end of Grade 9 (half a year behind regular students). If these students have one more credit by the end of Grade 9 (i.e., five credits), the probability increases to 55%; if they accumulate six credits, the probability of passing the OSSLT is 69%.

![Figure 5.10 Correlation of Students' Average of Grade 9 Course Marks with Grade 10 OSSLT Outcomes](image)

Figure 5.10 shows the correlation of students’ achievement on the Grade 9 report card with their OSSLT performance. Based on the regression analysis, the probability of passing the OSSLT is estimated to be 35% or less for students who achieve an average of below 50 in their course marks. The probability is estimated to be 35%-65% for students who achieve an average of 50-60 in their Grade 9 course marks. These results based on Grade 9 report card achievement are very similar to those based on students’ report card achievement in Grade 8 when they are in their final year of elementary schooling.

### 5.4 Impact of Gender on Students’ OSSLT Performance

No evidence of gender gaps was observed when predicting whether students would pass the OSSLT based on their achievement on the Grade 8 or Grade 9 report card. Further study is needed to identify the cause of this unusual observation. Small gender gaps were observed based on students’ results on the Grade 6 EQAO – female students had a slightly higher probability of passing the OSSLT than male students when achieving same levels on the Grade 6 EQAO.

Figure 5.11 shows the probability of passing the OSSLT for male and female students, based on students’ Grade 9 EQAO results. The gender gap occurs mostly at Level 1 (71% vs. 62% for females and males) and narrows at levels 2 and 3. There is no significant difference at Level 4 of Grade 9 EQAO assessment.
Figure 5.11 Impacts of Gender and Grade 9 EQAO Achievement on Students’ Grade 10 OSSLT Outcomes

Figure 5.12 Impacts of Gender and Grade 9 Accumulated Credits on Students’ Grade 10 OSSLT Outcomes

Figure 5.12 shows the probability of passing the OSSLT for male and female students based their accumulated credits by the end of Grade 9, including summer schools. The significant gender gap happens at almost every level of accumulated credits: female students have a better chance, in general, of passing the OSSLT than male students when accumulating the same number of credits by the end of Grade 9. Again, the gap occurs mostly in the middle range of accumulated credits, and narrows toward both ends (either far fewer or far more credits).
5.5 Impact of Socioeconomic Status on Students’ OSSLT Performance

Based on the regression analysis, students from different socioeconomic status (SES) communities have differences in the probability of passing the OSSLT for the first time when achieving the same in earlier grades. Figure 5.13 shows the probability of passing the OSSLT for students from different SES backgrounds, based on their Grade 6 EQAO achievement.

![Figure 5.13 Impacts of Socioeconomic Status and Grade 6 EQAO Achievement on Students’ Grade 10 OSSLT Outcomes](image)

![Figure 5.14 Impacts of Socioeconomic Status and Grade 6 EQAO Achievement on Students’ Grade 10 OSSLT Outcomes](image)
The biggest difference happens at Level 2 on the Grade 6 EQAO: the probability of passing the OSSLT is 70%, 67% and 58%, respectively, for students from high, average and low SES communities. The SES gap narrows at Level 3 and there are no significant SES differences at Level 4. Similar SES differences were observed in Grade 9 EQAO (Figure 5.14), accumulated credits by the end of Grade 9 (Figure 5.15) and Grade 8/9 report card results (Figure 5.16).
5.6 Summary of Findings from the Grade 6 Cohort Study

The Grade 6 cohort tracking study included 8604 students who were enrolled in Grade 6 in the 1998-1999 or 1999-2000 school years. Their academic results in grades 6-9 were tracked using their student identification numbers. The impacts of student gender, socioeconomic status, and Grade 6/9 EQAO achievement and Grade 8/9 report card results on students’ OSSLT performance were investigated.

Students with low achievement in the earlier grades tend to continue to struggle in the later grades when taking provincial assessments. The logistic regression analysis shows that the probability of passing the Ontario Secondary School Literacy Test for students who achieve Level 1 on the Grade 6 EQAO assessments is estimated to be only 20%.

In general, students from low socioeconomic status (SES) communities face more challenges than their peers from high SES communities. The SES gaps occur mostly at Level 2 or below on the Grade 6 EQAO and repeat the same pattern on the Grade 8/9 report card results. The SES differences narrow at Level 3 and there is almost no significant difference at Level 4.

Students who failed the OSSLT were more likely to achieve Level 2 or below on the Grade 9 EQAO assessment of mathematics, the Grade 6 EQAO assessments, or the Grade 8 report card. They were much less likely to be on track in their credit accumulation at the end of Grade 9, had significantly lower average marks in their Grade 9 courses and tended to have greater gender differences in marks and accumulated credits than students who passed the OSSLT.

The logistic regression model based on the data of the student cohorts can be used to identify potential at-risk students in the transition years (Grade 6-9) who achieve:

- Level 2 or below on the Grade 6 EQAO assessments
- Level 1 or below on the Grade 7/8 report card
- Level 1 or below on the Grade 9 EQAO assessment of mathematics
- Six or fewer credits by the end of Grade 9
- Sixty or below on average Grade 9 course marks

Intervention programs should be designed to support at-risk students, especially those students with “Triple Jeopardy” – male students from low SES communities and with low achievement in the early grades. For example, if the early intervention programs can address the at-risk students’ needs and help them to improve their Grade 6 EQAO achievement from Level 1 to Level 2, the probability of later passing the OSSLT would increase from 20% to 67%. If they can achieve Level 3 on the Grade 6 EQAO assessments, the probability of passing the OSSLT would increase to 96%.

6. Implications of the SK, Grade 3 and Grade 6 Cohort Studies

The three cohort tracking studies employed several student cohorts to investigate the correlations of students’ early achievement with their performance on provincial assessments. Although we do not have kindergarten to Grade 10 achievement data for a single student cohort to study the
direct correlations between their achievement results in different grades, we can still use results from these tracking studies to investigate the correlations between the different phases in students’ schooling, i.e., Senior Kindergarten-Grade 3, Grade 3-6, and Grade 6-10.

Three additional analyses were conducted by employing multinomial logistic regression analysis. This statistical method is useful when the outcomes have more than two categories. For example, by analyzing data from the 2001-2002 SK cohort study we can use students’ Grade 1 report card reading results to predict their probabilities of achieving at each level on the Grade 3 EQAO reading assessment. Similarly we can use students’ Grade 3 EQAO reading results to predict their most possible achievement levels on the Grade 6 EQAO reading assessment. As there are only two categories in the OSSLT outcomes (successful and not successful), the multinomial logistic regression results would be the same as binary logistic regression results.

Tables 6.1-6.3 show the multinomial logistic regression results. These results are slightly different from the previous sections as only students’ reading results were used as input variable (students’ writing and mathematics results were used with reading in the Grade 3 and Grade 6 cohort studies, Section 4 & 5). For illustration purposes and to simplify the analyses, students’ contextual factors, such as gender, socioeconomic status (SES), were also excluded from multinomial logistic regression models.

Table 6.1 Probabilities of Students' Grade 3 EQAO Reading Outcomes Based on Their Achievement in Grade 1 Report Card Reading

<table>
<thead>
<tr>
<th>Grade 1 Report Card Reading</th>
<th>Grade 3 EQAO Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ Level 1</td>
</tr>
<tr>
<td>≤ Level 1</td>
<td>45%</td>
</tr>
<tr>
<td>Level 2</td>
<td>22%</td>
</tr>
<tr>
<td>Level 3</td>
<td>8%</td>
</tr>
<tr>
<td>Level 4</td>
<td>1%</td>
</tr>
</tbody>
</table>

Table 6.2 Probabilities of Students' Grade 6 EQAO Reading Outcomes Based on Their Achievement in Grade 3 EQAO Reading

<table>
<thead>
<tr>
<th>Grade 3 EQAO Reading</th>
<th>Grade 6 EQAO Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ Level 1</td>
</tr>
<tr>
<td>≤ Level 1</td>
<td>38%</td>
</tr>
<tr>
<td>Level 2</td>
<td>11%</td>
</tr>
<tr>
<td>Level 3</td>
<td>3%</td>
</tr>
<tr>
<td>Level 4</td>
<td>2%</td>
</tr>
</tbody>
</table>
Table 6.3 Probabilities of Students’ OSSLT Outcomes Based on Their Achievement in Grade 6 EQAO Reading

<table>
<thead>
<tr>
<th>Grade 6 EQAO Reading</th>
<th>OSSLT Outcomes</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Failed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤Level 1</td>
<td>76%</td>
<td></td>
<td>24%</td>
</tr>
<tr>
<td>Level 2</td>
<td>27%</td>
<td></td>
<td>73%</td>
</tr>
<tr>
<td>Level 3</td>
<td>6%</td>
<td></td>
<td>94%</td>
</tr>
<tr>
<td>Level 4</td>
<td>1%</td>
<td></td>
<td>99%</td>
</tr>
</tbody>
</table>

The above regression results can be used to predict students’ OSSLT outcomes based on their achievement in early grades. For example, from Table 6.1-6.3:

- The probability of achieving Level 2 on the Grade 3 EQAO reading is 45% for students who achieve Level 1 or below on the Grade 1 report card reading;
- The probability of achieving Level 2 on the Grade 6 EQAO reading is 39% for students who achieve Level 1 on the Grade 3 EQAO reading;
- The probability of passing the OSSLT for the first time is 73% for students who achieve Level 2 on the Grade 6 EQAO reading.

Therefore, for a student who achieves Level 1 or below on the Grade 1 report card reading, the probability of passing the OSSLT for the first time is $45\%\times39\%\times73\%=13\%$, assuming that younger student cohorts will follow the same trajectory as the older cohorts, and there are no major educational reforms or new intervention programs introduced in their schooling. Similarly, for a student who achieves Level 2 on the Grade 1 report card reading, the probability of passing the OSSLT for the first time is $44\%\times47\%\times94\%=19\%$.

A similar approach can be used to predict students’ OSSLT outcomes based on their achievement on the Grade 3 EQAO reading assessment. For example,

- The probability of achieving Level 2 on the Grade 6 EQAO reading is 39% for students who achieve Level 1 on the Grade 3 EQAO reading;
- The probability of passing the OSSLT for the first time is 73% for students who achieve Level 2 on the Grade 6 EQAO reading.

Therefore, for a student who achieves Level 1 on the Grade 3 EQAO reading, the probability of passing the OSSLT for the first time is $39\%\times73\%=28\%$. Similarly, the probability of passing the OSSLT for the first time is $47\%\times94\%=44\%$ when a student achieves Level 2 on the Grade 3 EQAO reading.

The above predictions are based on multinomial logistic regression results from three different cohort studies with assumptions of younger student cohorts following the same trajectory as the older cohorts without major educational reforms or new intervention programs introduced in their schooling. However, as more and more educational systems are moving towards on
7. Summary of Findings

Students with low achievement in the earlier grades tend to continue to struggle in the later grades in meeting the provincial Grade 3, 6, 9 and 10 EQAO standards. From the SK cohort tracking study, the probability of meeting the Grade 3 EQAO reading standard for students who achieve below Grade 1 report card standard is estimated to be ≤23% (Level 1) and ≤45% (Level 2). For students who achieve Level 16 (Grade 1 expectation) or below on the Grade 1 PM Benchmark, the probability of meeting the Grade 3 EQAO standard is estimated to be ≤57%.

From the Grade 3 and Grade 6 cohort tracking studies, the probability of meeting the Grade 6 EQAO standards for students who achieve Level 1 or below on the Grade 3 EQAO is estimated to be ≤19%. The probability of passing the OSSLT for the first time is estimated to be ≤20% for students who achieve Level 1 or below on the Grade 6 EQAO.

When combining all the results from the cohort tracking studies with the assumptions of students being in a similar learning environment and following the same trajectory in their schooling without major educational reforms or new intervention programs introduced, the probability of passing the OSSLT for the first time for students who achieve Level 1 or below on the Grade 1 report card is estimated to be ≤13%; the probability is ≤19% for students who achieve Level 2 on the Grade 1 report card. Similarly, the probability of passing OSSLT for the first time is 28% for students who achieve Level 1 on the Grade 3 EQAO reading, and increases to 44% when students achieve Level 2 on the Grade 3 EQAO reading.

Male students face more challenges to meet EQAO standards than female students if they have low achievement levels in the earlier grades. In most of cases, the significant gender difference occurs at Level 1 or 2 of student achievement. The difference narrows at Level 3 and there is no significant gender difference at Level 4.

Students from low socioeconomic status (SES) communities face more challenges than their peers from high SES communities. Similar to gender gap findings, the SES gaps occur mostly at Level 2 or below in student achievement and repeat the same pattern in the other grades. Again, the SES differences narrow at Level 3 and there is no significant difference at Level 4 in most cases.

Although there are more students from half-day kindergarten programs meeting the Grade 3 EQAO standard than students from full-day programs, the impact of kindergarten programs (half-day vs. full-day) on individual student’s Grade 3 EQAO performance is statistically insignificant.

Students with special needs are less likely to meet the Grade 3 EQAO standard than other students when achieving below expectations on the Grade 1-3 PM Benchmark or report card. For example, when achieving Level 16 on the Grade 1 PM Benchmark, the probability of meeting
the Grade 3 EQAO standard for special needs students is 34%, while the probability for other students is 59%.

Students’ EQAO achievement and credit accumulation are better indicators than the report card results in terms of predicting EQAO outcomes in later grades. Although PM Benchmark standards are not expected to align with EQAO standards as it assesses students’ fundamental reading skills, PM Benchmark can be used to identify at-risk students who are achieving below grade expectations.

Intervention programs should be designed to support at-risk students, especially those students with “Triple Jeopardy” – male students from low SES communities and with low achievement in the early grades. If these intervention programs can address the at-risk students’ needs and help them to improve their achievement from Level 1 to Level 2, the probability of later meeting the EQAO standards would be dramatically increased. For example, the probability of meeting the Grade 6 EQAO standards would increase from 19% to 59% if students achieve Level 2 instead of Level 1 on the Grade 3 EQAO. The probability of passing the OSSLT would increase from 20% to 67% if students achieve Level 2 instead of Level 1 on the Grade 6 EQAO.

Future studies are necessary to examine the contribution of other indicators – such as students’ attendance/suspension, English as a Second Language, years since arrival in Canada, mobility, teacher experience and school climate – to students’ success or failure on the provincial EQAO assessments.

Acknowledgments

Overall MISA funding to the York Region District School Board was provided by the Ontario Ministry of Education. MISA funding for these cohort tracking studies was allocated by the Board. The author would like to thank Robert Dunn, Superintendent of Education and MISA Lead, and Dr. Lyn Sharratt, Superintendent of Curriculum and Instructional Services, for their leadership and support in these studies. Sincere thanks go to Barry McKillop, Senior Administrator of Curriculum & Instructional Services, for his endless support in these research projects. The author would also like to thank staff members in Research & Evaluation Services, especially Daria Lindsey, Manager of Assessment & Evaluation, and Chandra Turner, Manager of Research, for their valuable comments.
References


