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ABSTRACT

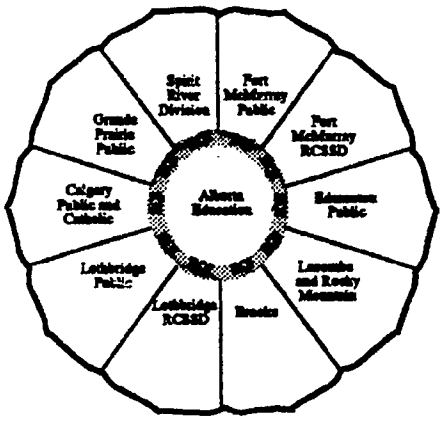
The purpose of this project was to implement the principles of Outcome-Based Education (OBE) in the "Fort McMurray (Alberta, Canada) Roman Catholic Separate School District (RCSSD) No. 32" and to collect data related to student achievement, responsibility, and attitudes in mathematics to help assess the effects of the implementation. This report tells the story of the OBE project as conducted in one elementary school and one high school. Chapter 1 provides a brief description of the district, the project purposes, and the implementation processes. The literature and research which provided a support basis for the project are presented in Chapter 2. Chapter 3 provides a description of the action research design. The OBE model is discussed in Chapter 4, followed in Chapter 5 by findings in the areas of student achievement, responsibility, and attitudes. Implications of the project for the district and other jurisdictions are discussed in Chapter 6. Appended are additional statistical tables, a summary of stakeholder responses, a sample teacher-made test, and a copy of the stakeholder survey forms. (Contains 35 references.) (Author/MDH)

High Success in Mathematics

Through

Outcome-Based Education

Fort McMurray RCSSD No. 32



Educational Quality Indicators:
Collaboration in Action

High Success in Mathematics

Through

Outcome-Based Education

Fort McMurray RCSSD No. 32

Under Contract to Alberta Education
Edmonton, Alberta

Please Note

The views and recommendations expressed in this report are those of the researchers and not necessarily those of the Department of Education.

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Many stakeholders of the Fort McMurray Catholic Schools significantly impacted the Fort the OBE project. The visionary leadership and support by our superintendent, Jerry Heck, and our local board was evident throughout the project. The support provided by parents, teachers, students and the community were critical to the success of the project. A special thanks to our parents for supporting the children and teachers through the changes. Their input continues to provide insights into how the process can be continuously improved.

Our teachers demonstrated an extraordinary dedication to the collaborative improvement process. Many hours were spent in creative team problem solving to determine ways which might help students to be successful. Teachers continue to meet collaboratively to discuss possible improvements to the process.

The 1989-92 organization and delivery team members are listed here:

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Our gratitude is extended to all of our stakeholders for the significant role they played in this project.

Project Coordinator
Phyllis Geddert

Abstract

The purpose of our project was to implement the principles of Outcome-Based Education (OBE) and to collect data related to student achievement, responsibility and attitudes in mathematics to help us assess the effects of the implementation. This report tells the story of the OBE project. The implementation process and results give testimony to teacher beliefs, dedication and collaborative efforts.

Chapter One provides a brief description of our district, the project purposes and our implementation processes. The literature and research which provided a support basis for the project are presented in Chapter Two. Chapter Three provides a description of our action research design. The OBE model is discussed in Chapter Four, followed by our findings in the areas of student achievement, responsibility and attitudes in Chapter Five.

In a sense, our indicators project has just begun. We are now implementing a district-wide strategic improvement plan with a focus on student success. The implications of our project for the district and other jurisdictions are discussed in Chapter Six.

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Chapter One

An Introduction to the OBE Project

Chapter One provides a brief introduction to the Outcome-Based Education (OBE) pilot project within the Fort McMurray Catholic Schools. In this chapter, the reader will find a description of the district contexts, and the beliefs about learning and teaching which provided the foundation for the OBE project.

Background

In 1989, educators in the Fort McMurray Catholic Schools faced several challenging questions. What evidence did we have that our students were learning what was important? How many students were learning well? Did we believe that all students could learn what is important? If so, what could we do to promote success for all students?

Initially, we responded to these questions with further queries. What learning was essential for all students? What indicators did we now collect that provided us with the information on how many students were learning well? How could all students learn well if they learned in different ways and at different rates? Could we change the prevalent expectations that minimum competencies were "good enough"? What were the political hurdles? Would our parents support high expectations?

At the invitation of the superintendent, two school teams volunteered to participate in a school improvement pilot project. Our purpose was to address the questions and issues collaboratively. The two pilot schools were St. Gabriel School, comprised of Early Childhood Services to grade 9, with an enrolment of 636 students, and Father Patrick Mercredi Community High School, grades 10 to 12, with an enrolment of 641 students. We reviewed the literature to determine whether our proposed intervention processes were supported as researched, effective practices. We discussed our beliefs about learning. It was when we discussed educational practices that we realized that many of our habits were not clearly justifiable in light of our beliefs. Our realization of this fact catapulted us into a grass-roots restructuring of the traditional educational process through Outcomes-Based Education (OBE) principles. Our efforts were centered on the beliefs that all students can learn, success begets success, and schools control the conditions for success.

At about the same time, Alberta Education invited the district to become a partner in the provincial Educational Quality Indicators initiative. The OBE project was approved as a provincial indicators project. Financial and collaborative support was provided to conduct a research-based school improvement effort over a period of three years. Our goal was to collect indicators which would help us determine if the OBE process made a difference in student demonstrations of success.

A 15 member OBE/EQI team was established locally, consisting of administrators, teachers from grades 3-10, and central office staff. The team initially focused on developing significant student outcomes based on what we thought our students would need for their success in the twenty-first century. Student achievement, positive, caring attitudes and responsibility were identified as highly significant outcomes. Teachers selected measures which would provide information about how our students were performing in these outcomes. Growth over time would be a significant indicator of success.

The pilot project began with a focus in mathematics, grades 2-10. However, teachers from all subject areas were invited to participate in professional development opportunities and subsequently, many teachers began to integrate the OBE strategies in other subject areas. In their view, the OBE principles "made sense". This report, however, provides a summary of the processes and results in the area of mathematics.

The Fort McMurray Context

The Fort McMurray Catholic schools currently enroll 3,751 students, ECS to grade 12. The district is comprised of four elementary schools, three elementary-junior high schools and one high school located within a 20 kilometer radius.

The Fort McMurray Catholic School District No. 32 is one of two government funded school districts in Fort McMurray. As of 1992, approximately 43% of the commercial and residential city taxes are designated in support of the Fort McMurray Catholic District.

The city of Fort McMurray is located 459 kilometers north of Edmonton, Alberta. The population of Fort McMurray is approximately 34,000. The latest municipal census (1989) enumerated:

- The city is heavily represented in the age groups between 30 and 44.
- Females represent 48% of the population, males make up 52% of the population.
- The largest group of Fort McMurray residents, 37.7% come from other points in Alberta. The second largest group comes from Newfoundland (13.3%). Over 11% of the residents come from outside Canada.

- The primary sources of employment for Fort McMurray residents are two oilsands plants which employ 45% of Fort McMurray's labor force. The largest percentage of the labor force is employed in the basic sector, which includes agriculture and forestry, mining and manufacturing.

Values of the Fort McMurray Catholic Schools

The values of the Fort McMurray Catholic Schools are expressed in the following belief statements:

All students can learn and experience success.

A quality education develops the whole child - spiritually, intellectually, socially, physically and emotionally.

Quality education enables successful lifelong learning and pursuits.

Learning occurs best in a safe and caring environment where students believe they can and will succeed.

Each person is a unique gift from God and therefore worthy of respect.

All district personnel are called to live the Gospel of Jesus Christ.

Sensitivity, fairness, integrity and Christian values characterize our interactions with student, staff, parents and the community.

Quality education is best achieved when all responsible stakeholders take an active role.

Positive people aspire to excellence, are adaptable, renewable and meet challenges as opportunities.

Fort McMurray Catholic Schools belong to and serve the entire community.

Customer satisfaction and responsiveness are critical to our success.

Educators are accountable for ensuring academic success.

Project Purpose

The purpose of our EQI project was to determine whether Outcome-Based Education (OBE) produces positive results in student achievement, responsibility and attitudes in mathematics.

Some of the guiding questions for the project were the following:

- Do the indicators provide sufficient data to suggest that the OBE process is making a significant positive difference to student success in the significant desired outcomes?
- Do the indicators provide clear information regarding areas which need continued improvement in the OBE process? If so, which areas need improvement and what plan of action is needed to implement the changes?
- Is the OBE process a viable one for other teachers, schools or districts to consider in their efforts to promote student success? If so, what will they need to consider as they begin to restructure schooling through OBE?

Assumptions

We had some basic assumptions as we began the OBE process. Namely, we assumed that:

- Mathematics is an essential area of learning for all students because it prepares students for lifelong learning and for productive functioning in a democratic society.
- All students can learn, but they learn in different ways and at different rates.
- Students are better able to demonstrate success in mathematics when previous learning has been successful.
- Students achieve better results when they become active and responsible collaborators in the learning process.
- Students are likely to achieve high levels of performance when they possess a positive attitude toward learning. This attitude includes a liking for the subject and the belief that what they are learning is meaningful and achievable.
- Teacher, parent and student collaboration is critical to the success of this project.

Definitions

Table 1 provides the definitions used in the OBE project.

Table 1

OBE Project Definitions

Outcomes:	Demonstrations of student learning.
Outcomes of Significance:	The most essential outcomes we want all students to demonstrate to be successful now and in the future.
Outcome-based	An aligned focus of all educational efforts on the desired student outcomes.
Expanded Opportunities:	The conditions established by teachers and schools to promote student success, including the time and way most appropriate for their learning.
High Expectations:	Beliefs and supportive practices which clearly communicate that educators believe all students can demonstrate the outcomes at high levels of performance.
Indicators:	Qualitative and quantitative "pictures of quality" from which teachers and administrators can make informed decisions regarding improvement.

OBE Project Design

Year One

In the first year of the project, teachers collaboratively defined the outcomes of significance. They also discussed the implications of the OBE principles on their current practices. Plans were made to revise some of the current practices and focus on designing down, clarity, high expectations, expanded opportunity. The outcomes of significance were developed from stakeholder input during team meetings, random interviews with business personnel and a review of the current literature. Finally, in the first year, the pilot teams selected the measures which would provide information on how well students were performing.

During this planning year, teachers participated in professional development opportunities in the area of Outcome-Based Education. Several attended the National OBE conferences in Phoenix. In August 1990, 11 math teachers participated in a week-long professional development session to develop methods of assessment which were closely aligned with the desired outcomes. Teachers worked collaboratively to form what they believed were parallel forms of assessment. One teacher would develop the questions in three assessment forms which dealt with one or two of the outcomes. A teaching partner would develop parallel questions for other outcomes on the assessments. These assessments would allow students to demonstrate successful performance of the desired outcome. The assessments were also designed so students could reassess on outcomes which they did not immediately master. Since the development of these forms, there have been major revisions to focus more on the higher order thinking skills which will allow students to demonstrate their mathematics learning in a practical way. There has also been a move toward greater integration of subject matter to allow this practical demonstration of learning to occur. This was an exciting phase in which we realized that a focus on the significant outcomes meant that not all the details were equally significant.

Year Two

The second year was our implementation phase. Planning time was scheduled for teachers to work collaboratively to meet the needs of individual students, to plan, or to "share" students in cross-grade tutoring situations. Together, teachers observed student performances and planned alternative strategies when a method needed refining. The selected measures were used to gather data. The resulting indicators were used to determine to what extent students were demonstrating achievement, responsibility and positive attitudes in mathematics. At the end of year two, teachers met to discuss what had gone well and what changes should be made in the following year, based on the results and on their shared experiences.

Also in 1991, the OBE teachers were selected, from many applicants, to be presenters at the National OBE Conference in Denver, Colorado. The teachers provided a practical view of the OBE process. The sessions were well attended and participant responses were very positive.

Year Three

Year three was a year of fine-tuning and continued data collection. During this year, many requests for information arrived in the district in response to an article carried by the *Globe and Mail*. The article, written by Andrew Nikiforuk, was a result of references made to the Fort McMurray OBE process in the *International Comparisons in Education* study. Initial responses to external requests were made but follow-up was to occur at a later date when the district had completed the pilot phase.

The teachers' commitment to the collaborative improvement process was clearly evident. Table 2 provides a view of the dedicated efforts of our teachers. The many phone contacts teachers made to parents, and the informal contacts made by teachers or the consultant were not recorded.

Table 2

Fort McMurray Catholic Schools
Three-Year Summary of OBE Meetings and Activities
September '89 to June '92

Number of Sessions	Type of Session
98	OBE team meetings
53	OBE inservices for teachers
17	Parent awareness/input sessions (360 participants)

Fort McMurray Catholic Schools, 1992

Scope of the OBE Pilot Project

The process of OBE was initially implemented in grades 3-10. Provincial indicators were collected at grades 3, 6 and 9. The targeted outcomes for data collection were student achievement, responsibility and attitudes in mathematics.

The elementary mathematics OBE process was officially offered for a total of 210 minutes per week or 133 hours per year. At the junior high level, students received 240 minutes of mathematics instruction per week, offered in six 40 minute blocks. This allowed for approximately 150 hours of mathematics instruction per year. High school students received mathematics instruction in 80 minute blocks each day for a total of approximately 125 hours per 5-credit semestered course. Integrated approaches to instruction occurred at various levels.

The OBE pilot process was implemented in approximately 30 classes per year. The process was delivered by 12 to 15 teachers annually, depending on semester scheduling and teacher placements. Approximately 600 to 700 students were involved in the project annually.

Project Limitations

Some of limitations of our project, those which might be refined or improved through an "expanded opportunity" included:

- the absence of valid and reliable criterion referenced performance measures which allow us to annually track higher level thinking skills performance in mathematics.
- the initially limited parent and community input in deriving the outcomes of significance.

Other limitations which might be more difficult to alter included:

- mid-year and annual changes in teaching staff. According to responses from parents, students and teachers, some of the changes in staff appeared to significantly impact the learning process.
- small sample size of some of the results. Although many of the results are very encouraging, continued study of the process would be welcomed to track achievement, responsibility and attitudes of students over time in other areas of the province or country.
- calendar defined time and learning opportunity constraints. OBE staffs continuously sought ways to address the issue of learning time. Students were given opportunities, although not unlimited opportunities, to learn beyond the regular calendar defined opportunities. These included after class hours of assistance to students and summer sessions. Technological support was sought to provide better methods of dealing with the time issue. The alignment of software with Alberta curriculum and essential outcomes was an important consideration in reviewing technological support possibilities. This issue remains to be solved. Some efforts, however, were more successful. At the junior high level, several students mastered the program outcomes prior to "year end" and progressed to the next grade level program outcomes.

In the following chapters, the OBE process is described in greater detail, beginning with a closer look at the literature pertaining to the OBE process.

Chapter Two

OBE Related Literature and Research

The OBE project was initiated as a result of a desire for greater student success. The research provided evidence that our intervention strategies would likely have merit since they were proven, effective instructional strategies. Chapter Two opens a window to the research pertinent to the OBE project.

The Reasons for Change

The literature abounded with voices calling for educational change. Several cited reasons for change included technological forces or trends, political demands for accountability, or a social need (Alkin, 1988; Hathaway, 1989).

It appeared that all three reasons affected our district's OBE change efforts. The literature pointed to a trend which called for the rethinking of our educational vision for all students. What should all students be demonstrating to be successful in the twenty-first century? This question held elements of all three reasons for change:

Trends:	Our vision for student success needed to reflect the demands of the future.
Accountability:	Our results indicated that not all students were learning well.
Social Equity:	ALL students should be demonstrating success.

Based on these reasons for change, our search now focused on indicator systems, educational improvement, outcome-based and effective teaching literature. Our quest was to promote greater success for all students in the area of achievement, responsibility and positive attitudes.

The literature revealed that some classroom, school and district practices were more effective than others in promoting achievement and affective outcomes.

Research Findings

Rubin and Spady (1984) demonstrated the value of continuous learning based on mastery of prerequisite outcomes. Between 1987 and 1990, Spady wrote several articles on school reform and challenged educators to consider their current practices and beliefs. He challenged the inherent beliefs resulting from the representations of the bell curve and traditional systems of grading. Spady's writings influenced a renewed look at the work of Bloom, Block and Guskey. The four principles of Spady's High Success or Outcome-Based Education process are: designing down from where you want to end up (developing exit outcomes of significance), maintaining a clear focus on significant outcomes, providing appropriate time and support for learning, and maintaining high expectations and standards for all students to demonstrate success. These principles are based on the philosophy that all students can learn and be successful, success at one level promotes success at the next level, and schools control the conditions for success.

Lezotte (1991) identified seven correlates of effective schooling which have influenced school improvement processes. The correlates are: safe and orderly environment, climate of high expectations for success, instructional leadership, clear and focused mission, opportunity to learn and student time on task, frequent monitoring of student progress, and home-school relations.

Bloom (1984), Block, Efthim and Burns (1989), and Guskey and Gates (1986) described the process of mastery learning which assist students to learn in the time they need and encourages high performance. Slavin and Karweit (1984) produced a report indicating no significant effects related to the use of mastery learning. This report was refuted in subsequent studies by proponents of the OBE and mastery learning processes.

The U.S. Office of Education (1987) produced 19 findings which supported the hypothesis that efforts related to instructional quality can enhance the instructional conditions within a school. Findings included and supported the use of cooperative learning, building on prior knowledge, teacher feedback regarding student learning, teacher expectations and direct instruction.

Fraser, Walberg, Welch, and Hattie (1987) studied the positive effect sizes within the major syntheses of the research. The study reported the results of many individual studies of academic learning conducted during the past half century in numerous countries. The results of these studies showed that improving the quality of instruction can result in vastly more effective and efficient academic learning for students. The major findings supported the need to look seriously at inputs and processes which include reinforcement, cues and feedback, cooperative learning, high teacher expectations, good questioning techniques, among others.

Table 3 summarizes the findings of some of the major studies.

Table 3

Literature and Research Findings

Author/Source	Outcome	Findings
Northwest Regional Educational Lab (1990)	Achievement	Excellent practices which positively effect achievement and affective outcomes include: prioritized learning goals, activities matched to student developmental levels, monitoring of student progress, feedback, whole group instruction, clear and focused instruction, beliefs that all students can learn, and high expectations for student learning.
Rogers & the Glendale OBI Team (1989)	Achievement	Students in OBI classes average significantly above (11%) students in non-OBI classes on district criterion referenced tests. Many students returning from college report that they are better prepared (know more going in) than most of the other students in their classes.
	Attitudes	On a district attitudinal survey of students in OBI classes, most students reported that they prefer their OBI classes, learn more in OBI classes, believe that learning is easier in OBI classes and wish more of their classes were using OBI.
Radwanski (1987)	Achievement	The most problematic subject for dropouts appears to be mathematics, followed by English. Records reveal that a significant number of academically successful students (C average or better) are in the ranks of dropouts. Low marks and lagging credit accumulation are a strong predictor of dropping out. "...(a) proportion of dropouts would have been able to meet program requirements with extensive special help in subject areas where they were experiencing difficulty, and a further proportion might have been able to cope academically in high school if they had arrived from elementary school better prepared." (pp. 80-81)

Table 3 *(Continued)*

Literature and Research Findings

Author/Source	Outcome	Findings
Lezotte (1991)	Achievement	Seven correlates of effective schooling are: safe and orderly environment, climate of high expectations, instructional leadership, clear and focused mission, opportunity to learn and student time on task, frequent monitoring of student progress, and home-school relations.
US Office of Education (1987)	Achievement	School efforts related to instructional quality which enhance the instructional conditions within a school are: prior knowledge, teacher feedback, teacher expectations, direct instruction, questioning, homework and cooperative learning.
	Achievement Confidence Responsibility	Efforts at home which affect these outcomes are: curriculum of the home, reading to children, independent writing, counting, speaking and listening, developing talent, and ideals.
Fraser, Walberg, Welch, & Hattie (1987)	Achievement	The results show that improving the quality of instruction can result in vastly more effective academic learning for students. The major findings support the need to look seriously at inputs and processes which include reinforcement, cues and feedback, high teacher expectations, good questioning techniques, and instructor background.
	Affective Outcomes	The various facets of the affective domain have a positive correlation with achievement.
Siba (1986)	Achievement	In one year, as a result of an individualized continuous progress math home study program, students in the "average" range surpassed what was taught in school at their "grade" level.

Table 3 *(Continued)*

Literature and Research Findings

Author/Source	Outcome	Findings
Guskey & Gates (1986)	Achievement	Positive results were found in all subject areas as a result of the mastery learning process.
	Attitudes	Attitude effect sizes related to students' desire to study more and a greater confidence in their ability.
Bloom (1984)	Achievement	Parental awareness and support for a child's learning helps to increase achievement.
		70% of the mastery learning students attained the level of achievement reached by only the highest 20% of the students under conventional conditions.
		Teacher use of cues, explanations, and active participation promoted higher student achievement.
	Attitudes	Corresponding changes in students' attitudes and interests in the subject occurred.
	Higher Level Thinking	At the college level, discussion classes (28 students) and labs produced "pronounced" differences in student thinking skills as compared with large lecture classes.
Slavin (1987)	Achievement	No significant effect on standardized test measures related to the use of mastery learning was found.
Rubin & Spady (1984)	Achievement	In 1981 over half of the 6th graders and over one quarter of the 5th graders scored at the 99th percentile on the Metropolitan Achievement Tests in mathematics. No more than one or two students per year in the entire school of 400 K-6 students failed to reach grade level on standardized mathematics tests (including mildly handicapped students).

An Outcome-Based Improvement Model

David (1987) reminded districts to match curricular goals and indicators, to ensure that indicators reflect the content and quality of instruction, and to go beyond aggregate measures such as test score averages.

The basic criteria for developing an appropriate indicator systems model suggested by the OERI Study Group (1998) were:

- measure the central features of schooling
- measure what is actually being taught or considered important for students to know
- provide information that is policy-relevant
- focus on the school site
- allow for fair comparisons, and
- maximize usefulness and minimize the burden of the process.

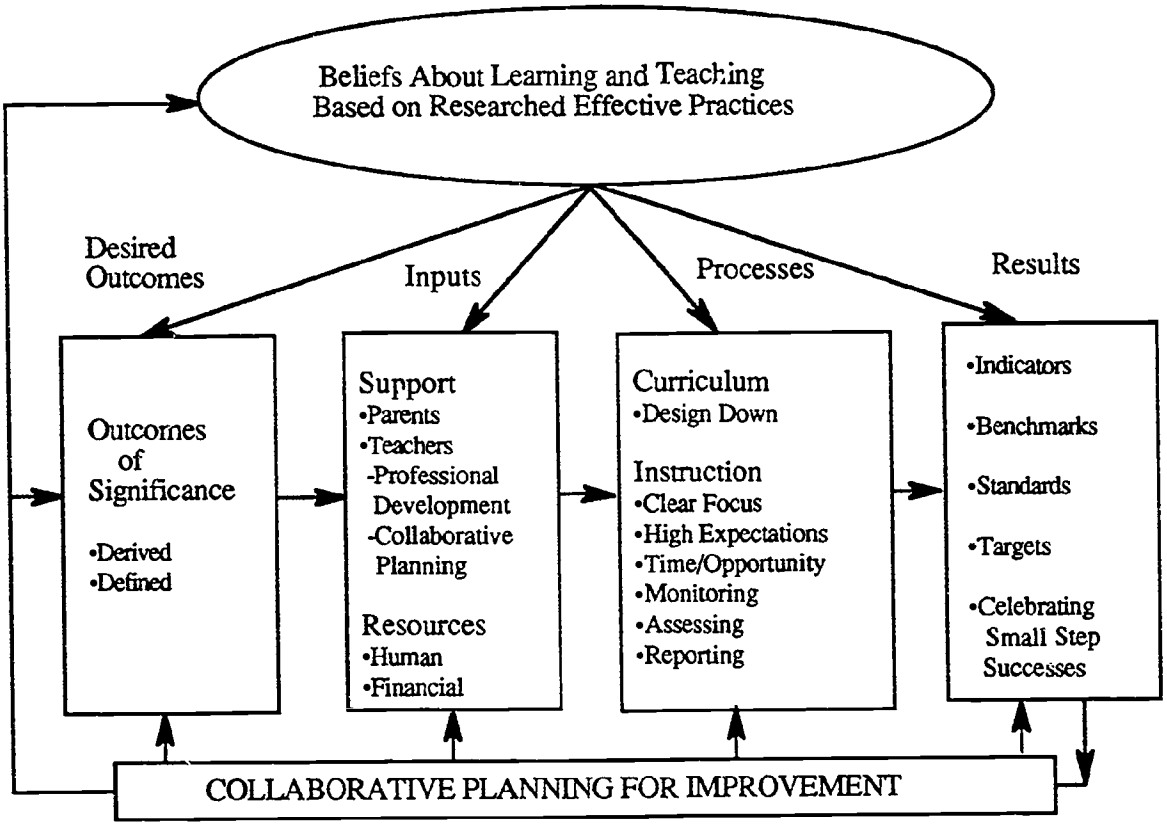
The OBE team determined the measures to be used to collect the data. They concurred with the need to maximize usefulness and minimize burden so that instructional time would remain the priority.

Walberg (1984), Oakes (1986), Hymel (1988), and others have developed models in which inputs and processes generate the outputs or outcomes. In our efforts to synthesize research, it became increasingly clear that our proposed OBE practices and a collaborative planning process were likely going to produce positive results.

Our educational improvement model is depicted in Figure 1.

Fort McMurray Catholic Schools

OBE FRAMEWORK FOR EDUCATIONAL IMPROVEMENT



Building Collegial Ownership

The literature clearly suggested that the appropriate use of indicators within a collegial process could be a catalyst for school improvement efforts. (Fraser, Walberg, Welch & Hattie, 1987; Bloom, 1984; David, 1987; OERI, 1988; Alkin, 1988).

David (1987) suggested that data alone have never been a catalyst for change. She suggested data are more likely to be credible to school staffs if they have had the opportunity to suggest what should be measured and how it should be measured.

The United States Office of Education (1987) indicated that the process of teachers sharing ideas, cooperating in activities and assisting one another's intellectual growth positively affect student achievement (p. 67).

Fraser, Walberg, Welch & Hattie (1987) found that the environmental variables which most affect student outcomes are cohesiveness, satisfaction, task difficulty and goal direction.

Oakes (1986) stated that "unless research knowledge is supported by inquiry within schools, local school districts, and state education agencies themselves, little change is likely to occur" (p. 153). A collegial process which incorporates the use of indicators is of paramount importance in school improvement efforts.

Champlin (1990) indicated that the premises which propelled the Johnson City schooling reform efforts included the use of indicators and a collegial "grass roots" change process. They recognized the fact that a school district is an interconnected and interdependent system and that any change would be directly related to the willingness of all participants to engage in an active program of renewal. Champlin advised educators who are involved in school improvement efforts to pay heed to these important features.

Literature and Research Review Summary

Research supported the reality that local decision makers have a large and important task. The literature suggested that appropriate decision making can occur when:

- there is clear focus on desired outcomes
- decisions are based on comprehensive knowledge of results
- decisions are made and implemented collegially.

These were the major conditions which activated the OBE pilot project.

The researched effective practices which became the pilot project processes included prioritized learning goals, high expectations, beliefs that all students can learn, clear and focused instruction, monitoring of student progress, feedback and building on prior knowledge. These processes are described in the following chapter.

Chapter Three

OBE Project Design

Chapter Three describes what we did to collect our data and who was involved in the process. The use of qualitative and quantitative measures provided a comprehensive picture of the project results.

Overview

The EQI/OBE project was designed as a three year action research project. The first year of the project was a planning year in which the OBE process, significant outcomes and indicator system were collaboratively derived by stakeholders. In the second year, the planned instructional processes and selected measures were field tested. Year three was the refinement year in which collaborative improvements were made based on the results of the field test.

Data Sources

The purpose of the indicators project was to determine, through the use of qualitative and quantitative data, whether our inputs and processes had a positive effect on student outcomes. To collect the data annually, the OBE team decided to use a variety of measures and data sources to provide a comprehensive picture of student success in the desired outcomes. Table 4 outlines the measures and data sources used in the OBE project.

Table 4

Educational Quality Indicators/Outcome-Based Education Assessment Instruments

Student Outcome	Measures	Source(s)	Levels
achievement	Alberta Education Mathematics Achievement Tests	students	3, 6, 9
	teacher developed tests	students	3-10
	local surveys	students	3-10
		teachers	2-10
		parents	2-10
		administrators	2-10
responsibility	local surveys	students	3-10
		teachers	2-10
		parents	2-10
		administrators	2-10
	random interviews	students	3-10
		parents	3-10
		teachers	2-10
		support staff	2-10
		administrators	2-10
attitudes	*School Subjects Attitude Scales*	students	5-10
	local surveys	students	3-10
		parents	2-10
		teachers	2-10
		administrators	2-10
	random interviews	students	3-10
		parents	3-10
		teachers	2-10
		support staff	2-10
		administrators	2-10

The OBE Sample

Our project sample included the following stakeholder groups:

Students

The OBE pilot group included approximately 600 grade 3 to 10 students in year 2 and approximately 700 grade 2 to 10 students in year 3.

Teachers

11-15 teachers implemented the pilot project in approximately 25 classes per year, depending on semester scheduling and teacher placements.

Parents

Approximately 360 parents attended out OBE awareness and input sessions. They provided survey and verbal responses regarding support or improvement for the process.

All parents of students in the project were surveyed at the end of the 1991 school year, and again at the close of the 1992 school year. Given the number of students in the programs, approximately 1,300 surveys were distributed in years 2 and 3 of the project.

Support Staff

Approximately three support staff members assisted students in mathematics in one of the pilot schools.

Administrators

Two principals and vice-principals were involved in the project over the three years.

Collection Procedures

An effort was made to find a balance between qualitative methods such as surveys and interviews, and quantitative methods such as provincial achievement or teacher made tests. Multiple perspectives were gleaned by inviting input from students, parents, teachers and administrators.

Provincial Achievement Tests

Provincial mathematics achievement tests were written by students in the official writing years and followed by repeated use of the measure in the following years. The tests were duplicated with permission from Alberta Education. Teachers received the tests on the morning of administration, supervised the students' writing of the test, and forwarded the tests to be scored by a district team. The purpose of our using these provincial tests was to determine, through reliable and valid measures, whether the OBE process showed achievement gains over time. Although comparisons were made with provincial peers, the major comparisons we wanted to see were those within one school over time.

Teacher-Developed Criterion Referenced Assessments

Teacher-developed tests were used in grades 2 to 10. These provided the data which were used in reporting learning progress to students and parents. Other sources of information for progress reporting included samples of student work in portfolios and curriculum aligned checklists.

Local Surveys

Local surveys were developed to invite stakeholder perceptions related to each of the significant outcomes. Survey statements were rated on a 5-point scale:

Not at all	A little	Moderately	Quite a lot	Very much
(1)	(2)	(3)	(4)	(5)

Statements to which parents responded included:

- I am aware of the High Success process in my child's class.
- My child has shown an increase this year in
  - -achievement
  - -responsibility
  - -positive attitudes

Statements to which students responded included:

- I like this process of learning.
- This method has helped me to get higher math scores.

Stakeholders were invited to provide additional comments. Some responses were quite elaborate and provided some valuable "thick data".

Letters were mailed to all high school OBE parents, requesting their completion of the survey. Questionnaires and stamped, return envelopes were enclosed. At the grade 2 to 9 levels, letters were sent home with students. A return envelope was provided for parent use.

Student survey forms were completed during class time and were administered by the homeroom teachers, then forwarded to the OBE consultant.

Interviews

Random interviews were held periodically with various stakeholders and followed a format similar to the survey. Some interviews were held on a casual basis without the questionnaire format. Many of these interviews were held in the first year of implementation. During year one, early feedback allowed us to make appropriate and immediate changes in the process.

School Subjects Attitude Scales

The *School Subjects Attitude Scales* (Nyberg and Clarke, 1983) provided quantitative data in the affective area. The purpose was to assess students' attitudes toward mathematics over the three year project. Students provided responses related to perceived difficulty, usefulness, and evaluation of mathematics. The data were collected annually from students in grades 5 to 10.

Data Analysis

An analysis of change over time provided a picture of the effects of the OBE process. Difference scores were obtained by finding the difference between the pre-OBE scores and scores following the implementation of OBE.

The provincial measures used in grades 3, 6 and 9 were repeated, with the permission of Alberta Education, to provide a difference score over time. The provincial data did not allow us to easily track individual student progress over the years although program comparisons could be made.

The local surveys provided a summary of student, parent, teacher and administrator perceptions in the areas of achievement, attitudes and responsibility. These were necessary to provide a more comprehensive picture of the effects of the pilot project. These surveys were distributed in years two and three to provide a picture of change over time.

Chapter Four

An OBE Framework for Educational Improvement

The OBE process is presented in detail in this chapter. The four principles of OBE set the stage for the instructional processes. Teacher collaboration and pioneering courage were the critical factors in the implementation of the process.

The Guiding Principles

The principles of Outcomes Based Education (Spady, 1987) guided our team discussions and decisions throughout the three year pilot project. The principles include:

Designing Down

Our purpose was to promote success for all students. In order to promote success, we needed to clearly define the broad-based, significant outcomes which students would need for their future. What did future trends tell us students would need to demonstrate success in the twenty-first century? Then we "designed down" to program areas. The focus on significant outcomes provided a meaningful method of organizing for instruction.

Maintaining a Focus on the Significant Outcomes

We needed to maintain a clear focus on the outcomes of significance. As we became wrapped up in some of the curriculum details we needed to continuously consider what we were asking students to demonstrate. Our collaborative work kept us on task and brought us back to the "drawing board" many times.

High Expectations

In OBE, teachers believed that their expectations for all students to perform at high levels had a major impact on student demonstrations of the outcomes. Student work needed to be done and done well to qualify for credit. In math, students were expected to demonstrate mastery by performing 80% or higher for each program outcome in order to receive credit for the skill. In some cases, a skill was seen as a "can do" skill, which did not receive a mark at all. Rather, a checklist was used and this implied, if needed, a 100% mastery level. Our reporting style changed in the pilot process since averaging or summarizing a lot of learning did not adequately describe what a student could do. Reports included a listing of all the mathematics concepts the student had mastered. It also included a listing of the concepts which a student had not demonstrated yet, or were "In progress".

Expanded Time and Opportunities for Learning

Teachers were astutely aware that students learned in different ways and at different rates. They were also cognizant of the fact that the opportunities provided for students to demonstrate their learning were frequently limited by time or by the methods used in the initial instruction.

Teachers began to provide more than one chance for students to learn a concept or skill. Ideally, students had the opportunity to participate in a variety of active learning experiences during the introduction of a concept. A reteaching process, when needed, provided another opportunity for learning. The reteaching might include such practices as peer tutoring or cooperative learning, if these were not included in the initial learning opportunity. Additional opportunities to learn provided the support many students needed to demonstrate success.

The issue of providing appropriate time for students to demonstrate their learning was magnified by the calendar system. Some students needed time beyond a defined semester or school calendar system. Similarly, some students who mastered concepts quickly needed the opportunity to continue their progress.

Dealing with the issues of time and support for learning required collaboration and a good dose of pioneering pluck.

An Overview of the Practice Changes

The known variables which were altered in our pilot outcome-based instructional process are described in Table 5.

Table 5

Changes in Fort McMurray Practices

Practices	Previous Practices	Pilot Project Practices
Instruction	Bell curve expectations	High expectations for all
	Time driven learning	Outcomes-driven learning
	"Averaging" of learning	Demonstrations of outcomes
	Textbook-driven learning	Textbook as resource
	Monitoring for management	Monitoring to provide feedback regarding progress
	Summarized reporting	Clear reporting by outcome
Collaboration	Lecture style presentations	Collaborative, interactive PD sessions based on desired outcomes, literature and research
	Parental participation	Collaboration with parents, community, business
Professional Development	Randomly selected based on interest assessment	Outcomes focused, based on results
Data Collection	Annual summary of school-based activities	• Learning results based on outcomes of significance and • Tracking of improvement over time

Fort McMurray Catholic Schools, 1991

An OBE Collaborative Planning Model

The OBE improvement process evolved over time through collaboration. Our collaborative model is summarized on the following page.

A more detailed description of the collaborative model is outlined on page 27. This description may be useful to jurisdictions that are embarking on an educational restructuring process.

Educational teams are cautioned to remember that change occurs over time and that sufficient time must be allocated to encourage long-term gains in ownership and results.

OBE: WHAT DOES IT LOOK LIKE?
A Grass-Roots, Collaborative View

Know What You Want Students to Demonstrate

- What are the community and business expectations and world trends? What will students need to know, do and be like to be successful in the future? Involve all stakeholder groups in identifying the outcomes of significance.
- Define each outcome so that a clear understanding is developed regarding what each outcome means. What would students be doing if they demonstrated critical or creative thinking? Review literature and real life work place situations to develop clear definitions for each outcome.
- Involve all stakeholders in a collaborative learning process to increase understanding of each outcome and how to promote it in the home and school.

Keep a Focus on the Outcomes of Significance

- Choose instructional methods and strategies which will promote student demonstration of the outcomes of significance in a real life practical way.
- Then look at the curriculum content you want students to know.
- Use the significant outcomes as the focus for enabling meaningful learning of content.

Maintain High Expectations and Standards

- Communicate your belief that all students can learn and perform at high levels.
- Maintain high performance standards for all students.

Expand Time and Opportunities for Learning

- Students learn in different ways and at different times. Use a variety of methods to help students learn. Reteach when necessary, using a new approach.
- Document and credit the demonstrations of the outcomes as they occur.

An OBE Design for Collaborative Educational Improvement

Phase I
How to Begin the Transition to Outcomes-Based Education

1. Invite a team of stakeholders to participate in the improvement process.

2. Develop a process which will provide opportunities for stakeholder input regarding student outcomes which are seen to be essential for students' future success in life.

3. Collaboratively review the trends and the research, then derive and define the significant outcomes which will drive improvement efforts.

4. Organize staff development opportunities which will promote a collaborative review of beliefs about learning and teaching, based on knowledge of results and current educational literature.

5. Communicate the vision of outcomes to all stakeholders and seek continued input regarding ways in which to promote continuous progress toward the outcomes.

Phase II
Planning for and Maintaining an Instructional Focus on Outcomes

1. Communicate the vision of outcomes to students and parents and seek input regarding practical ways in which to promote continuous progress toward the outcomes.

2. Offer collaborative opportunities for teachers to plan, share and implement strategies which will
   - clearly focus on the significant outcomes and "design down" to match all components of schooling with those outcomes.
   - address the "time to learn" and "opportunity to learn" issues.
   - align practices such as active student involvement and integration of curriculum with the desired significant outcomes.
   - communicate and maintain high teacher expectations for the success of all students.
   - assess each student's continuous progress in the outcomes of significance and the school's overall health in the outcome areas.
   - continuously provide feedback to students regarding their progress and seek their input regarding improvement.
   - maintain regular connections with parents to promote awareness of the focus on outcomes and each child's growth in demonstration of these outcomes.
   - credit and celebrate learning when it occurs.

Phase III
Collecting and Reviewing the Results to Develop a Plan for Improvement

1. Field test the process using the assessment methods selected in Phase II, collect and analyze the data.

2. Refine the process through collaborative review and discussion and develop a strategy for improvement based on the results.

Fort McMurray Catholic Schools, June 1992

Chapter Five

Findings and Discussion

In this chapter, we share our OBE pilot project findings related to student achievement, responsibility and attitudes in mathematics. The data collected through the use of qualitative and quantitative measures suggest that the OBE process produces positive results in student achievement, responsibility and attitudes.

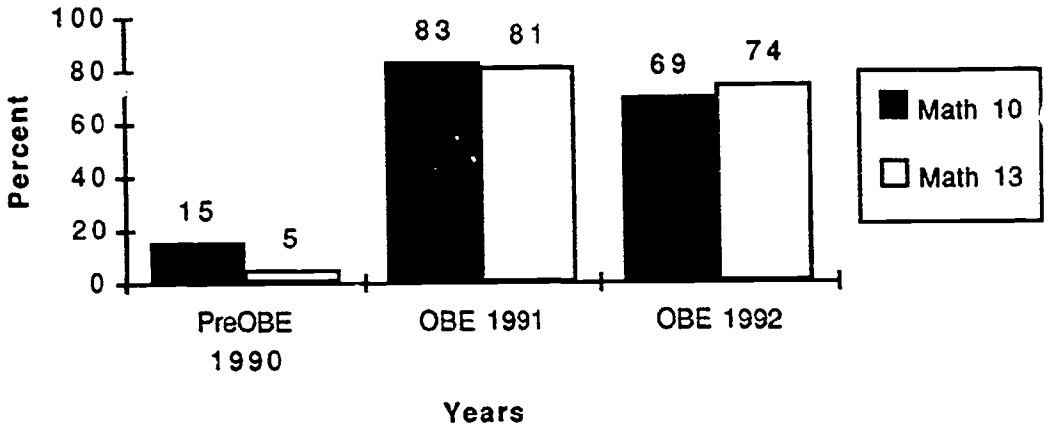
Student Achievement in Mathematics

Teacher-Developed Assessments

Our findings indicate that many more students are reaching mastery (80% or higher) levels in mathematics outcomes than previously.

The teacher recorded marks indicate that more Math 10 and Math 13 students are performing at higher levels than previously. The data are displayed in the following graph.

Percentage of Mathematics 10 and 13 Students Achieving Mastery (80% or higher) on Teacher Tests



There were substantial increases in achievement at the higher levels in both Math 10 and Math 13 in 1991 and 1992 although the results were higher in the first year of implementation. Teachers believed that a clear focus on what was to be demonstrated and high expectations for all students were making a difference in student performance. Teachers however, were concerned about the students who were still reticent in accepting responsibility for learning. Teachers saw students counting on several chances to demonstrate success and procrastinating in demonstrating the outcomes. Time was an obvious factor for teachers and students in the semestered system. Reporting times were tedious for teachers, as students attempted to "catch up" on demonstration of the outcomes. In 1992, 19 students from the Math 10 and 13 classes withdrew to attend the personalized learning centre or Math 14 classes. Teachers felt these students exhibited behavior problems due to their lack of prerequisite skills or understanding of the concepts. Teachers indicated that students did not drop out of school but rather made decisions to get the prerequisite skills through another course before registering for Math 10 for a second time. The personalized learning centre was an attempt to provide another learning opportunity for these students prior to their enrolling in Math 10. This action corresponded to Radwanski's (1987) suggestion that a proactive process through extensive special help would assist these students' learning and prevent their dropping out of school.

A review of the first semester 1992-93 grade 10 math results indicated that 80% of the total grade 10 students who had participated in two years of OBE instruction (grades 8 and 9) were performing at mastery levels of 80% or higher in all math courses in the first term. Thirty-nine percent of the OBE students who registered for math courses in the first semester enrolled in Math 10. Of these, 96% were performing at mastery levels. Forty-six percent of the students took Math 13; 85% of these students were performing at mastery levels. Fourteen percent of the OBE

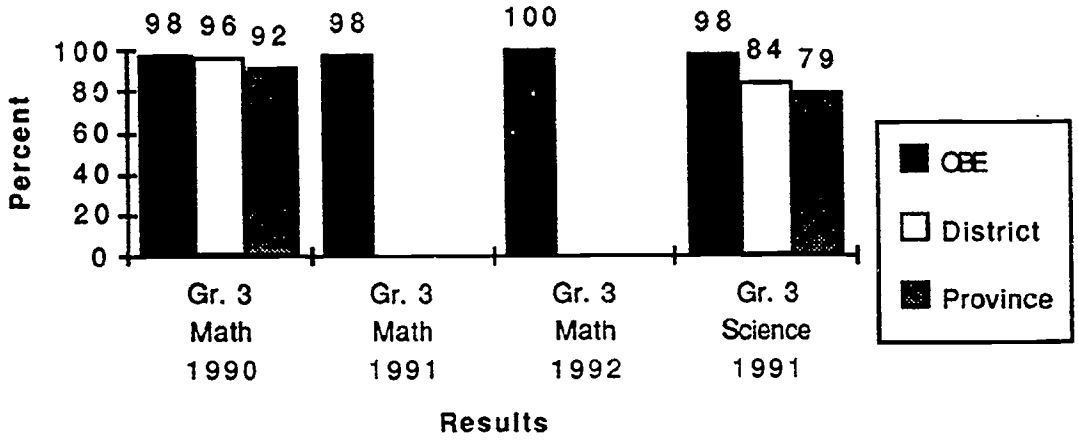
students enrolled in non-OBE math courses (Math 14 and 16). Of these, 25% were performing at the mastery levels in the first term report.

Provincial Achievement Tests - Acceptable Standard

OBE students demonstrated higher achievement in external measures, such as the provincial mathematics achievement tests for grades 3, 6 and 9. In all cases, OBE results showed increased achievement over time.

Grade 3

Percentage of Grade 3 Students Achieving Acceptable Standards on the Total Provincial Math and Science Tests



In 1990, 98% of the OBE grade 3 students achieved the provincial standard. This performance was repeated in 1991. In 1992 all grade 3 students were performing at the provincial acceptable standard. It may be argued that the teachers were teaching to the test. Teachers valued the conditions of the provincial testing process and the school and district attempted to maintain those conditions at all times. Teachers were dedicated to teaching the curriculum outcomes. They believed it was the dedication to the teaching of the outcomes, and the provision for time and opportunity to learn which caused these results to occur. In fact, in 1991, grade 3 students wrote the provincial science test and teachers indicated that they spent time preparing for that test. They were keen to see the results because they felt there was a great deal of overlap between science and mathematics in 1991, e.g. lots of graphing and practical application. They believed strongly that OBE transfers into other subject areas.

In sharing their perceptions, the grade 3 teachers talked about the processes they had implemented in their classrooms. Both teachers had been teaching at the grade 2 level in the same school during the 1988-89 school year. They felt the 1990 grade 3 students were "high ability" students. In 1990 they had offered some

second chances at tests. The teachers believed the 1991 group was not a high ability group and "worked harder" to promote student success of the program outcomes. One teacher felt that this group was somewhat "lazy" but worked well under pressure! The teachers shared their resources and ideas regularly. They refined their tests and indicated that they did not review things that were not aligned with the outcomes.

The grade 3 teachers shared the following comment when asked for their perceptions regarding the results:

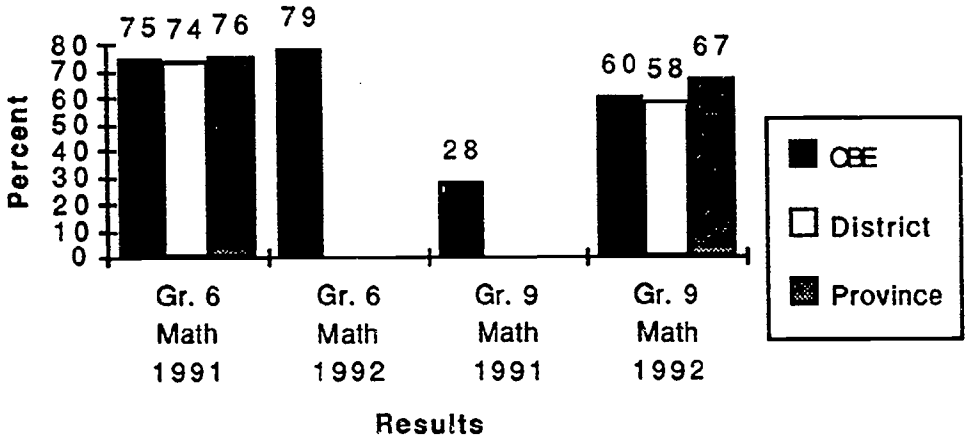
- "We were not as dependent on the textbook."
- "In September, we saw that 'being done' was foremost in students' minds. The process we undertook was to get students to think about their own process of learning - and quality! The students knew they weren't going to be done until it was done well!"
- "We were directed to think critically about what the children needed to do easily and what we could do without. We took things that would be beneficial for student learning and did that EARLY so the students would have the skills. Problem solving was taught early because it was a skill they had to have. We made them discuss and verbalize what should be done e.g. process. They (students) made up their own problems for other kids to do! Subsequent new skills in regrouping were taught in the problem solving format. We had students drawing, using manipulatives, talking and sharing ideas with a partner. Students worked in groups of 4. We tried to see who could come up with a way to solve the problem. We stressed the PROCESS, not the answer, thereby reinforcing the students' thought process."
- "An estimated 80% of my parents work. The students demonstrate frequent emotional ups and downs. These organization, problem solving strategies are not usually taught at home."
- "OBE helps children fill the learning gaps. Particularly the children from other schools. It is very diagnostic! One student analyzed his own progress and said, 'I have to improve in division!'"
- "Speed in completing an outcome never got a priority. The focus was on mastery of problem solving methods and processes rather than speed."
- "At first, the student activities had to be black and white or they couldn't THINK about it. They had a fear of right versus wrong. We gave them more independence because we were prepared for anything e.g. level of skill. So we could allow that independence! Previously, we were very teacher directed in our teaching process. Now we provide more student choices."
- "We promoted cooperation through tutorials. e.g. Kids helping kids or tutors helping younger students in Grade 1. The noise level was up, but it was good for teaching concentration!"

The grade 3 teachers expressed surprise at survey results which they had collected in their own classrooms. Students positively ranked mathematics with physical education and art. They also expressed surprise at the students' reaction to the writing of the achievement exam. "They love the achievement test!"

The 1992 results were similar. All students performed at the acceptable standard.

Grades 6 and 9

Percentage of Grade 6 and 9 Students Achieving Acceptable Standards on the Total Provincial Mathematics Tests



In 1991, the grade 6 students performed slightly above their local peers in the mathematics achievement test. There was a significant variation in collaborative efforts and implementation between classes at this level as compared to the grade 3 level. Basically, collegial planning did not occur other than involvement in the district team planning sessions. The results of the classes are combined. The 1992 OBE grade 6 results showed higher performances than the local and provincial results of 1991.

Teacher descriptions of the OBE process at the grade 6 level included:

- "My implementation of OBE changed the achievement results and attitudes e.g. self-confidence, of these students!"
- "When we got to the exam time, the students wanted to do math all morning. They enjoyed math!"
- "The principles transfer into all the different subject areas."

- "In the future, I would do a lot more problem solving and ensuring students know how to read instructions!"

Some of the changes in practice included the following:

- In 1989-90 students received few expanded opportunities. In OBE practices, students received more opportunities.

- Previously, everything counted e.g. "stuff" students didn't know was averaged in with the "stuff" they knew and was held against them at every reporting period. In OBE practices, record keeping became very focused on outcomes. Students got credit when they mastered an outcome. One teacher stated, "I didn't grade as much this year as last - only once the students were successful." Previously, some random record keeping occurred. "The next space in the book was the next activity we did!" The record keeping system became a diagnostic tool and identified student needs and successes.

- Previously, random use of textbook questions occurred. In OBE, selected assignments were given from selected resources.

- Previously, when students were done with an assignment, they were done, regardless of the performance quality. In OBE, students knew what was expected of them. They could keep going when they mastered a concept at a high performance level. "They loved knowing what was coming next."

- Previously, instruction was more "ad lib". "I spent time teaching things students didn't really need to do or know." In OBE, "I was more prepared. Practice tests and assessments were ready before instruction began."

Grade 9

In 1991, 60 OBE grade 9 students wrote the 1988 Alberta Education Pilot Math test. Only 28% of the students performed at the acceptable provincial standard. Preceding and following the test, the students indicated their perceptions that this test was not "worth" any credit, so they did not attempt to achieve their best. In 1992, during a discussion following the writing of the provincial test, students indicated that they had tried their best. Some students felt the questions had been "tricky". Their 1992 performance was lower than the provincial average but slightly higher than the local results. The 1992 OBE grade 9 performance showed a dramatic increase over the 1991 school results.

Teacher practices included a great deal of assistance to students after class hours and the choice for students to move ahead beyond the regularly defined time constraints. In the 1991-92 school year several students completed the course outcomes prior to the end of the year and moved to the next grade level outcomes mid-year.

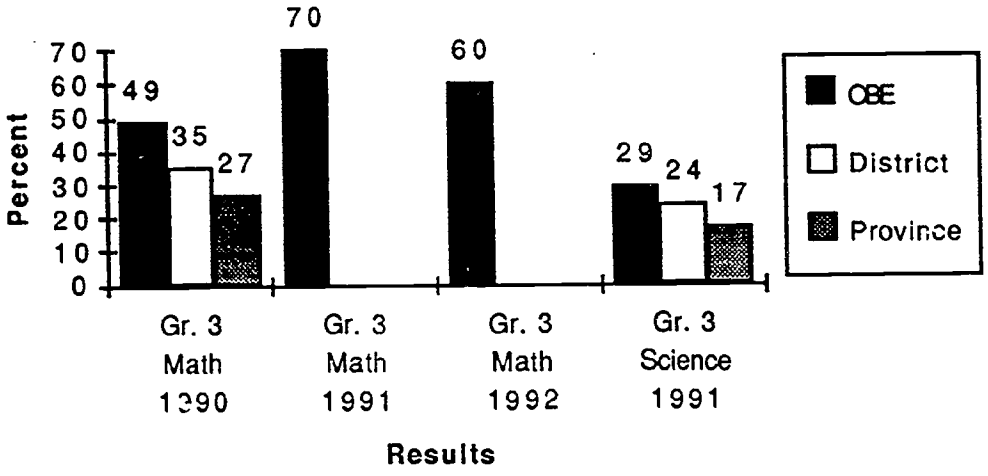
Other variations in inputs included additional preparation times for OBE planning in mathematics. A teacher aide was available for math classes. Parent meetings provided awareness for parents and support for the process.

Provincial Achievement Tests - Standard of Excellence

Data regarding student achievement at the standard of excellence levels is displayed in the following graph. In all cases where repeated tests were administered, results over time showed improvement gains in the OBE classes, as compared to earlier results.

Grade 3

Percentage of Grade 3 Students Achieving Standard of Excellence on Total Provincial Mathematics and Science Achievement Tests

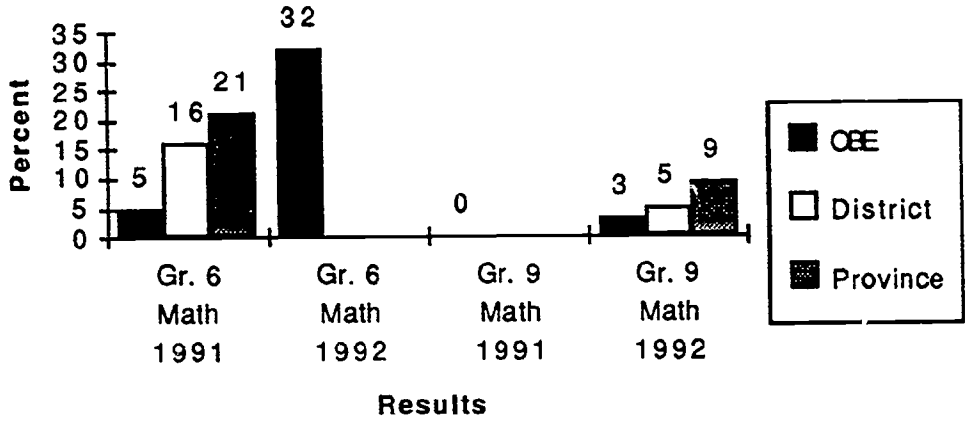


In 1992, a greater percentage of the OBE students reached the provincial excellence standard in mathematics than in 1990. This was lower than the 1991 results but a significant sustained increase from 1990.

The OBE results in science were consistent with the mathematics results, although the percentage of students performing at the standard of excellence was lower. OBE students outperformed their local and provincial peers in science. The differences between grade 3 OBE and provincial results were significant.

Grades 6 and 9

Percentage of Grade 6 and 9 Students Achieving Standard of Excellence on the Total Provincial Mathematics Achievement Tests



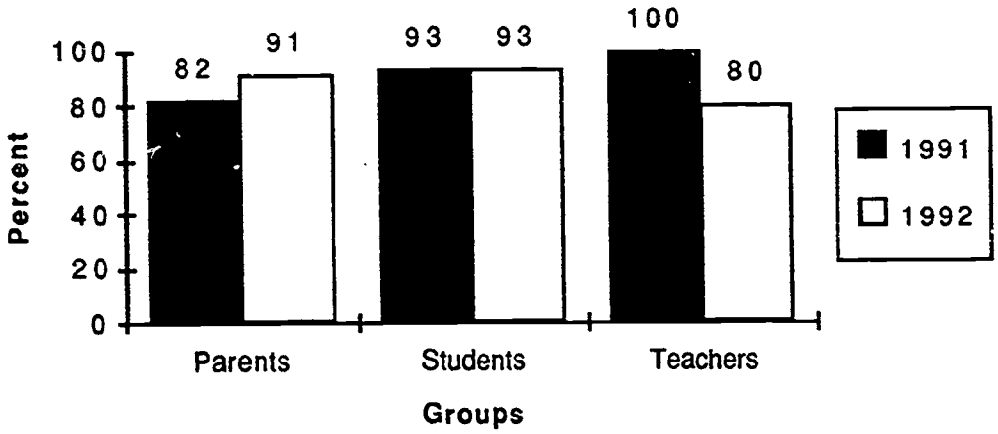
The 1992 grade 6 Standard of Excellence results showed a dramatic increase in mathematics achievement over the results of 1991. The 1992 OBE grade 9 students did not match the provincial or local performances in the standard of excellence but they increased their own school performance slightly over the 1991 results.

Stakeholder Perceptions Regarding Outcomes

Parent and student survey responses showed perceived gains in student achievement, responsibility and attitudes as a result of the OBE process. Teacher responses indicated a perceived decrease in positive changes although interviews with teachers indicated that expectations for the demonstrations of the outcomes were higher in 1992.

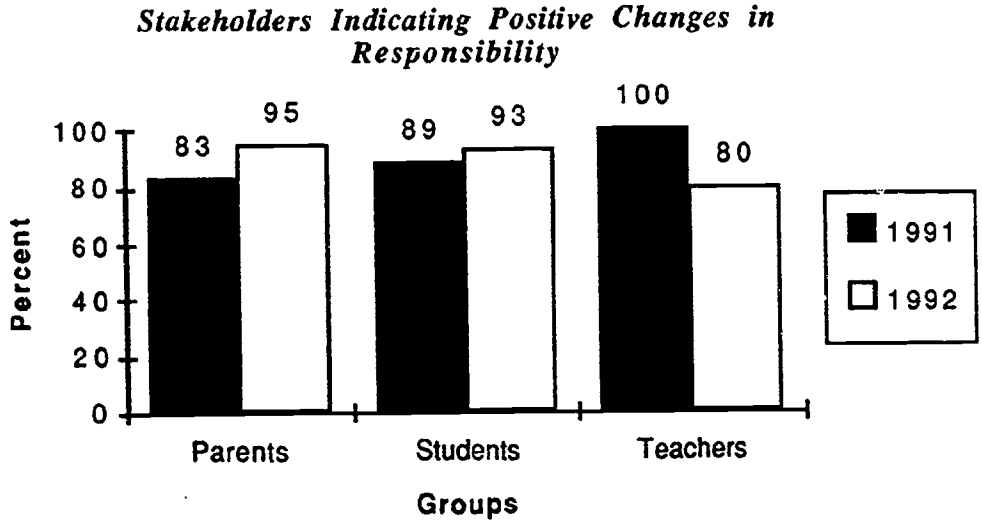
Although the results were positive, the number of parents responding was low (15% in 1991, N=98; 19% in 1992, N=150).

Stakeholders Indicating Positive Changes in Student Achievement in Mathematics



Parent and student perceptions regarding positive changes in achievement increased slightly and were more closely aligned in 1992 than in the first year of implementation.

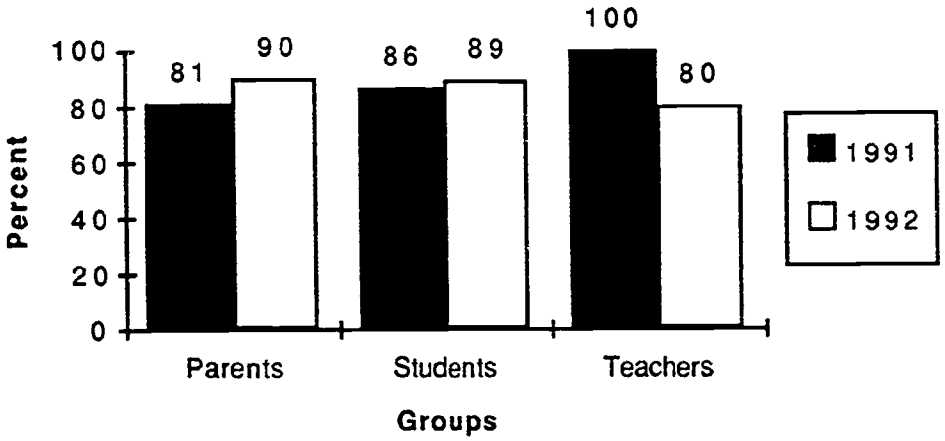
Teacher perceptions appeared to suggest that we may have experienced some Hawthorne effects. In 1991, all teachers indicated a substantial change in student achievement, responsibility and attitudes. Interviews with teachers in 1992 indicated their continued high expectations for student achievement. However, teachers believed achievement could be higher, students attitudes could be more positive and students could show greater responsibility for their own learning. In each area, achievement, responsibility and attitudes, teacher perceptions moved from 100% in 1991 to 80% in 1992.



The most significant increase in stakeholder perceptions appeared in the area of student responsibility as perceived by parents. One parent indicated in 1991 that her child was even choosing to clean up her room now. The mother attributed this phenomenon to OBE, believing that OBE had made her child feel better about herself, thereby increasing her desire to demonstrate responsibility at home.

Student responses related to perceived increases in responsibility were also in higher in 1991. Teachers felt students could demonstrate greater responsibility for learning.

Stakeholders Indicating Positive Changes in Student Attitudes



Parent responses regarding perceived increases in positive student attitudes were higher in 1992 than in 1991. A slight increase in student perceptions was noted. Teachers felt students could be more positive.

Whether students feel better about themselves as a result of achievement or whether they need to feel good about themselves in order to achieve well has long been debated. The results appear to suggest a correlation between achievement and gains in the affective and behavioral domains.

The *School Subjects Attitude Scales* (Nyberg & Clarke, 1983) were administered annually over the three-year project. The results appear in the following table.

A review of the responses resulted in a suggestion that since the indicators did not vary significantly, only minimally if at all, interpretations should be made with caution. Given these cautions, it may be somewhat presumptuous to make the following observations:

- There appear to be some positive gains in the OBE grades 5 and 6 classes while district results have stayed virtually the same over the three year period.
- Grade 7-9 OBE students appear to think math is less useful than previously.
- OBE Math 10 results suggest that students think math is less useful than previously.
- OBE Math 13 results suggest that some students believe math is more useful and they appear to like it slightly more than previously.
- Grade 7-10 students appear to think math is not an easy subject.

Table 6

Mean Scores for Attitudes Toward Mathematics on the *School Subjects Attitude Scales*

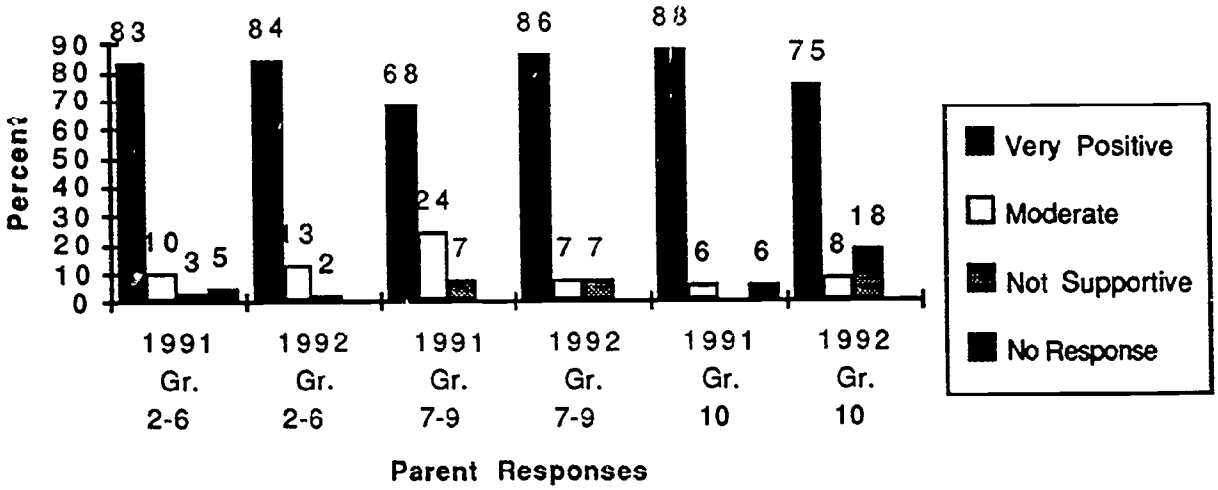
Attitudes In Mathematics	District 1990	District 1991	District 1992	Pre OBE 1990	OBE 1991	OBE 1992
Gr. 5/6	(N=366)	(N=383)	(N=432)	(N=84)	(N=97)	(N=102)
Evaluation	27.5	26.6	27.6	21.3	27.6	28.5
Usefulness	33.9	33.8	33.8	32.3	33.6	35.0
Difficulty	26.3	25.3	26.3	24.6	26.8	27.1
Gr. 7-9	(N=434)	(N=522)	(N=461)	(N=183)	(N=243)	(N=229)
Evaluation	23.9	22.7	29.5	24.4	24.1	24.6
Usefulness	32.9	32.3	34.1	34.4	33.1	31.8
Difficulty	22.0	23.1	22.9	21.4	21.4	21.9
Math 10				(N=102)	(N=65)	(N=80)
Evaluation				23.9	20.2	21.4
Usefulness				34.5	31.5	26.9
Difficulty				19.7	20.5	18.1
Math 13				(N=37)	(N=44)	(N=27)
Evaluation				21.7	25.0	23.1
Usefulness				28.6	33.3	28.9
Difficulty				23.6	23.0	21.8

Note. A mean score of 24 represents a neutral score; a mean above 24 represents a positive feeling toward a subject; one below 24 represents a negative attitude.

Parent Support for the OBE Process

Parent support for the Outcomes-Based Education process increased at the grade 2 to 9 levels in the second year of implementation. There was a decrease of support at the grade 10 level. The responses are graphed below.

Percentage of Parents Indicating Support for the OBE Process



Generally, parent support for the OBE process was very positive. A significant increase in support occurred at the junior high levels. A decrease was evidenced at the grade 10 level. At a meeting with parents of grade 10 students, parents indicated they were supportive of the philosophy and principles of OBE but they believed that our "time to learn" principle was not appropriately adhered to through the semester system. This constraint had also been noted by teachers. It was hoped that technological systems would support and improve time to learn practices. An integrated learning system project is currently being implemented by the district to serve as an instructional resource for teachers.

Stakeholder Perceptions Regarding Strengths of the OBE Approach

Parent Perceptions

A summary of the parent comments received through the survey indicates the following strengths of the OBE process:

- High standards for achievement.
- High expectations for students to work at it and perform well.
- The process builds self-esteem and confidence.
- Second chances are realistic.
- Promotes a solid understanding for math.
- High demonstration of teacher support for student success.
- The clear reporting system.
- Provides clear feedback to students.

Student Perceptions

Student comments in support of the OBE process included the following: (All comments were provided through surveys. Comments received through random interviews were similar to the written comments.)

Grades 3-6

- OBE is less confusing and easier.
- Second chances help to improve math skills.
- Students appreciate good marks.
- Students appreciate the time to learn.
- Less chance of parent being angry.
- Useful to get a job.
- It provides a challenge.
- It's fun.

Grades 7-9

- More is learned and remembered.
- It's easier than previously.
- Students appreciate getting high marks.
- Allows students to learn from mistakes.
- Students can move ahead.
- Opportunities to go back and get a better understanding about a concept are appreciated.
- Students feel they actually learn rather than get passed.
- Extra help available.
- Helps students become more responsible.
- Will provide opportunity to get a good job and be proud of self.

Grade 10

- Opportunity to learn from mistakes.
- Encourages independent work.
- Makes students work harder.
- The process is easier and students are confident about passing.
- Better learning occurs. Students realize they have to know the work.
- Students realize that "cheating won't get me anywhere".
- Increases understanding in math even after tests have been written.
- Less tension on when you write a test.
- Ensures that work is done.
- Provides opportunities for students to learn the material better.
- OBE Math is no longer a difficult subject to grasp.

Teacher Perceptions

All teachers indicated a consistent use of the following instructional practices in their classrooms:

- Clear instruction by outcome
- Grading and record keeping by outcome
- Mastery expectations
- More than one chance for students to learn
- Reteaching of an outcome in a new way when students do not master a concept the first time.
- Use of a "qualifier" for students to demonstrate success prior to reassessment on outcomes.

Teachers generally felt that the local team sharing meetings were helpful in sharing ideas and concerns. One teacher indicated, "These (planning days) give you a chance to talk with others regarding the process." One teacher felt the "time resource is what we need more of (at least continue to have as we do now)."

Teachers felt the district and the school had provided adequate support for resources and training to assist in the implementation of the OBE process. One teacher responded, "most definitely, but the need will still be there for a few more years yet!"

Stakeholder Perceptions Regarding Weaknesses of the OBE Approach

Parent Perceptions

A summary of the parent comments received in the survey returns indicates the following weaknesses of the OBE process:

- Students who move to non-OBE classes do not necessarily perform well in those classes even with having had time in the OBE process.
- Second chances are not realistic.
- Students get behind and drop the subject.
- Material adequacy may not be as important as skill mastery in each outcome.
- Opportunity to "goof off" and not try hard the first time.
- Semester system goes too fast - too easy to stock-pile outcomes.
-

Student Perceptions

Grades 3-6

- It's a bother, sports activities may be missed.
- Teachers expect too much.
- The process continues even when students are not finished.

Grades 7-9

- Students can get behind.
- Second chances are not realistic.
- Fear of going to a school that might not have OBE.
- Allows students to be lazy.
- Too many outcomes in a year.
- Having to redo outcomes is not fair.

Grade 10

- Students feel rushed but like the second chances.
- It's demanding, given the work in other subjects as well.
- 80% expectation is too high.

Teacher Perceptions

Some concerns expressed by teachers included the following:

- How to improve student responsibility and higher level thinking skills.
- The need to show students how math is used in the day to day world.
- How to deal with the OBE principles within a semestered system.
- How to encourage student talent in all areas.

Unanticipated Results

The Alberta Chamber of Resources, in partnership with Alberta Education, provided a summary of educational comparisons in the document *International Comparisons in Education - Curriculum, Values and Lessons*. A description of the OBE process was provided as an example of effective instructional methodology.

The Toronto *Globe and Mail* carried a story on the OBE process in April of 1992. We received approximately 145 requests from teachers, administrators, superintendents, parents and community agencies across Canada. This indicated that stakeholders are keenly interested in an educational improvement process with a focus on student outcomes.

In September (1992) CBC's *The National* reported on the OBE process through the educational series "Making the Grade". The report assisted us in seeing the OBE process through an externally objective set of eyes.

Alberta Education invited the Fort McMurray Catholic Schools OBE team to develop a monograph in support of continuous learning and results based education. The monograph, entitled *Every Child Can Learn* is in the publishing stage at the time of writing. It includes stories written by teachers, samples of various locally developed resources and practical descriptions of OBE practices. The document incorporates reflective questions, with a focus on OBE principles, to guide staff or improvement team discussions. Chapters in the document include:

Developing the Vision: Clarifying our Beliefs About Teaching and Learning
What Constitutes Learning Success for Each Child?
Contexts for Learning
Identifying Learner Strengths in Planning Next Steps
Instructional Practices Which Promote Continuous Learning
Assessing Learning Progress
Reporting Learning Growth
Home and School Connections, and
Stories by Teachers

The monograph is available through the Learning Resources Distributing Centre, Edmonton, Alberta.

Chapter Six

Summary and Implications

The OBE project is summarized is this final chapter. Jurisdictions are welcome to review the processes, use what is of significant value and improve on what we have done.

Summary

Rationale

The Fort McMurray Catholic Schools welcomed an invitation from Alberta Education to collaboratively determine how well our students were achieving essential learning outcomes.

We were interested in collecting data which would allow us to assess the effects of an educational restructuring process. The principles of OBE were well supported in the educational research. The OBE team wished to align its practices with the principles to increase student success. Our hypothesis was: If the OBE principles are separately supported in the research as effective practices, they should produce significant results in student achievement when introduced simultaneously.

The OBE team understood that the OBE restructuring process necessitated a comprehensive transformation of some educational practices, beginning with our vision of student success. Our focus for improvement and data collection was in one subject area since we had been cautioned to "start small". The reason for our initial focus in mathematics was brought about by the superintendent's understanding of results and his vision for improved student demonstrations of student achievement in mathematics.

Purposes

Our project purposes were to implement OBE in two schools and to review the effects of our efforts on student achievement, responsibility and attitudes in mathematics.

To collect the data annually, the OBE team decided to use a variety of qualitative and quantitative measures and data sources to provide a comprehensive picture of student success in the desired outcomes. Our measures included provincial achievement tests, parent, student and teacher surveys, and random interviews.

Conclusions

The quantitative and qualitative evidence strongly suggests that the OBE process is effective in producing positive results in student achievement, responsibility and attitudes in mathematics.

The improved outcomes appear to have been brought about by a collaborative focus on the principles of OBE; namely, designing down from the significant outcomes, maintaining a clear focus on the outcomes, expanded time and opportunity for learning, and high expectations for the success of all students (Spady, 1987).

A summary of our results indicates that:

- More students are achieving at higher levels of performance on teacher developed and external measures.
- There was an increase in the percentage of parents showing support for the process at elementary and junior high levels.
- There were overall gains in parent and student perceptions regarding positive changes in student achievement, responsibility and attitudes.
- Collaboration is critical to the successful implementation of a restructuring or improvement effort.
- The OBE process provides an effective framework for school improvement efforts.

Implications

The findings imply that the OBE process provides a successful framework for the delivery of a variety of effective instructional practices. The results of the OBE practices show improved student achievement, responsibility and attitude outcomes.

Recommendations

For Other Districts

Districts are invited to review the principles of OBE and determine what might be useful in their journey toward improved student outcomes. We hope that jurisdictions will take the best from the lessons we have learned and make adaptations appropriate to their local needs.

Stakeholders may ask, "If OBE promotes student success, why aren't more schools using it?" As a result of the requests for information we have received, it is clear that stakeholders all across Canada are keenly interested in the OBE process. There is clearly a move toward defining what it is we want students to demonstrate in the future and what we can do now to promote student success.

For Alberta Education

Our experiences with OBE have created local ownership of the Minister's *Vision for the Nineties*. We encourage Alberta Education to continue the emphasis on educational improvement by focusing on the significant outcomes and by providing curriculum documents which clearly define the desired outcomes in general and specific learner expectations.

Alberta Education has modeled the collaborative improvement process through the EQI project. We believe the province's collaborative focus on outcomes of significance is a positive one. Local indicators provide a picture of the general well-being of education in classrooms and schools. The use of a variety of indicators can provide a significant and rich source of information from which teachers and administrators can make informed decisions regarding educational improvement.

One of our limitations was the absence of reliable and valid mathematics achievement measures which would have allowed us to track student learning progress in the higher level thinking skills. Our project would have benefited from provincially developed performance-based measures to assist us in this process.

Follow-Up

The EQI/OBE pilot project officially concluded but the teachers involved in the project see the need for a long-term improvement vision. They are committed to the continuation and improvement of the OBE process.

Teacher Improvement Suggestions

Some of the proposed changes resulting from teacher discussions as they reviewed the indicators and experiences included the following:

- Greater encouragement for students to move beyond regular calendar defined "grade" levels.
- Continuation of the design down work.
- Across level resource availability in each classroom to promote learning beyond designated grade level.
- Greater integration of higher level thinking opportunities through instruction and assessments.
- Technological support for continuous reporting.
- Continued collaborative efforts in planning.

Parent and Student Improvement Suggestions

- Teacher training emphasis in motivation techniques for today's generation.
- Expand the program to grades 11 and 12, to other subjects and schools.
- Track the number of retakes.
- Choices regarding participation in the process.
- Fun math and role playing e.g. banker, farmer, stock market, etc.
- More time in class to complete outcomes.
- Slow down the process.
- Greater emphasis on homework.
- Change the standard to 90%; change the standard to 70%
- Eliminate deadlines for demonstrations of outcomes.
- Have fewer outcomes.

Other District OBE Support Strategies

District support for the continued implementation of the indicators project included a comprehensive and collaborative strategic planning effort with a focus on student success. The process had wide representation from key stakeholder groups and is expected to significantly impact education in the Fort McMurray Catholic Schools. Emphasis will be placed on developing instructional strategies and data collection procedures in the following outcomes of significance:

- Mastery of Program of Studies outcomes
- Catholic Christian service and witness
- Problem solving and decision making
- Critical and creative thinking
- Learning to learn
- Positive attitudes/behaviors, responsibility, adaptability
- Effective communication
- Cooperation
- Continuing to learn
- Self-esteem

Principals are currently meeting to identify the attributes which they would expect students to demonstrate in each of these outcomes of significance. Some administrators have begun to meet with staffs to identify the attributes and to align curriculum and instruction with these outcomes. In some classes, students have begun to define these outcomes and have listed what they believe are significant behaviors which would demonstrate success in the outcomes. Student ownership of the outcomes is critical to their success.

Approximately 200 letters were sent to local businesses recently to invite employer input regarding characteristics which would be expected of employees at the workplace in each of the significant outcomes. Similar letters have been mailed to approximately 100 parents, asking for their view of what student success looks like in these outcomes. The responses from both groups will be summarized and will serve as valuable source of information for our schools.

A collaborative review of current indicators and needs related to the outcomes is occurring through School Improvement Teams. These teams are comprised of parents, administrators, teachers and students. Based on their assessment of current results and needs, the teams will collaboratively plan improvement strategies to enhance student success.

School Management Plans will be focused on the improvement of delivery and results in these outcomes of significance. The management plans are developed annually by administrators and teachers at each school.

Concluding Statement

Outcome-based education is a school improvement and restructuring process; it is not a program. Collaborative teacher efforts are critical to the effectiveness of an improvement process in any school or district. Each teaching team may implement the process in slightly different ways but the questions all teams must continuously ask are:

1. Are students learning what we believe is important to learn?

2. What evidence do we accept that students are demonstrating success in the outcomes of significance?

3. Based on our understanding of results, what can we do to improve the instructional conditions so students learn and progress continuously?

The premises and principles of OBE have provided the foundation for the collaborative improvement process over the last three years. The indicators strongly imply that the outcome-based process implemented within a collaborative environment has produced positive changes in student achievement, responsibility and attitudes.

In our view, the OBE process is a very positive way to promote greater student success. We believe that many of our students will be better able to cope academically in high school because they have arrived from elementary school better prepared. We also believe the OBE process will better prepare our students for success after they leave our schools because they have demonstrated greater success in the outcomes of significance.

References

Alberta Chamber of Resources. (1992). *International Comparisons in Education - Curriculum, Values and Lessons*. Edmonton: Alberta Education.

Alkin, M. C. (1988). National Quality Indicators: A World View. *Studies in Educational Evaluation, 14*, 11-24.

Block, J. H., Efthim, H. E. and Burns, R. B. (1989). *Building Effective Mastery Learning Schools*. New York: Longman.

Bloom, B. (1984) The Search for Methods of Group Instruction as Effective as One-to-One Tutoring. *Educational Leadership*, May 1984, 4-17.

Champlin, J. (1990). *Reaching for the Best - the Outcomes Driven Developmental Model Makes it Possible*. Notes on a speech delivered at the annual Outcome-Based Educational Conference, Phoenix, Arizona.

David, J. L. (1987). *Improving Education with Locally Developed Indicators*. The RAND Corporation, New Jersey.

Fort McMurray Catholic Schools. (1992). *Every Child Can Learn: Accommodating Differences in Elementary School*. Edmonton: Curriculum Branch, Alberta Education.

Fort McMurray Catholic Schools. (1992). *Strategic Planning Initiative*, Western Management Consultants, Alberta.

Fraser, B. J., Walberg, H. J., Welch, W. W. and Hattie, J. A. (1987). Syntheses of Educational Productivity Research. *International Journal of Educational Research, 11*, 145-252.

Guskey, T. R. (1984). The Contribution of Mastery Learning. *Outcomes, 4*, 1-10.

Guskey, T. R. (1988). Mastery Learning and Mastery Teaching: How They Complement Each Other. Adapted from a presentation at the 1988 annual meeting of the American Educational Research Association. *Principal*, 6-8.

Guskey, T. R. and Gates, S. L. (1986). Synthesis of Research on the Effects of Mastery Learning in Elementary and Secondary Classrooms. *Educational Leadership, 33*, 73-80.

Hathaway, W. A. (1989). *Education and Technology at the Crossroads: Choosing a New Direction*. Edmonton: Alberta Education.

Hymel, G. M. (1988). *A Macromodel of Effective, Outcome-Based, Mastery Learning Variables: An Expanded View*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Lezotte, L. and Jacoby, B. C. (1990). *A Guide to the School Improvement Process based on Effective Schools Research.* Michigan.

Lezotte, L. (1991). *Correlates of Effective Schools: The First and Second Generation*, Effective Schools Products, Okemos, MI.

McEwen, N. and Zatko, G. (1989). *Educational Quality Indicators: Framework for Action.* Alberta Education: Government of Alberta. Paper presented at the annual meeting of the Canadian Educational Researchers' Association, Quebec City.

Northwest Regional Educational Laboratory. (1990). *Effective Schooling Practices: A Research Synthesis 1990 Update*, Oregon.

Nyberg, V.R. and Clarke, S.C.T. (1983). *School Subjects Attitude Scales.* Edmonton: Planning Services Branch, Alberta Education.

Oakes, J. (1986). Keeping Track, Part 2: Curriculum Inequality and School Reform. *Phi Delta Kappan, 68*, 148-154.

Office of Educational Research and Improvement, (1988). *Creating Responsible and Responsive Accountability Systems.* U.S. Department of Education.

Ontario Institute for Studies in Education. (1988-89). The Maturation of Educational Measurement. *e+m newsletter* 45, 1-7.

Radwanski, G. (1987). *Ontario Study of the Relevance of Education, and the Issue of Dropouts.* Toronto: Ontario Ministry of Education.

Rogers, S. and the Glendale OBI Team. (1989). Outcome-Based Education Operationalized in the Classroom: The Glendale Outcome-Based Instructional Model, *Outcomes, 8(1)*, 21-27.

Rowe, L. A. (1985). *The Outcomes-Driven Developmental Model (ODDM): A Program Designed to Accomplish Comprehensive School Improvement, K-8.* Johnson City Central Schools, New York.

Rubin, S. E., and Spady, W. G. (1984). Achieving Excellence Through Outcome-Based Instructional Delivery. *Educational Leadership*, May 1984, 37-44.

Siba, S. (1986). The Excellent Education System for One and a Half Million Children. *Programmed Learning and Educational Technology, 4*, 306-330.

Slavin R.E. (1987). Mastery Learning Reconsidered. *Review of Educational Research*, 57, 175-213.

Spady, W. G. (1987). On Grades, Grading and School Reform. *Outcomes*, Winter, 31-36.

Spady, W. G. (1988). Organizing for Results: The Basis of Authentic Restructuring and Reform. *Educational Leadership*, 46.

Spady, W. G., (1989). Key Messages From the High Success Program on OBE: Part I, *Outcomes*, *8(1)*, 15-19.

Spady, W. G., (1989). Key Messages From the High Success Program: Part II, *Outcomes*, *8(2)*, 18-23.

Spady, W. G., Filby, Nikola F. and Burns, Robert (1986). *Outcome-Based Education: A Summary of Essential Features and Major Implications*. Far West Laboratory.

Spady, W. G. and Marshall, Kit J. (1991). Beyond Traditional Outcome-Based Education. *Educational Leadership*, October, 67-72.

United States Office of Education. (1987). *What Works: Research About Teaching and Learning*. Second Edition. Federal Government.

Appendix A

Tables

Table 7

Percentage of Grade 10 Students Achieving Different Results

Level of Achievement	Pre-OBE 1990	OBE 1991	OBE 1992
Math 10	**(N=158)**	**(N=154)**	**(N=174)**
80% or higher	15	83	69
50-79%	59	0	0
Incomplete*	0	1	0
No Credit	26	17	31
Math 13	**(N=110)**	**(N=89)**	**(N=86)**
80% or higher	5	81	74
50-79%	58	0	0
Incomplete*	0	1	0
No Credit	37	18	26

**Incomplete means students may complete the course outcomes during the summer.
Source: Teacher developed tests Fort McMurray Catholic, 1990-91.

Table 8

Percentage of Grade 3, 6 and 9 Students Achieving Standards* on the Total Provincial Achievement Tests

Achievement	N**	Acceptable Standard			Standard of Excellence		
	OBE	OBE	District	Province	OBE	District	Province
Grade 3 Math							
1990	53	98.1	96.0	91.8	49.1	34.8	26.9
1991	47	97.7	N/A	N/A	69.8	N/A	N/A
1992	50	100	N/A	N/A	60.0	N/A	N/A
Grade 3 Science							
1991	47	97.8	84.1	78.9	28.9	23.7	16.6
Grade 6 Math							
1991	40	75.0	74.0	75.5	4.8	16.3	20.6
1992	47	79.0	N/A	N/A	32.0	N/A	N/A
Grade 9 Math							
1992	80	60.0	57.8	67.4	2.5	5.2	8.9

Source: Alberta Education Achievement Test Results

*85% of students are expected to achieve the acceptable standard or higher; 15% are expected to achieve the standard of excellence.

** Grade 3 (1990) District N = 253
Province N = 33,349
Grade 6 (1991) District N = 123
Province N = 31,930
Grade 9 (1992) District N = 232
Province N = 27,888

Table 9

Percentage of Parents Indicating Support for OBE

	1991 (N=40)	1992 (N=82)
Grade 2-6		
Very Positive Support	83	84
Moderately Supportive	10	13
Not Supportive	3	2
No Response	5	0
Grade 7-9	(N=41)	(N=28)
Very Positive Support	68	86
Moderately Supportive	24	7
Not Supportive	7	7
Grade 10	(N=17)	(N=40)
Very Positive Support	88	75
Moderately Supportive	6	8
Not Supportive	0	18
Not Applicable	6	0

Source: Stakeholder Surveys, Fort McMurray Catholic Schools
Note. Percentages may not total 100 due to rounding.
Total number of parents responding was 248. (1991 = 98 or 15.2%, Grades 3-10, 1992 = 150 or 19%, Grades 2-10.)

Table 10

Percentage of Stakeholders Indicating Positive Changes in Outcomes

Student Outcomes	Students		Teachers		Parents	
	1991 (N=426)	1992 (N=492)	1991 (N=10)	1992 (N=10)	1991 (N=98)	1992 (N=52)
Achievement	92.6	93.2	100	80	82.3	90.5
Responsibility	89.3	92.7	100	80	82.6	95.3
Attitudes	86.0	89.3	100	80	80.6	90.2

Source: Stakeholder Surveys, Fort McMurray Catholic Schools

Appendix B

Summary of Stakeholder Responses
June, 1992

Parent Perceptions Regarding the OBE Process

Parent Comments (General)

- I believe (OBE) sets a high standard for the students and if they work at it, can acquire good grades. (It) requires constant motivation from student to attain high standards.
- The grade school and junior high education programs do not adequately prepare students for the high success process.
- The High Success process can be very beneficial to those who use it to the best of their ability. It builds self-esteem and confidence.

Parent Comments (Pro)

- This program has been very positive for my child and has contributed to her success in math.
- I feel my son could not have done as well without it (OBE).
- You're doing an excellent job. Keep up the good work.
- I appreciate the calls from the teacher.
- We believe in the full potential development of our child and this program aims for high success. Our personal thanks to the teachers who devote their time for this project.
- I think it is excellent that the students get another chance. Mainly because 1) everyone deserves a second chance because it could just be a bad day for them. 2) because it helps them to learn by repetition and lets them feel that they can do it.
- ...I feel strongly that the OBE math program at St. Gabriel's is very effective...my younger child has solid understanding of the math he has learned up to this point. I'm sure he'll succeed. The school and teachers are to be commended for their efforts. It's reassuring to know they have the vision to realize that all jobs will require excellent math/science skills, not just a 50% ability.
- This year I have come to realize the impact of the teacher on OBE. I love OBE and what it's done to give our sons a better grounding in math skills and opportunities to learn at their own pace.
- My son has really benefited from this program. When he moves to the next unit, I know he has mastered the prior units.
- I know the program is a good one. I know it works and we support it. After the information session I probably understood all the steps that are required to achieve the 80% mark. But, if I get a phone call from the math teacher trying to explain a problem with our student, and uses the "language" to explain, I'm sorry but I get lost! Again, thanks for the extra efforts the teachers put in. We sincerely appreciate it!
- (Child's) past performance in school and how well he is doing with the high success now just proves even more to us (parents) that we have caught on

to something that not only works but out shines by far the past (20 years) teaching methods.

- I love the report card...I can clearly see where (child) needs to improve...I love the boost to self-esteem that comes when a student can say "I can do it!" (Child) continues to gain confidence in math.

Parent Comments (Con)

- Students who do well in the OBE program do poorly again when they go to regular teaching. Don't understand that because when my oldest son took it last year he said he finally understood math and now he's nearly failed grade 11.
- Where in the real world of work are we given many chances to succeed? Sometimes I get the impression that students are not taking enough initiative to do well the first time and teachers are overburdened with test-making and running after students to have them do a retest. I really don't feel it is the teacher's responsibility to have each child achieve 80%.
- We think that the program doesn't work at all. It only allows children to get behind and when they realize how much behind they are, they drop the subject. We don't see any wrong with a kid getting 75-79% instead of 80%.
- There appears to be a lack of instant recall of basic multiplication tables.
- High success is fine as long as the child understands math concepts but if he doesn't it becomes frustrating as he is left behind while class moves on. Is the school prepared to pay for summer school classes because (a) child is not getting help he needs in class?
- OBE is a good method to track progress of outcomes and feedback results to parents. I am concerned that OBE is more concerned about a process to ensure skill level has been reached in each step of the unit being learned, and is less considerate of the adequacy of the material. The result I believe is a less challenging math program that may not serve the needs of the child in future.
- This system promotes negative attitudes. Children are given the impression that it is okay to "goof off" and to rewrite again and again. This is not acceptable as children do not do their best.

Some questions parents still had included the following:

- Will this type of class continue in grade 11, I hope so?
- Why hasn't the program been extended beyond grade 10?
- I question whether this teaches students responsibility and consequences.
- Will the program last only as long as there are staff supporting it or as long as the government enforces it?
- What happens if a student fails math at the end of the year? Is it possible for a student to opt out of this program? What happens if a student cannot achieve any high school math credits. What is the fundamental purpose of this school having this program?
- Time allotted for completion and understanding of each concept.

Suggestions provided by parents included:

- Specific teachers' training emphasizing motivation techniques for today's generation.
- Make sure the program is run for no other reason except for the good and benefit of our children! Do not use this as a means to enhance the image of the school board.
- I suggest to do the same program for grade 11 and 12.
- I would like to receive a detailed report of outcomes completed and the number of retakes...I would like to see more courses offered using this method.
- A detailed layout of the positive and negative aspects of this program should be presented.
- I suggest class discipline be improved upon before students are expected to return...for incomplete work.
- Choice about whether or not a family wishes to participate. Children self-evaluating and assessing whether or not they wish to rewrite the test according to their abilities, not 80% blanket by teachers. Semester goes too fast - too easy to stock-pile outcomes...there is no time to go back to incomplete outcomes at a later date - teach math over the year...
- ...emphasis must be placed on study for the first test.
- ..I would personally like to see more of the mechanics of math taught so any math questions could be worked out without the use of a calculator.
- Fun math and role playing to understand mathematics the fun way (as a banker, farmer, stock market, etc.)
- It would be helpful to the children if a lot more subjects were held in this manner.
- Keep it up please and extend it to other subjects. My daughter's confidence has improved drastically.
- Excellent program - communication with both parents and school is a necessity and a must not something to be hoped for. The children will win every time with this program.
- ...I think that we should make it easier and more lively for (students).

Student Perceptions

Student Comments (Grades 3 to 6: Pro)

- (OBE) is not as confusing.
- It is easier for me to learn.
- I like it because it gives us a second chance and also helps to improve our math skills.
- I like it because I would rather have a good mark NOT bad.
- I like it because I like learning harder questions. I like it when they are very hard. I find them challenging.
- I like it because it's a good opportunity to get better.
- I like it because some schools don't give other chances and because you can get a better mark.
- I like math because I like taking time on math.

- I like this process of learning because I get better marks and have a better chance of passing.
- If I get lots wrong I can get a second chance, my mom won't be very mad.
- I like this because I will use this in the near future to get a job.
- I get to learn and go back to the things I did not understand.
- OBE gives me better understanding in what I get wrong.
- Because if we did not have it lots of my friends would probably still be in grade 4 and me.
- Because you learn a lot so you can get into college, get good marks and good jobs, I think you should keep it like this.
- It's quite a challenge but I like it that way.
- I like it because I don't have to stay at the same level as everyone else.
- I like it because I think it's fun.

Student Comments (Grades 3 to 6: Con)

- I don't like it because it is a bother, but I like the opportunity.
- I don't like it because I miss soccer games and I like playing with friends.
- I don't like it because you always move up outcomes when you're not done the other ones. The teachers expect too much.

Suggestions by Students (Grades 3 to 6)

- Better math text book.
- To make the work more interesting so the kids will like to do it.
- Making this program available to more grades.
- I think we should have OBE in every subject.
- Nothing! It's a great program!
- I don't think there's anything else, just to put in more schools.

Student Comments (Grades 7 to 9: Pro)

- It's very important to have OBE because you learn more and not forget about it.
- I like this process of learning so I can be successful when I am older.
- This is very easy, it is a lot easier than not using it.
- It's fun, you can only get 80 or higher in math.
- I like it because you get to improve your mark and it helps you learn from your mistakes.
- It's sometimes hard and sometimes boring.
- It is easier to learn. If you want to get ahead you can.
- It helps me when I fall behind or don't understand I can go on to a new thing and go back when I understand.
- It's simple, straight to the point, self-explanatory and you can do a lot of it quickly.
- I like it because it gives you a chance to actually learn rather than get passed by the rest of the class. Plus you can work at your own pace.
- It is a lot easier and you get more than one chance to improve. You also can get a high mark if you do all your outcomes

- I like the OBE because that way I can get higher marks and if I get an outcome wrong, I can redo to see what I did wrong.
- I like it because then I get great marks and I always know what I'm doing and if I don't, I go for extra help after school.
- Gives you a chance to make sure you know what you're doing.
- It's OK - it helps a person to be more responsible and give them a chance to improve.
- It helps me a lot to understand my math better.
- I can learn something one at a time and still remember everything easily.
- It gives me a chance to really learn instead of just failing it and forgetting it. We really have to learn it.
- I like it because it doesn't rush me.
- I like OBE because you have a better chance to do better. Also you get to go ahead and go at your own pace. I really enjoyed math this year. (I usually hate math! But not this year.)
- I like it because it's fun and you need math in your life.
- Because I can get a good job and I would be proud of myself.

Student Comments (Grades 7 to 9: Con)

- I can't get anything done in the math class.
- I don't really like it because you get behind very easily. We do way too much way too fast.
- Because it doesn't give us a fair chance at the real world because in real life we don't get more chances. If we go to a school that doesn't have OBE we will have a hard time because we are used to OBE.
- It teaches you laziness and the methods of "scamming" your teachers. You may get an outcome right, but on the cumulative exam, my mark drops significantly.
- People are going at different paces, nobody learns together and it goes by too fast (units) for me to learn anything.
- It's hard to finish all the outcomes before the end of the year.
- Give us more time in class to get our outcomes done.
- It sometimes is not as fair because if you get a few wrong on one outcome I have to redo it.

Suggestions by Students (Grades 7 to 9)

- Let us do our outcomes more often in class.
- Should slow down with the teachers. We had 3 already.
- Get books set to this process. It's sometimes hard to find the right information.
- Why mess with perfection!
- There isn't enough stress put on doing your homework.
- Don't have so many tests. Once a week is too much. Hard to keep up.
- If work isn't done, test shouldn't be allowed to be written.
- Slow it down. Not to go so fast.
- Returning to the old system because in university, we don't get second chances.
- Don't have OBE. It keeps students behind. We go to school to do work in school not after school.

- No suggestions. I like it the way it is.
- Less outcomes, more time to complete.
- I don't think it really needs any improvement.
- Should be given material on your own and get help if you need it.
- Make it so that you have to have 90 percent or over.
- I think that we should go back to the normal way (like in elementary). It's easier to learn that way.
- The process of OBE is OK but I think it would be easier to do OBE if we can get a mark of 70%, 80%, 90% or 100%.
- No OBE.
- I think you should get the mark you get first of all...
- I think we should have two teachers.
- We should have after school sessions more often.
- You should get all the chances you want, and you should be able to ask for help during the test.

Student Comments (Grade 10: Pro)

- It's good because you get chances if your work is wrong but I find it stressful because you're expected to get so many questions right.
- I like it because it is easy and brings you to work by yourself.
- I like this process because it makes us work harder.
- It is a lot easier and you will pass math. You get more chances to pass the tests.
- I learn better. It's easier to receive high marks.
- This process of outcome-based (education) enables you to learn and gives you chances to get better marks and better understanding even after you write the test.
- I find it really hard to keep up with all the work in Math 10 but Math 13 is pretty easy.
- I like it because there is less tension on you when you write a test.
- I like it because it gives me a chance to receive a better grade.
- It's good when you show up, but when you get behind it's not that great.
- I like it.
- It makes sure that my work is done.
- It guarantees me a good mark and I have to learn and know the work. Cheating won't get me anywhere.
- You work hard; you get a good mark. You don't work hard; you don't get a good mark.
- It's difficult sometimes and frustrating, but I also think it's an advantage for us to learn the material better.
- For me, math is a difficult subject to grasp. With the OBE, math is no longer a problem. It makes it easier for me to learn math.

Student Comments (Grade 10: Con)

- I like it because I get 2 other chances to get a mark. Only thing I don't like is that everything is rushed.
- It is kind of fast, it takes a lot to keep up...

- It is too demanding for me because I have a lot more work to do in my other subjects.
- I am so far behind I don't think I can improve.
- It's not good because if we get under 80% but still over 50% (which is a pass technically) we are made to feel that we are not smart because we have to do it again.
- I don't like this process because you have to come in after school to work on tests and it's too fast. I like it because you can't get a mark under 80.
- More makeup time in class. Not as many outcomes per test. Better explanation of formulas.

Suggestions by Students (Grade 10)

- Don't have deadlines for outcomes. People should have their outcomes done when they are ready and they know the work.
- Don't have it at all or have a choice if you want the program or not.
- Less units per math course.
- I like it the way it is.
- I think we should have more learning time.
- Allow more class time to do outcomes.
- Not as many outcomes for the amount of time we have to learn it. One test a week is too much.
- The Math 10 course is too fast to have all of those (reinforcements).
- It should be 70% and up.
- The process is OK, it just needs improvement.
- Use it in grade 11 and 12.
- I think we should go back to the old way of learning math.
- No suggestions.
- Take away the deadlines.
- Go through the program, maybe a little slower.

Teacher Perceptions

Teacher Comments (Pro)

- All teachers indicated a consistent use of the following instructional practices in their classrooms:
  -Clear instruction by outcome
  -Grading and record keeping by outcome
  -Mastery expectations
  -More than one chance for students to learn
  -Reteaching of an outcome in a new way when students do not master a concept the first time.
  -Use of a "qualifier" for students to demonstrate success prior to reassessment on outcomes.

- Teachers generally felt that the local team sharing meetings were helpful in sharing ideas and concerns. One teacher indicated, "These (planning days) give you a chance to talk with others regarding the process." One teacher felt the "time resource is what we need more of (at least continue to have as we do now)."

- Teachers felt the district and the school had provided adequate support for resources and training to assist in the implementation of the OBE process. One teacher responded, "most definitely, but the need will still be there for a few more years yet!"

Teacher Comments (Con)

- The lowest survey rating, given by 33% of the teachers, was in the area of enrichment activities for students. All of these teachers felt there was little time to pursue enrichment activities in the process.
- The marks have improved (even from first and second semester); however there still needs to be an improvement made in the responsibility and problem solving skills being displayed by the students.
- We need to work towards the students helping themselves through peer tutoring, computers and so on.
- (Regarding the outcomes of achievement, responsibility, positive attitudes and decision making/problem solving) I believe we still have a ways to go in all of the above areas. Students are not feeling as good about mathematics to the extent that I believe they should. We need to show them how math is used in the day to day world. Right now we don't have time for it. Students need to develop more responsibility for their work. I think we have improved on decision making and to some extent, problem solving. Students are making the decisions to come in more, work harder the first time and have been dealing with the problem of budgeting their time. We are still dealing with a program within the semester system. Only the strong will survive. Students that are weak (those that should be in Math 13) will not.
- We need effective methods for dealing with students who refuse to cooperate with the OBE process.
- The key elements for success: 1) regular attendance 2) good work habits. Students who are regular attenders and who have good work habits will succeed. Most of these students will succeed in Math 10, 20, 30 and can do well. Some will not succeed without spending mega amounts of time on their math. If a student has to spend too much time on math, then their other subjects suffer and their social life suffers, too. Then you have to ask if they need Math 30. If they have talents in areas totally unrelated to math then they should be encouraged to develop their talents and take the Math 13, 23, 33. This should happen in grade 10 and not in grade 12 when it is too late to change things. This is also where the counseling aspect should come in.

Appendix C

Teacher Made Test Sample

MATH 10 UNIT 6 FORM X

Solve each equation and check your answers.

1. $y^2 - 5y - 24 = 0$
2. $x^3 = 81x$
3. $m^2 - 2m = 15$
4. $m^3 - 3m^2 - 10m = 0$
5. $3x^2 + 9x = 0$
6. $x^2(x - 7) - 9(x - 7) = 0$
7. $\frac{x^2}{6} = x - \frac{3}{2}$
8. $\frac{x^2}{5} + \frac{11x}{10} + \frac{1}{2} = 0$
9. $x^4 - 13x + 36 = 0$
10. $x^4 - 8x^2 + 16 = 0$

Solve each word problem and check your answer.

11. Two numbers have a sum of 15 and their product is 56. Find the numbers.
12. Two numbers differ by 4 and the sum of their squares is 106. Find the numbers.
13. The sum of the squares of two consecutive even integers is 52. Find the numbers.
14. The length of a rectangle is 4 cm more than twice the width. If the area is 70 cm^2, find the dimensions.
15. The perimeter of a right triangle is 48 m. If the length of the hypotenuse is 20 m, find the lengths of the other two sides.

Simplify the rational algebraic expressions and give the restrictions.

16. $\frac{x - 4}{x^2 - 16}$
17. $\frac{6m + 6n}{8m + 8n}$
18. $\frac{5x + 10}{x^2 + 4x + 4}$
19. $\frac{3y^2 + 15y - 18}{2y^2 - 4y + 2}$
20. $\frac{3x^2 - 9x - 30}{9x^2 - 63x + 90}$

DISTRIBUTED PRACTICE

Simplify each of the following.

21. $\dfrac{(-10x^2y^3)(6xy^4)}{4x^2y^2}$

22. $\dfrac{64x^5y - 16x^3y^2 + 4xy}{4xy}$

Factor Completely.

23. $x^4 - 25x^2 + 144$

24. $12x^2 - 33x + 18$

Solve and check

25. $\dfrac{4y}{3} = \dfrac{y}{2} + 45$

Appendix D

Stakeholder Survey Forms

FORT MCMURRAY CATHOLIC SCHOOLS
HIGH SUCCESS MATH PROGRAM
TEACHER / ADMINISTRATION SURVEY

PLEASE IDENTIFY YOURSELF BY CHECKING THE APPROPRIATE CATEGORY: TEACHER _____ ADMINISTRATOR_____

Instructions: Please circle your response regarding the identified topics according to the following rating scale:

RATING SCALE

Not at all	A Little	Moderately	Quite a Lot	Very
1	2	3	4	5

If additional space is required for comments, please feel free to attach a sheet to this response form.

HIGH SUCCESS/OBI TEAM PLANNING SESSIONS

1. The local Team Sharing meetings have been helpful in sharing ideas and concerns regarding the High Success process. (If you have not attended any meetings, please check here and do not rate _____) 1 2 3 4 5

2. The local Planning sessions have been helpful in developing strategies for use in the classroom. (Preps, Day Sessions) If not, please explain_____ 1 2 3 4 5

_____

Comments: _____

_____

_____

HIGH SUCCESS IMPLEMENTATION

1. I have used the following High Success strategies in my classroom: (Administrators: please identify whether these have been observed in use:)

Clear instruction by Outcome	1 2 3 4 5
Grading and Record Keeping by Outcome	1 2 3 4 5
Mastery Expectations	1 2 3 4 5
Second Chances for Students to Learn (When they need it)	1 2 3 4 5

Reteaching of an outcome in a new way when students do not master it the first time	1 2 3 4 5
Use of "qualifier" for student to demonstrate success prior to reassessment	1 2 3 4 5
Enrichment activities	1 2 3 4 5

Comments_____

RESOURCES

1. I am in need of additional resources for High Success programming. 1 2 3 4 5

Please explain:_____

2. The district has provided adequate support for resources and training to assist in the implementation of the High Success process. 1 2 3 4 5

3. My school has provided adequate support for training to assist in the implementation of the High Success process. 1 2 3 4 5

Comments:_____

STUDENT ACHIEVEMENT

1. Students in my class have shown a marked increase in the following outcomes of significance: (Administrators: please identify your perception of achievement overall in the OBE Math classes.)

Academic Achievement (Math)	1 2 3 4 5
Responsibility	1 2 3 4 5
Positive/Caring/Confident Attitudes	1 2 3 4 5
Decision Making/Problem Solving Ability	1 2 3 4 5

Comments:_____

FORT MCMURRAY CATHOLIC SCHOOLS
HIGH SUCCESS MATH PROGRAM
PARENT SURVEY

RESPONSE SCALE

Not at all	A Little	Moderately	Quite	Very
1	2	3	4	5

1. I am aware of the High Success process in my child's class. 1 2 3 4 5

   Awareness was provided through: _____

   _____

   _____

2. I am supportive of the High Success process at my child's school. 1 2 3 4 5

   Reasons: _____

   _____

   _____

   _____

3. My child has shown an increase in:
   - Student Achievement 1 2 3 4 5
   - Responsibility 1 2 3 4 5
   - Positive/Caring/Confident Attitudes 1 2 3 4 5
   - Decision Making/Problem Solving Ability 1 2 3 4 5

   Specific Examples: _____

   _____

   _____

   _____

   _____

4. Suggestions or comments:

   _____

   _____

   _____

   _____

FORT MCMURRAY CATHOLIC SCHOOLS
HIGH SUCCESS MATH PROGRAM
STUDENT SURVEY

RESPONSE SCALE

Not at all	A Little	Moderately	Quite	Very
1	2	3	4	5

1. My teacher uses the Outcome-Based (OBE/High Success) in my Math class. 1 2 3 4 5

2. I like this process learning> 1 2 3 4 5

   Reasons: _____

   _____

   _____

   _____

   _____

3. I have shown a positive increase in the following areas because of the OBE/High Success process in Math:

   Achievement in Math 1 2 3 4 5

   Responsibility 1 2 3 4 5

   Positive/Caring/Confident Attitudes 1 2 3 4 5

   Decision Making/Problem Solving Ability 1 2 3 4 5

4. I have taken advantage of extra help provided by my Math teacher on the after school study hall when I had an incomplete on an outcome 1 2 3 4 5

5. Suggestions for improvement of the process:

   _____

   _____

   _____


Alberta
EDUCATION