A REVIEW OF THE K-12 MATHEMATICS PROGRAM FOR BRIGHTON CENTRAL SCHOOL DISTRICT

Brighton Central School District K-12 Math Committee

Spring 2009

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Executive Summary

As part of an ongoing curriculum review process, the K-12 mathematics program was conducted in order to ensure that curriculum resources and instructional practices are meeting the needs of all learners throughout the district. As this was the first districtwide review that had taken place in a number of years, protocols were designed to inform both the process and the conclusions. This work involved defining, as a district, preferred states of mathematical literacy, determining which types of data would best reflect student progress toward meeting those defined mastery levels, collecting and then subsequently analyzing those data for trends. The following summary in no way reflects the comprehensiveness of this review but rather, attempts to highlight some of the key areas which were evaluated.

Student Achievement

Student achievement in the context of mathematical literacy was defined as the ability to understand and become proficient with the skills of mathematics, communicate and reason mathematically and solve problems using appropriate tools and strategies. Analysis of the K-12 data revealed that the students of Brighton Central School District are meeting and exceeding proficiency standards in these areas. District data were compared internally across years, between student performances of similar schools, and when appropriate, to state and national data values. Overall, Brighton students outperformed these comparative groups. Analysis of subgroup populations indicated a need to further attend to and differentiate instructional practices for students with disabilities and those who are not meeting with mathematical success.

Teacher Perceptions

Since the implementation of the current mathematics program, teachers have been afforded multiple professional development opportunities to acquire and hone their knowledge and skills about best practice in mathematics instruction. In addition to workshops and seminars specifically designed for this increased acquisition, Teachers on Special Assignment (TSAs) have been provided by the district to provide ongoing coaching in this area. These opportunities have supported a professional staff throughout the years and enabled each educator to target professional growth needs on an individual basis. Analyses of surveys about pedagogical practice indicated that the teachers believe that the curriculum is engaging and supportive of student skill acquisition but that continued work in the areas of differentiation and assessment is needed.

Parent Perceptions

Parents complete the circle of learning support for every child. To be an effective partner in the learning process, they need to have the knowledge and skills to assist and support their children at each level. Surveys were distributed to the parents of the district and although a very small percentage of parents responded, a proportion of those that did indicated that they would like more information about how to assist their children within the mathematics area.

A REVIEW OF THE K-12 MATHEMATICS PROGRAM FOR BRIGHTON CENTRAL SCHOOL DISTRICT

INTRODUCTION: PURPOSE OF PROGRAM EVALUATION

Program evaluation plays a key role in improving the performance of our schools. As a learning community, Brighton Central School District utilizes a program evaluation process as a means of accessing and organizing information about student achievement and the role current curriculum and instructional practices play in supporting that achievement. The evaluation itself is more than just an audit. As a high performing learning community, it is essential that data are used throughout the program evaluation process to inform the ongoing efforts to improve student learning. It is the intent of this process that data are used to both reveal areas in which current practices are leading to increased student achievement as well as define those areas of future need.

In the current evaluation, the K-12 mathematics program is being conducted in order to ensure that curriculum resources and instructional practices are meeting the needs of all learners throughout the district. In addition, given that this was the first formalized evaluation to take place in many years, the process used to conduct the evaluation has also been documented so that it can inform future evaluations.

HISTORY OF THE MATHEMATICS PROGRAM FOR BRIGHTON CENTRAL SCHOOL

Brighton Central School District has a long history of excellence in mathematics education. Students have typically been very successful in mathematics and many go on to pursue fields in mathematics, engineering and medicine. Never, however, has a systematic review of the mathematics programs K-12 been conducted nor has the district ever systematically collected data and evidence of this "success." In order to establish a context for the current BCSD mathematics program, a brief history of the development of the mathematics program and its relationship to the larger context of mathematics education reform is essential.

The current national mathematics education reform movement began in the mid-1980s "in response to the documented failure of traditional methods of teaching mathematics, to the curriculum changes necessitated by the widespread availability of computing devices, and to a major paradigm shift in the scientific study of mathematics learning" (Battista, 1999). Beginning in 1964 with the First International Mathematics Study, US students have consistently performed poorly in comparison to their counterparts in other areas of the world. This performance has been repeatedly documented in multiple subsequent international studies over the past 50 years. In 1983 the National Commission on Excellence in Education cited "poor performance on tests administered by the NAEP, declining SAT scores, and an increase in remedial courses by colleges, businesses, and the military as evidence of a 'rising tide of mediocrity' in schools in the United States" (Senk and Thompson, 2003). In addition, results of research in cognitive science have provided educators with better understandings of "how students learn". The National Research Council (1989), for example, stated that "Research in learning shows that students actually construct their own understanding based on new experiences that enlarge intellectual frameworks in which ideas can be created. Much of the failure in school mathematics is due to a tradition of teaching that is inappropriate to the way most students learn." These results conclude that people learn better from active engagement and social interaction (see also, for example, NRC 1999, 2000). The National Council of Teachers of Mathematics (NCTM) reacted to this growing body of evidence that

mathematics education in the US needed significant attention and adjustment with the publication of their first set of mathematics standards, the *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989).

The goal behind the original NCTM *Standards* document was to create a new vision of what mathematics was/is important to learn and what mathematics instruction should look like in a K-12 environment. Shortly after the release of this work, the field realized that there were not materials available for districts, schools and teachers to actually enact the true vision of these *Standards*. In the early 1990's the National Science Foundation (NSF) offered grant opportunities for writing curricula that would "put into practice" the recommendations of NCTM's *Standards*. Ultimately, 13 NSF-funded programs were developed: 3 at the elementary level, 5 at the middle level and 5 at the high school level. Each of these programs was developed by a team of mathematicians, higher education and K-12 mathematics educators, and researchers. Each of these programs spent at least four years in development which included piloting, revisions, field testing, more revisions and final publication, all of which took place with actual students in actual classrooms with real teachers providing feedback. Pre-publication versions of the materials became available in the mid-90's.

Brighton educators, due to their involvement in projects at the Warner Graduate School of Education at the University of Rochester, became aware of these programs and the research supporting them in 1997. Through a piloting process, middle school math teachers tried out some of the units from one of these NSF-funded programs, *Connected Mathematics* (Lappan, et al, 1996) and began to see their students engage in mathematical thinking and problem solving in ways that they had not seen before. The district supported developing leaders in this curricular change. Middle school teachers attended conferences, worked with teachers in other districts as well as with the authors of the program. During this time, results of the NYS Math 8 Assessment scores (the only NYS middle school math assessment given at that time) continued to climb and Brighton students outperformed other area districts as teachers became more knowledgeable about the program and instructional implications.

These results, coupled with observational data, provided the district with evidence that these programs could be effective not only in improving students' mathematical knowledge and reasoning skills but also on their performance on high stakes exams. As a result, the district began to explore opportunities for similar changes at the K-5 and 9-12 levels. Collaborations with the Warner School and other districts continued. Ultimately, this continued work led to the adoption of *Investigations in Number, Data, and Space* (Mokros & Russell, 1995), the *Connected Math Project* (CMP) (Lappan, et al, 1996) and *Core-Plus Mathematics* (Coxford, et al, 2003) (*see Appendix A for a complete timeline of implementation).*

In order to be successful, research indicated that math teachers must have ongoing access to high quality professional development that would support their pedagogical needs within the new math curricula (Tarr et al., 2008). The district supported teachers in this journey by providing numerous opportunities for professional development which included attending conferences, working with teachers in other districts, and developing district mathematics leadership expertise in this work.

In 2001, departments were charged with creating a philosophy statement that would guide the implementation of the BCSD mathematics curriculum map. As a result of this work, the following belief statements were written:

- Mathematics can and must be learned by all students. Mathematics education requires high expectations and strong support for all students to be successful and meet their full potential.
- A mathematics curriculum should be coherent and well articulated across the grades. The curriculum should guide students to increasing levels of sophistication and depth of knowledge.
- A mathematics curriculum should support development of thinking and reasoning skills while focused on important mathematical ideas.
- The mathematics curriculum should support the communication of ideas through reading, writing, and discussion.

- Students must learn mathematics with conceptual understanding to enable them to solve the new kinds of problems the rapidly changing world presents.
- Assessment should be an ongoing classroom activity that supports the learning of mathematics and informs instruction.
- Effective teaching requires that the teacher knows and understands mathematics, knows and understands the developmental stages of learners, and knows and employs a variety of instructional strategies.
- Technology should be used in mathematics education as a teaching tool to enhance student learning, but not as a replacement for basic understanding and computational fluency.

In addition, specific goals were developed to identify measurable outcomes for the students in the district.

1. Students will meet and exceed New York State Standards in mathematics understanding.
2. Students will be enrolled in a math course every year through graduation.
3. All students will be successful on the Math A Regents exam.
4. All students will be successful on the Math B Regents exam.
5. Increase participation in college math study.

These beliefs and goals informed the current program evaluation process as well as an understanding of current priorities as identified by NCTM.

Evaluation Design

In the summer of 2008, a request was made by the Board of Education, that the current K-12 math program be evaluated for its effectiveness in meeting the developing mathematical literacy needs of all of the students at Brighton. With that in mind, a design for the evaluation process was constructed by representative members of the K-12 math teaching staff, administrators, BOE members and parents following the models of program evaluation published by the National Study of School Evaluation, the National Research Council, and benchmarked processes from other school districts around the state and nation.

The program evaluation was designed to assess two key issues:

1. The extent to which the students are achieving the expectations for their learning.
2. The extent to which the instructional practices of the school support student achievement.

In order to conduct a comprehensive evaluation, it was decided to further delineate each issue so that data from multiple sources could be used to triangulate the results and support subsequent conclusions.

To explore the issue, “The extent to which students are achieving the expectations for their learning.” student achievement was defined by the following three dimensions:

1. Dimension 1: Students understand the concepts of and become proficient with the skills of mathematics.
2. Dimension 2: Students communicate and reason mathematically
3. Dimension 3: Students solve problems by using appropriate tools and strategies.

Each one of these areas was further defined by the following performance indicators:

1. Dimension 1: Students understand the concepts of and become proficient with the skills of mathematics. This is manifested when….
    a. Students perform essential operations with a variety of forms of numbers choosing appropriate tools and level of precision.
    b. Students recognize patterns from real-world, geometric, graphical and numeric situations as recurring functional relationships. They express relationships verbally, symbolically,

graphically, or as tables of values. They use representations to solve problems, make predictions, and draw conclusions.

c. Students have an understanding of geometric objects and relationships and can make and use measurements in a variety of settings.
d. Students use statistical methods to describe, analyze, evaluate and make decisions.

2. Dimension 2: Students communicate and reason mathematically. This is manifested when students….
    a. Express mathematical thinking in writing using representations, pictures, numbers, words
    b. Share mathematical thinking → with peers, teachers, others
    c. Use clear, precise communication
    d. Make and investigate conjectures – back them up with evidence/proof
    e. Analyze and evaluate the mathematical thinking and strategies of others
    f. Ask questions for clarification, "What if…".
    g. Evaluate and infer to make predictions

3. Dimension 3: Students solve problems by using appropriate tools and strategies. Solve non-routine/unrehearsed problems. This is manifested when students…
    a. Demonstrate flexible thinking
    b. Utilize, evaluate, and refine multiple strategies
    c. Use efficient strategies appropriate to his/her grade level
    d. Produce accurate work
    e. Exhibit flexibility with tools/technology – choosing appropriate tools, effective/efficient tools for his/her grade level
    f. Connect strategies to context

Operationalization of the concept of "organizational supports" had to take place in order to evaluate the issue, "The extent to which the instructional practices of the school support student achievement." The purpose of this data collection was to determine the extent to which organizational conditions align to validated principles and indicators of high performing systems. For this construct, three specific areas were identified as being integral to the process; curriculum, instruction, and assessment. In addition, the role of the parent was included as another indicator of organizational support. In addition to the three dimensions previously addressed, a fourth dimension was established to further define this area of inquiry.

4. Dimension 4: All teachers have knowledge of math content and pedagogical standards of delivery.

Once each of the dimensions was defined, decisions were made concerning which data elements would be the best measures for each of the areas. As stated earlier, it was the intent of the evaluation team to collect data from a variety of sources to better support any conclusions and needs identification that were drawn. These data were both quantitative and qualitative and were thought to thoroughly depict the dimension in question. The following table presents the type of data that were collected.

Dimension	Data Elements *(including subgroups where applicable)*
Dimension 1: Students understand the concepts of and become proficient with the skills of mathematics.	1. Math A and Math B scores to scores of similar schools (three year trend). 2. AP/SUPA enrollments, examinations 3. SAT scores 4. Percent of students receiving Regents with Advanced Designation 5. Percent of students achieving levels 3 & 4 in 3-8 Math. Comparison to similar schools. 6. Longitudinal analysis of Measures of Academic Progress

	(MAP) scores (gr 2-7). 7. Brighton postgraduate data 8. Parent perceptions of skill acquisition among students.
Dimension 2: Students communicate and reason mathematically.	1. Analyze student work samples for evidence of mathematical thinking. 2. Parent perceptions of students' abilities to communicate and reason mathematically. 3. Teacher perceptions of students' abilities to communicate and reason mathematically.
Dimension 3: Students solve problems by using appropriate tools and strategies.	1. Assign students robust problem sets and analyze using a district developed rubric. 2. Analyze students' responses from unit assessments to discern intergrade level variability in selection of strategies. 3. Parent perceptions of problem solving abilities among students. 4. Teacher perceptions of problem solving abilities among students.
Dimension 4: All teachers have knowledge of math content and pedagogical standards of delivery.	1. Survey teachers regarding perceptions of curriculum, instruction, and assessment practices and fidelity to District standards and performance indicators 2. Parent perceptions of organizational structures supporting student learning. 3. Professional development history

RESULTS

Dimension 1: Students understand the concepts of and become proficient with the skills of mathematics.

In order to evaluate whether or not students are developing mathematical concepts and building proficiency with mathematical operations, data were reviewed across all grade levels. In many instances, standardized test scores were used to make these determinations. It was felt by the committee that these data were valid indicators of student performance for this dimension. Specifically, the following data were used and analyses performed:

1. Math A and Math B scores compared to scores of similar schools (3-4 year trend, where available).
2. AP/SUPA enrollments, examinations
3. SAT scores
4. Percent of students receiving Regents diploma with Advanced Designation
5. Percent of students achieving levels 3 & 4 in 3-8 Math and comparison to similar schools.
6. Longitudinal analysis of Measures of Academic Progress (MAP) scores (gr 2-7).
7. Brighton postgraduate data
8. Parent perceptions of skill acquisition among students.

Math A and B Results: 2005-2008

Math A

The Math A exam is a New York State (NYS) Regents exam given to all students following the study of algebra 1 and the first half of geometry. After completing the second half of the geometry curriculum and algebra II, students are given the Math B exam, a second standardized, NYS Regents exam. It should be

noted that only the Math A exam is required by New York State in order to fulfill the high school graduation requirements and while students are not required to take the Math B exam by the state, a large proportion of Brighton High School students do. For this evaluation and analysis, student performance at all levels (55%, 65% and 85% pass rates) on both the Math A and B exams for the years 2005-2008 were compared. In addition, comparisons to similar local and state schools were also included. (*see Appendix A for NYS definition of "similar school".*) Analyses were performed for the entire student population as well as comparisons of general to special education populations.

Brighton Math A Regents
All Students

Total Tested	Year	Percentage of students scoring at or above: 55%	65%	85%
312	2005	100%	98%	52%
295	2006	98%	97%	62%
355	2007	100%	99%	57%
302	2008	99%	97%	61%
2007 Sim. Schls.		95%	92%	42%

Brighton Math A Regents: Gen. Ed. Students

Total Tested	Year	Percentage of students scoring at or above: 55%	65%	85%
285	2005	100%	99%	55%
265	2006	100%	99%	66%
317	2007	100%	98%	61%
257	2008	100%	98%	66%
2007 Sim. Schls.		98%	95%	50%

Brighton Math A Regents: Spec. Ed. Students

Total Tested	Year	Percentage of students scoring at or above: 55%	65%	85%
27	2005	100%	93%	22%
30	2006	87%	80%	23%
38	2007	100%	97%	24%
45	2008	96%	89%	33%
2007 Sim. Schls.		91%	76%	10%

*Note: Comparative data for similar schools for 2008 for Math A was not available due to the fact that 2008 was the first year of the New York State Integrated Algebra exam. Schools across the state had the option of administering this exam. The last Math A exam was administered in Brighton in January 2009.

Math A Analysis

- Over 95% of Brighton students passed the Math A Regents across the four years. Consistently, over 50% of the students exceeded standards at the 85% passing level across the four years.
- When compared to student performance in similar schools*, a larger percentage of Brighton students scored 85% or better on the exam across the three years (2005-2007) than students from other districts.
- When noting trends for students with disabilities (SWD), Brighton consistently had greater than 20% of this population scoring 85% or above. In addition, in the years between 2005 and 2008, 100% of Brighton's SWD passed the exam at the 55% level in two of the four years. This percentage is greater than that of similar schools for the same population of students.

Math B

The district goal for Brighton is that every student will pass the Math B exam. While this goal is not always realized, analysis of the percentage of students who graduate with the Regents diploma with advanced designation indicates that a large percentage of the students do. This is not always the case in other districts, where students enroll in alternate math courses which do not lead to the Math B exam. It is for this reason then, that one needs to take into consideration the comparative data when inspecting the results of the Math B exam. When combined with the analysis of students achieving the Regents diploma with advanced designation, one must conclude that the populations are not equal.

Brighton Math B Regents
All Students

Total Tested	Year	Percentage of students scoring at or above: 55%	65%	85%
296	2005	86%	74%	31%
326	2006	90%	80%	31%
316	2007	90%	82%	49%
367	2008	86%	75%	38%
2007 Sim. Schls.		86%	76%	32%

Brighton Math B Regents Gen. Ed. Students

Total Tested	Year	Percentage of students scoring at or above: 55%	65%	85%
279	2005	86%	75%	32%
296	2006	91%	81%	33%
288	2007	92%	86%	53%
342	2008	88%	77%	40%
2007 Sim. Schls.		83%	72%	27%

Brighton Math B Regents: Spec. Ed. Students

Total Tested	Year	Percentage of students scoring at or above: 55%	65%	85%
17	2005	82%	59%	6%
30	2006	73%	63%	7%
28	2007	71%	43%	7%
25	2008	56%	52%	8%
2007 Sim. Schls.		78%	49%	5%

Math B Analysis

- The percentage of students passing the Math B exam at the 85% level between the years of 2005-2007 has increased from 31% to 49%. There was a decrease in 2008. One possible explanation for this decrease could be the increase in overall class size. This trend will continue to be monitored and adjustments made if dictated.
- The percentage of Brighton students passing the Math B (65% mastery) has increased consistently between 2005-2007.
- Of the eight similar schools used for comparison, only one out scored Brighton across the three year time period (2005-2007)*.
- When analyzing the performance of the special education population across the three years, there is a decreasing percentage of students passing the exam at the 55% level. There is an uneven pattern of passing rate at the 65% level. There is a small, but steady increase in performance at 85% across the four years of 2005-2008. When comparing populations of students with disabilities from similar schools, students from Brighton out performed those students from other districts at the 65% and 85% performance levels. It should be noted that,

when conducting the comparisons, in many instances, 0% of the students with disabilities from similar schools scored 85% or higher.

*Comparative data for 2008 were not available at the time of analysis.

Advanced Placement (AP)/Syracuse University Project Advanced (SUPA) Enrollment and Results

One of the ultimate goals of the Brighton math program is that students will participate in college-level math study. In Brighton, there are two primary ways to accomplish this goal, through enrollment and participation in AP courses or through Syracuse University Project Advanced (SUPA) courses. The district currently offers AP math courses for Calculus AB, Calculus BC and Statistics. Analysis of Brighton results reveals that consistently, Brighton students score higher on AP exams when compared to the Monroe County average (*see Appendix B for complete data set.)* In addition to AP courses, SUPA Statistics is also offered to students to advance their math education and while there are no standardized exams related to this course, enrolled students may take the AP exam in addition to receiving Syracuse credit.

CALCULUS AB		2005			2006			2007			2008		
SCHOOL	Av. # of Grads	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3
BRIGHTON H S	**295**	**24**	8%	**75%**	**21**	7%	**81%**	**20**	7%	**65%**	**46**	16%	**83%**
Monroe Cty Avg.				55%			74%			64%			66%

CALCULUS BC		2005			2006			2007			2008		
SCHOOL	Av. # of Grads	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3
BRIGHTON H S	**295**	**38**	**13%**	**79%**	**47**	**16%**	**96%**	**54**	**18%**	**80%**	**46**	**16%**	**78%**
Monroe Cty Avg				55%			69%			54%			64%

AP STATISTICS		2005			2006			2007			2008		
SCHOOL	Av. # of Grads	TTL EXAMS (N)	% of Class	% GRS 3 OR >3	TTL EXAMS (N)	% of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3
BRIGHTON H S	**295**	**59**	**20%**	**68%**	**47%**	**16%**	**80%**	**54**	18%	**80%**	**23**	8%	**78%**
Monroe Cty Avg.										53%			64%

Scholastic Achievement Test (SAT) Score Analysis

Each year, students desiring to apply to college take the Scholastic Achievement Test (SAT) administered by the College Board. The SAT is the most widely used college admissions test and is taken by more than two million students every year. Virtually all colleges and universities accept SAT scores for entrance. The SAT measures knowledge of subjects learned in the classroom, including

reading, writing, and math, and how well students can apply that knowledge outside of the classroom. Research has shown that the test, along with high school grades, is the best predictor of success in college (College Board, 2009). SAT II tests are subject specific tests and are administered to those students interested in studying in a particular discipline or at the request of the accepting college or university. In general, students who take the SAT Level II tests have been enrolled in the accelerated mathematics program of Brighton Central Schools.

Five year Summary of SAT Scores for Trend Analysis

SAT I ALL

Year	N	Mean	SD	Min	Max	NYS Avg	National Avg.
2005	259	599.11	97.31	260	800	511	520
2006	238	610.97	103.84	200	800	510	518
2007	280	619.46	105.3	240	800	505	515
2008	216	614.26	101.6	360	800	504	515
2009	278	615.54	93.24	320	800		

SAT I Students w/Disabilities

Year	N	Mean	SD	Min	Max	NYS Avg	National Avg.
2005	16	510.6	104.7	340	710	473	487
2006	11	484.5	141.3	200	670	477	490
2007	17	486.5	96	240	610	475	488
2008	26	476.9	75	360	610	469	487
2009	22	520	85.7	340	680		

SAT II: Level 1

Year	N	Mean	SD	Min	Max
2005	45	621.33	60.92	490	750
2006	48	660.63	56.09	540	750
2007	48	668.75	58.19	520	750
2008	44	654.77	64.75	490	770
2009	47	675.11	56.14	560	800

SAT II: Level 2

Year	N	Mean	SD	Min	Max
2005	31	681	80.4	550	800
2006	25	724.4	57.3	570	800
2007	45	736.2	59.02	600	800
2008	38	723.7	77.8	530	800
2009	33	753	56.37	550	800

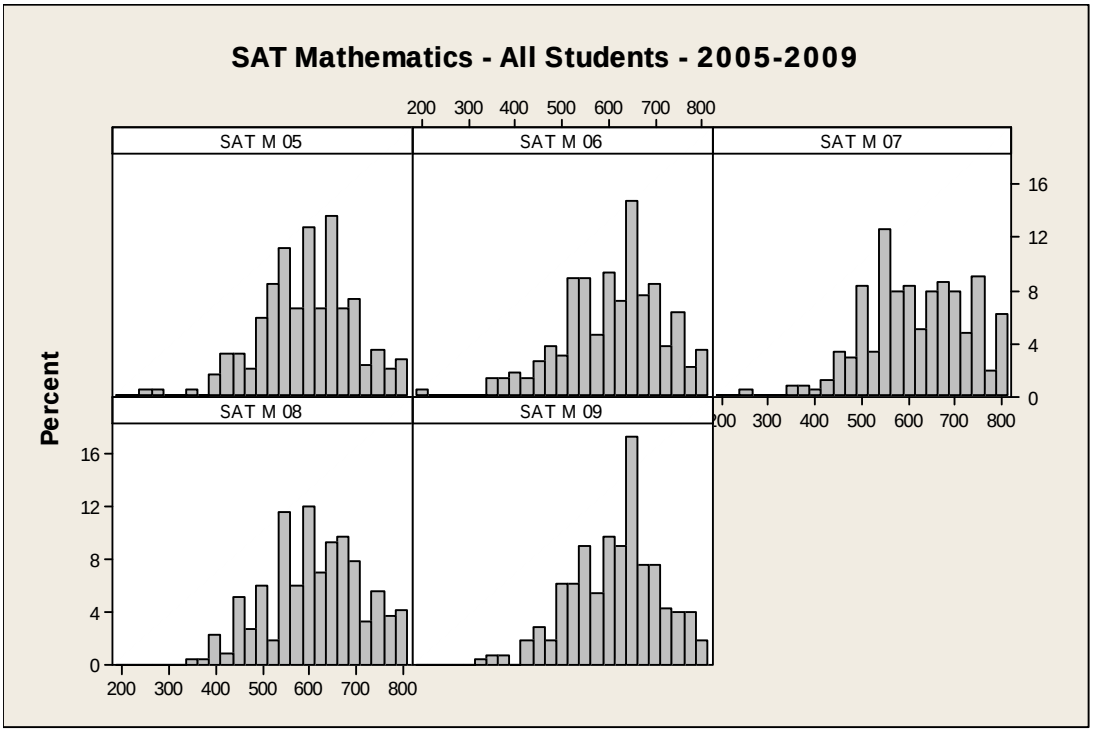
Statistical Analysis of SAT I Scores Over Time

	All Students			
	2005 - 2006	**2005 - 2009**	**2006 - 2009**	**2008 - 2009**
Statistical difference between the two means?	Statistical difference at the .1 level	Statistical difference at the .05 level	None	None
Statistical difference between the two standard deviations?	None	None	Statistical difference at the .05 level	Statistical difference at the .1 level

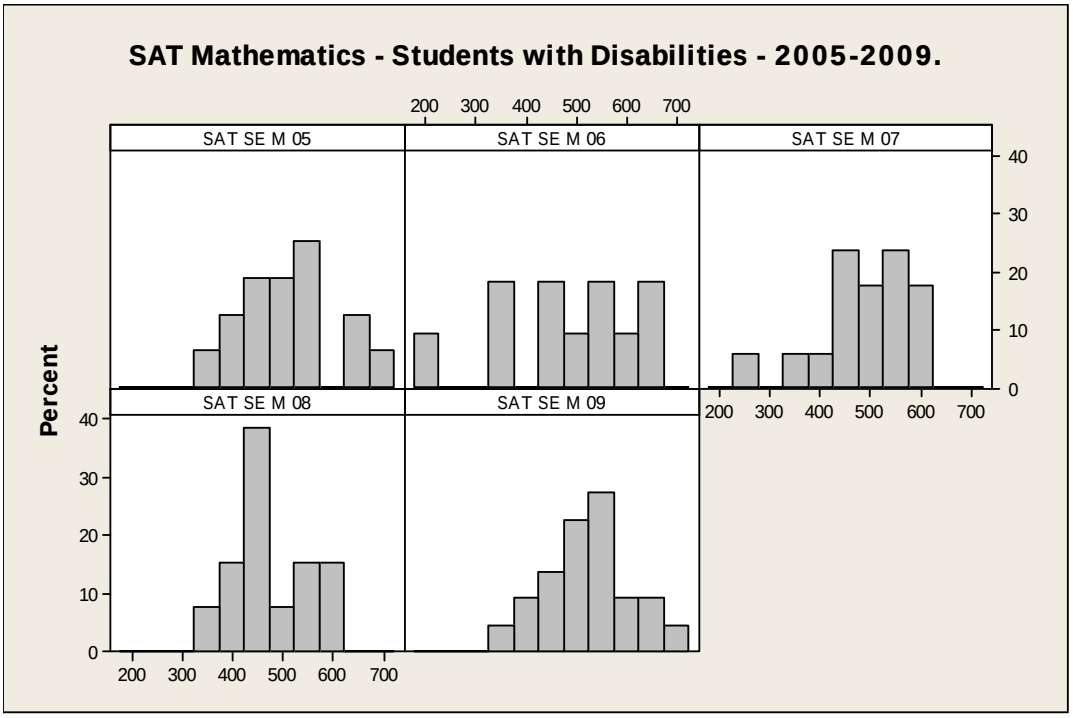
	Students with Disabilities			
	2005 - 2006	**2005 - 2009**	**2006 - 2009**	**2008 - 2009**
Statistical difference between the two means?	None	None	None	Statistical difference at the .05 level
Statistical difference between the two standard deviations?	None	None	Statistical difference at the .05 level	None

Histogram of Shifts in Scores Over Time for SAT I

All Students



Students with Disabilities



SAT Analysis

Typically, Brighton students perform well on the SATs, including the mathematics portion. Analysis of student results for both the general population as well as for students with disabilities reveals a consistent trend of increased mathematical abilities each year. Of note in the analysis of the last five years are the following observations:

- The SAT changed in 2006 adding the writing test and some "Algebra 2" questions to the math section for the first time. The class of 2006 was also the first class to have any Core Plus math. It should be noted that the 2009 graduating class is the first class to have used Core-Plus math materials throughout their entire high school career. Although comparisons of class mean do not necessarily indicate a significant increase in performance, analysis of the histogram indicates that there has been a shift in overall performance of the entire class since 2005. This shift is toward a higher performance level.
- Over the past two years, the standard deviation has decreased over the same period of time, indicating more consistent results.
- The number of special education students taking the test has increased and their performance on the exam has also increased as noted by the histogram.
- With the exception of 2008, student performance on the SAT II Levels 1 & 2 has shown a steady increase across the five year period.
- Brighton students outperform students from across New York State as well as the nation when comparing scores to state and national averages.

Regents with Advanced Designation

New York State allows for four different diploma types with its graduation requirements.

1. Regents diploma;
2. Regents diploma with an advanced designation;
3. State high school equivalency diploma
4. High School Individualized Education Program diploma

To earn a Regents diploma with an advanced designation a student must complete, in addition to the requirements for a Regents diploma,:

1. additional Regents examinations in mathematics. Students entering grade nine prior to September 2009 must pass two of the three commencement level Regents examinations in mathematics through one of the following combinations: Mathematics A and Mathematics B, or Mathematics A and Algebra 2 and Trigonometry.
2. one additional Regents examination in science, for a total of two Regents examinations, with at least one in life science and at least one in physical science; and
3. two additional units in a language other than English for a total of three units and the Regents comprehensive assessment in that language.

BCSD: BRIGHTON HIGH SCHOOL, HIGH SCHOOL COMPLETERS						
	ALL STUDENTS		GEN. ED. STUDENTS		STUDENTS WITH DISABILITIES	
	# of Stdnts	% of Grad	# of Stdnts	% of Grad	# of Stdnts	% of Grad
TOTAL GRADUATES						
2004 - 2005	299		276		23	
2005 - 2006	282		258		24	
2006 - 2007	321		291		30	
REGENTS DIPLOMA						
2004 - 2005	277	93%	258	93%	19	83%
2005 - 2006	269	95%	251	97%	18	75%
2006 - 2007	301	94%	276	95%	25	83%
2006-2007 Similar Schools		91%		94%		69%
REGENTS - ADVANCED DESIGNATION						
2004 - 2005	202	68%	201	73%	1	4%
2005 - 2006	219	78%	209	81%	10	42%
2006 - 2007	259	81%	245	84%	14	47%
2006-2007 Similar Schools		61%		66%		15%

Diploma Analysis

In evaluating the rate at which Brighton students achieve the Regents with Advanced Designation, the following observations are noted:

- The percentage of Brighton students achieving the Regents Diploma with Advanced Designation has increased incrementally over the last three years. When compared to the rates of accomplishment from similar schools, Brighton has a higher rate for students achieving this milestone.
- Brighton's percentage of special education students who graduate with a Regents Diploma with Advanced Designation is much higher than other similar districts.

New York State Testing Program in Grades 3-8

In 2006, New York State instituted an assessment practice for all students in grades 3-8 in the areas of English language arts and math. Prior to this time, only students in grades 4 and 8 were tested. At the time of grade level shifting, the tests themselves were significantly changed for both disciplines thereby rendering it imprudent to compare data longitudinally across years for any of the populations. To determine whether or not students in grades 3-8 were acquiring skills and concepts in the area of math (Dimension 1), data from 2006-2008 were analyzed. It should be noted that at the time of analysis, comparative data for similar schools for 2008 were unavailable.

In evaluating the performance of students in grades 3-8, a variety of analyses were conducted. Trends within a given grade level were taken into account. Changes in performance between years for grade levels may be a result of differing cohorts of students as well as changes in curriculum. Comparisons were also made between students in the same year across similar school districts. Results from this

comparison would rule out any cohort differences and may indicate an area of curricular/instructional difference. This conclusion would be especially true if a different trend were noted between similar schools across years. :

Math		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	271	99%	93%	28%
2007	246	98%	92%	33%
2008	264	100%	98%	37%
2007 Sim Schls		99%	95%	43%

Math 3: SWD		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	32	97%	72%	6%
2007	32	94%	72%	16%
2008	36	100%	92%	14%

Math 4		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	269	99%	93%	38%
2007	262	97%	97%	49%
2008	262	99%	95%	49%
2007 Sim Schls		98%	93%	45%

Math 4: SWD		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	32	88%	63%	6%
2007	36	100%	86%	25%
2008	34	91%	71%	21%

Math 5		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	264	95%	82%	26%
2007	258	99%	90%	39%
2008	279	99%	96%	50%
2007 Sim Schls		99%	92%	36%

Math 5: SWD		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	37	76%	46%	0%
2007	31	94%	48%	6%
2008	46	96%	87%	17%

Math 6		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	263	97%	79%	29%
2007	281	98%	83%	28%
2008	265	99%	93%	37%
2007 Sim Schls		97%	86%	31%

Math 6: SWD		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	37	84%	38%	3%
2007	41	88%	51%	2%
2008	30	93%	60%	3%

Math 7		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	300	97%	84%	29%
2007	270	99%	86%	32%
2008	302	98%	92%	39%
2007 Sim Schls		98%	86%	32%

Math 7: SWD		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	43	86%	42%	2%
2007	39	95%	59%	0%
2008	41	90%	59%	7%

Math 8		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	257	99%	86%	24%
2007	309	98%	81%	17%
2008	269	98%	90%	20%
2007 Sim Schls		97%	82%	23%

Math 8: SWD		Percentage scoring at level(s):		
	# Tested	Levels 2 - 4	Levels 3 - 4	Level 4
2006	20	95%	85%	5%
2007	45	91%	56%	2%
2008	39	90%	51%	0%

Analyses of these data indicate the following trends:

- Overall, there was a consistent trend of increased levels of proficiency (defined by levels 3 & 4) for many of the grade levels across years.
- This pattern was also consistent when comparing the progress of the subgroup Students with Disabilities with the exception of grades 4 and 8. In both of these grade levels, progress for this subpopulation has been inconsistent.

- In the area of gender differences, no significant pattern was established for any of the grade levels within Brighton.
- When comparing 2007 Brighton progress with that of similar schools, students consistently performed as well or better at L3/4 than students of the same grade level across years. *(Note: Similar school data for 2008 were not available at the time of this analysis.)*
- When comparing performance of students with disabilities across school buildings, Brighton students generally outperformed students from similar schools in overall level of proficiency (L3/4), but this trend did not hold true when rates of proficiency at L4 alone were compared.

Measures of Academic Progress (MAP) Analysis

MAP testing has been occurring in the district for students in grades 2-7 since 2005. MAP tests are state-aligned computerized adaptive assessments administered via a computer. They are unique in that they adapt to each student's ability, measuring what a child knows in a given discipline area. In addition, MAP tests measure academic growth over time, independently of grade level or age. Scores are reported on a "RIT" Scale. The RIT Scale is a curriculum scale that uses individual item difficulty to estimate student achievement. MAP scores are nationally normed so that standardized comparisons can be made.

Students in grades 3-7 take the math MAP test in the spring of each year. Students in grade 2 take the test in both the fall and spring so that growth can be determined. For the program evaluation process, student scores for tests administered in the spring of 2006-2008 were compared. While one would not necessarily expect to see an increase in RIT scores for the same grade level between years, the construction of this assessment allows the evaluator to follow a given cohort across years. Analysis of mathematics MAP scores in this manner yielded the following results.

- Students in Brighton always performed above the national average for every grade for every year.
- When comparing cohorts across years, overall student RIT scores improved between years.

Post-Graduate Student Survey

A survey was administered to all students in the graduating classes of 2004-2008. The survey was developed by members of the K-12 math program evaluation team and disseminated via the district's web site. Postcards were sent to members of the respective graduating classes, encouraging them to complete the questionnaire. The questions reflected students' perceptions of preparedness for post-Brighton work in all of the content areas (ELA, math, foreign language, social studies, science, physical education and visual and performing arts). It was decided by the evaluation team to disseminate a broad-based survey to the graduates rather than one specifically for math to reduce possible bias and to embrace the opportunity to concurrently gather information about all of the other subject areas. Because the team was most interested in the students' perceptions of their level of preparedness in the field of math, specific questions pertaining to this issue were added at the end of the survey (*see Appendix B for a copy of the survey).* Results are as follows.

- 105 Brighton graduates responded to the survey (8% of invited graduates from the graduating classes of 2004-2008). Of the respondents, seven indicated an intended major directly related to the field of math. Others indicated respective majors in science fields, business majors, education majors and direct employment.
- A majority of respondents indicated that their Brighton education was extremely useful or useful when preparing them to understand and apply mathematical concepts (69%). Note: 6% of respondents indicated that the question was "Not Applicable". The remaining respondents (25%) indicated that their math related educational experiences at Brighton were somewhat useful or not useful.
- A majority of the students who responded to the survey (74%) indicated that their high school math courses prepared them for college math. Fourteen percent (14%) indicated that they somewhat disagreed or disagreed with the statement, "My high school math courses prepared me for my college math courses."

- When asked what type of assistance they accessed while at Brighton High School, a majority of respondents (52%) responded "None" or left the question blank. Two indicated that they *could* have benefitted from math help and seventeen (16%) indicated that they had participated in some type of math support. The remaining respondents (30%) indicated that they had received assistance in other content areas.
- When asked what type of support they needed while in college, six students responded that they needed writing support, three responded that they sought out support with chemistry/organic chemistry and nine indicated that they participated in some type of math support. Additional responses included "No specialized support needed" or "I seek out my professors on an as-needed basis". There were no evident patterns in the level of support required by Brighton students once they graduated from the district.
- When asked what type of math classes they had taken since leaving Brighton, only seventeen (16%) indicated that they hadn't taken any type of math class. The remaining students (84%) participated in classes ranging from linear algebra to vector calculus.

Parental Perceptions of Student Acquisition of Mathematical Understanding and Basic Skills

In addition to the standardized data presented in the preceding pages, a parent survey was offered to discern overall parent perceptions about the Brighton K-12 mathematics program. The survey consisted of nine questions about the math program and two additional opportunities for "free response" (*see Appendix C for copy of survey*). Two questions specifically related to Dimension 1, *"I believe the mathematics program meets the learning needs of my child and enables him/her to advance to the next level."* and *"I believe the mathematics program allows my child to develop basic mathematical concepts."*

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
I believe the mathematics program meets the learning needs of my child and enables him/her to advance to the next level.	46 (16.85%)	87 (31.87%)	47 (17.22%)	51 (18.68%)	42 (15.38%)
I believe the mathematics program allows my child to develop basic mathematical concepts.	53 (19.41%)	105 (38.46%)	34 (12.45%)	46 (16.85%)	35 (12.82%)

Analyses of the results for these two questions indicate the following:

- 274 parents responded to the survey (12% of the potential Brighton parent population). The survey was constructed so that when asked to indicate what level of student they were responding for, K-2, 3-5, 6-8, 9-12, respondents could indicate multiple levels although they were asked, if they felt there were significant differences in their childrens' experiences at each level, to complete a separate survey for each. The largest number of responses represented parents of students in grade ranges 3-5 and 6-8 (33% and 32% respectively). The lowest number of respondents (16%) indicated they were providing input for the K-2 population. Nineteen percent of the respondents commented on the 9-12 program.
- When asked if they believed that the mathematics program met the learning needs of their child(ren), 49% indicated that they strongly agreed or agreed. Seventeen percent indicated that they were "unsure" and 34% percent indicated that they strongly disagreed or disagreed. In looking at the parent perceptions from individual grade levels, a majority of parents (58%) at the 6-8 level felt that the program met students' need while slightly under half of the respondents indicated this perception for students at the other grade levels.
- When asked if they believed that the mathematics program allowed children to develop basic math concepts, 57% said they strongly agreed or agreed, 12% indicated that they were unsure

and 30% indicated that they strongly disagreed or disagreed. Of note however pertaining to this question, were the inter-grade level differences. Proportionately, more K-2 parents (65%) than high school parents (39%) felt that the program allowed children to develop basic skills.

Dimension 2: Students communicate and reason mathematically.

In order to determine the extent to which the math program allows students to develop their abilities to communicate and reason mathematically, problem sets were developed by grade level teams to allow for the evaluation of this skill acquisition. It was decided to assess students in grades 2, 5, and 8 and students completing the pre-calculus course at the high school. These grades were chosen because these were the terminal points for each building and the team wanted to decrease the influence of transition on student performance. In order to assess this dimension, two data sources were considered:

1. Analysis of student work samples for evidence of mathematical thinking using a district determined rubric.
2. Parent perceptions of students' abilities to communicate and reason mathematically.

Open ended problems were developed for each of the students in grades 2, 5 and 8. Analysis of a selected problem from the pre-calculus mid-term was used for analysis of this dimension for the high school population. Scoring was completed using a rubric created by the National Council of Teachers of Mathematics (NCTM) (*see Appendix F for rubric*). Problems were assigned and then scored by a team of trained mathematics educators. Following the scoring, data were analyzed to determine student performance for Dimension 2. Results of the data analysis indicate the following:

- A majority of students in grades 2 and 5 scored at the "expert" or "practitioner" level (70%-71%). Within these levels students are able to use sophisticated arguments to justify a mathematical solution. In addition, the arguments use precise mathematical language and convey an awareness of audience.
- This pattern was not so readily evidenced at the 8th grade level. Here, student responses were scored evenly between Novice, Apprentice and Expert/Practitioner. Results of this analysis lead one to conclude that eighth grade students may not be developing their communication and reasoning skills at the necessary level. One must consider however a possible limitation of this data set and subsequent conclusion. Given that the level of student performance on the New York State eighth grade exam does not reflect the student performance on this problem set, it may be possible that the problems themselves were not a reliable indication of the mathematical behaviors of communication and reasoning.
- There were no gender differences apparent at 5th grade although there were slight differences in performance between males and females at grade 8. In general male 8th graders scored lower than their female counterparts in the area of communication and reasoning.
- There were also discrepancies noted for students with disabilities in both the 5th and 8th grades. More students in these populations scored in the range of Level 1 & 2 than compared to their peers without disabilities.
- A majority of students participating in high school pre-calculus courses, (PreCalc Basic, Pre-Calc, and Pre-Calc ES) scored at the "expert" or "practitioner" level (>80%). When scoring at these levels, there is evidence that students are able to use precise mathematical language and reasoning skills to justify a mathematical solution.

Within the parent survey, parents were asked if their child had a "reasonably" good attitude toward math and whether or not their child(ren) used math strategies to attempt difficult mathematical tasks. Mathematical attitude can influence one's ability to communicate about given concepts.

- Across the district, a majority of parents reported that they believed their child(ren) had a good attitude toward math with the highest response in the categories of "strongly agree" and "agree" being noted for the K-2 students. There was a decline in responses in these categories for the

other grade levels with the lowest affirmative responses appearing at the high school level. Here, only 53% of the parents believed that their child(ren) had a positive attitude toward math.

- Similar results were noted when parents were asked to comment on whether or not their child(ren) utilized strategies within their math work. Sixty-nine percent of the parents of K-2 students indicated that they "strongly agreed" or "agreed" while as before, 53% of the 9-12 parents indicated these levels with 15% responding that they were "unsure."

Dimension 3: Students solve problems by using appropriate tools and strategies.

One of the primary goals of any mathematics program is that students will develop the ability to apply the knowledge and skills that are being acquired to solve unrehearsed, authentic problems. The current instructional approach being used throughout the district fosters and reinforces that behavior by providing students with ongoing opportunities to engage in problem solving situations.

In order to determine the extent to which students are developing these skills, the problem set used to evaluate Dimension 2 was also used to ascertain student problem solving abilities. As with the prior analyses, the NCTM rubric was used to evaluate student work and parent perceptions were collected via the parent survey. Analysis of the student work indicated the following performance patterns:

- Sixty-seven percent of the students in grades 2 and 5 scored at Levels 3 & 4 (Practioner/Expert). Performance at these levels indicates that students select appropriate strategies to attempt to solve problems and at times, select the most efficient strategy. At this level, there is evidence of planning prior to solving the problem and there may be adjustments to strategy use depending on the outcome. Use of prior knowledge is also evidenced at these levels.
- At the eighth grade level, 47% of the students scored at Levels 3 or 4, with 42% at Level 2 and 11% at Level 1.
- Students with disabilities approached the problem solving set in a less sophisticated manner. At both grades 5 and 8, a majority of students in this subgroup scored at Levels 1 and 2.
- No differences in student performance were noted for gender classification.
- A majority of students participating in the high school pre-calculus courses scored at the "expert" or "practitioner" level (78.5%). When scoring at these levels, there is evidence that students are able to select among a variety of strategies and utilize them efficiently to solve problems.

On the parent survey, two questions were asked specific to Dimension 3.

1. Overall, I see my child choosing to actively engage in mathematical thinking and problem solving.
2. I see my child using strategies to attempt difficult mathematical tasks.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Overall, I see my child choosing to actively engage in mathematical thinking and problem solving.	69 (25.27%)	97 (35.53%)	40 (14.65%)	50 (18.32%)	17 (6.23%)
I see my child using strategies to attempt difficult mathematical tasks.	60 (21.98%)	115 (42.12%)	43 (15.75%)	48 (17.58%)	7 (2.56%)

Analyses of the results for these two questions indicate the following:

- Overall, a majority of K-12 parents responded favorably to these questions with 64% indicating they witnessed their child(ren) using strategies and 61% indicating that they believed their child(ren) actively engaged in mathematical thinking/problem solving.

- The highest values were noted for the parents of K-2 students. Subgroup analysis revealed a consistent trend for the 3-5 and 6-8 groups. Forty-six percent (46%) of the 9-12 parents felt that their child was actively engaged in the problem solving process.

Dimension 4: All teachers have knowledge of math content and pedagogical standards of delivery.

The last dimension, Dimension 4, attempts to quantify the degree to which the organization supports the work of the instructional program as well as the role the parents play in the overall mathematical literacy acquisition of the students. The process used to determine these relationships was based on an examination of instructional practices and organizational conditions within the buildings and a comparison of those findings to a set of validated principles and indicators of high performing systems. These indicators were gleaned from research on high performing school districts and their alignment to the NCTM standards (NSSE, 1997) *(see Appendix G for Principles of Instructional Effectiveness of Schools of Quality).* The purpose of the evaluation was to identify areas of strength as well as target areas for improvement that would impact student achievement. To conduct this review, surveys were disseminated to all staff, K-12, who were directly responsible for the teaching of mathematics. The survey contained sixty-seven questions divided into three categories; curriculum, instruction, and assessment *(see Appendix D for copy of survey*). Each of these constructs was defined for teachers as follows:

- Curriculum: The curriculum is designed to support students' achievement of the standards
- Instruction: The design of teaching strategies and learning activities for mathematics instruction should take into account the quality of the learning tasks, discourse, and classroom environment, and should incorporate systematic reflection.
- Assessment: The assessment system should be based on a process of gathering evidence about students' knowledge of, ability to use, and disposition toward mathematics, and of making inferences from that evidence for a variety of purposes.

Teachers were asked to evaluate individual items under each construct using the following scale:

4 = Exemplary level
3 = Fully functioning and operational
2= Evidence of progress, but not fully operational
1= Low level of development and/or implementation
0= No evidence of the indicators of quality

Responses were to reflect the teacher's perception of the organization or system based on experience, rather than of one's personal classroom behaviors. In total, sixty-eight teachers (approximately 75% of all teachers who teach math) responded to the survey. Results were analyzed for each construct and cross-group analyses were performed for grade level taught and years of experience. It should also be noted that during the analysis, eighty percent (80%) was arbitrarily selected by the evaluation team as the point of "desirability". This means that responses for the values of "exemplary" and "fully functioning" were combined and responses indicating that at least 80% of the respondents perceived the particular question to be descriptive of current state were noted. Analyses of teacher responses indicate the following:

In the area of Curriculum:

- Respondents indicated that they believed that important mathematical concepts and skills were being taught to students and that the curriculum was engaging and promoted problem solving, reasoning, and communication.
- For this area, there was also an indication that the majority of respondents didn't necessarily feel that the curriculum allowed for sufficient differentiation for all students and that because of this, some students experienced difficulties connecting their mathematical understandings to work outside the math classroom.
- In performing cross-group analyses, the same patterns of response were noted for teachers of all grade levels and all levels of experience.

In the area of Instruction:

- Respondents indicated that their instructional practices encouraged interaction among students and that one of the benefits of the current math program was that it engaged students in sophisticated conversations about mathematical principles.
- Concerns were expressed however about the amount of available time it took to deliver the instruction at its recommended level. Respondents did not feel that there was sufficient time for flexibility and differentiation because of the demands of the content. This was evidenced by low response values on questions such as:
    - Students have time to construct meaning and make sense of mathematical ideas and concepts.
    - The instructional time provided for learning is flexible and is scheduled to meet the needs of the students.

In the area of Assessment:

- Consistently, respondents to the survey indicated that the classroom assessments that were being used did not align to the essential understandings that had been identified for each of the grade levels. There seems to be a pervasive feeling among staff that when assessment information is available, it is not being used effectively to inform instructional practices.
- Although these perceptions were expressed by respondents from all building levels, K-2 teachers seemed to indicate special concern over the assessment practices. Of the teachers who responded, fewer teachers of grades K-2 indicated that assessments were being used in a variety of ways to monitor learning and inform instructional practice.

Parental Perceptions of K-12 Math Instruction

Parents were also asked to respond to a series of questions pertaining to their overall understanding of the K-12 math program, their abilities to access materials, and assist their children in developing mathematical literacy. In addition, two open ended questions asked parents to comment on their preferred method of receiving information and provided them with an opportunity to share perceptions about how well they felt their child's needs were being met in math class.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
I clearly understand the math materials (textbooks, worksheets, etc) and their purposes.	49 (17.95%)	107 (39.19%)	29 (10.62%)	61 (22.34%)	27 (9.89%)
I clearly understand what the math assignments are.	51 (18.68%)	123 (45.05%)	37 (13.55%)	47 (17.22%)	15 (5.49%)
I am able to assist my child with his/her homework.	85 (31.14%)	104 (38.10%)	16 (5.86%)	48 (17.58%)	20 (7.33%)
I have enough information about the math curriculum and expectations for my child.	34 (12.45%)	112 (41.03%)	49 (17.95%)	55 (20.15%)	23 (8.42%)

- Analysis of the results indicated that most parents at the K/2-6/8 level felt capable of assisting their children (92%-63%) although fewer respondents indicated an understanding of the math materials (68%-54%). At the high school level, less than half of the respondents felt that they could assist their child or understood the math materials.
- For the question regarding whether or not they felt they had enough information about the math program, overall, 52% of the respondents indicated that they *strongly agreed* or *agreed.*
- In analyzing the open-ended responses, it was noted that parents of students at various grade levels commented in differing ways. Over half of the respondents at the 3-5 level (55%) and 6-8

level (50%) felt their child's math class was meeting specific needs while less than half indicated that perception at the K-2 and 9-12 levels.

- Additional themes emerging from the analysis of the open ended questions included the following:
    - Satisfied with the program and its abilities to meet the needs of a variety of learners
    - Teachers are willing to assist individual students who need additional support
    - Not enough basics being taught
    - Program not challenging enough
    - Program too challenging

Compilation of the open-ended responses indicated that of the parents who responded to the survey, many expressed a desire for more "basic" math and the increased availability of more challenging materials. This was juxtaposed against the comments from parents indicating a thorough satisfaction with the program and its materials and a desire to keep the program "*as is"* because it is "great".

DISCUSSION

Student Achievement

The purpose of this program evaluation was to determine the degree to which Brighton students are developing mathematical literacy. In addition to acquiring the concepts and skills of mathematics, mathematical literacy was also defined by the students' abilities to problem solve, reason and communicate using appropriate tools and strategies. Overall, one can conclude, based on both the quantitative and qualitative data studied, that the students of Brighton Central School District are acquiring the desired mathematical behaviors at a rate comparable to or exceeding other students from around New York state and the nation.

Considering 3-8 New York State data alone indicates strong performance and growth from 2006-2008 related to students' proficiency with mathematical concepts and skills. Students in grades 2, 5 and pre-calculus also demonstrated strong abilities in communication, mathematical reasoning, and problem solving as noted by the analysis of the problems developed in-house and administered to a random sample of 2nd, 5th, 8th and pre-calculus students (11th-12th grade). Over 70% of students at these grades scored at the "practitioner" or "expert" levels in these areas. These areas were identified by the evaluation committee as important components to students' mathematical literacy. One area of note however, was the 8th grade results on the district-developed problem set. Here, only 50% of the eighth grade students scored at "practitioner" or "expert" level in the areas of communication, mathematical reasoning, and problem solving. This finding needs further investigating to determine whether there was a discrepancy with the type of question that was used to assess these areas at the 8th grade level, or if, in fact, more attention needs to be paid to these areas at the middle school level.

In addition, older Brighton students are achieving at an accomplished level in mathematics based on results of Math A and B tests and AP tests and the comparison to similar schools. In addition to the increased levels of students meeting or exceeding standards, consistent growth over time in the number of students (both regular and special education) who are challenging the Math B exam was observed. This increase results in an increase in the number of students receiving the Regents with Advanced Designation.

Despite the achievement of the overall student population, there were areas in which the data indicate are in need of further study and attention. Specifically, a portion of the students, primarily those within the subgroup of "students with disabilities", are not achieving at the same rate as their peers without disabilities, even though they are showing an increase in achievement over time. While this trend is similar to comparative groups from around the state, one can conclude that Brighton's goal of all students meeting or exceeding standards is currently not being met and work needs to continue to determine how to best support individuals who are challenged by the mathematics practices. This recommendation is supported within the teacher and parent populations as well.

Teacher Practices/Perceptions

Overall, teachers indicated that their instructional practices allow students to engage in sophisticated mathematical communication and that they believe that the important mathematical concepts and skills are being taught. Survey results also indicated an overall belief that the curriculum is engaging and promoted development of abilities to problem solve and reason in addition to communicate around mathematical concepts. Areas of need include more time for differentiation and student instruction in order for all students to construct better meaning and make more sense of mathematical ideas and concepts. Teachers also reported the need for more effective use of assessment data to better inform instructional practices. These findings support the conclusions outlined in the student achievement section. Increased knowledge and opportunities to differentiate instruction to meet the needs of all learners should result in increased achievement for all.

The Role of the Parent

Brighton parents are extremely involved in their children's' educational careers. As such, it is imperative that they have the skills and information necessary to assist in the educational process. Knowledge of curriculum and how students learn as well as specific information about the goals and objectives of each curricular area lead to increased student achievement. Results of the parent survey were mixed. While some parents felt that their children were achieving mathematically, others felt that the mathematical practices were not meeting their child's needs. Because of the mixed response, one can conclude that there is a disconnect between what parents perceive should be happening and what is. Increased opportunities to share information about the mathematics program and parental development about how parents can support students' mathematical literacy development outside of the classroom may help bridge the gap between perception and reality.

RECOMMENDATIONS

1. Ensure that all staff participate in professional development opportunities specific to addressing the needs of students challenged by mathematics.
    a. Continue to monitor performance of subgroups and provide instruction and materials to increase achievement.
    b. Encourage educators to build mathematics goals related to curriculum, instruction, and assessment into their annual professional growth plans.
    c. Investigate specific differentiation practices that are research based and designed to meet the needs to low performing math students. Practices may include pedagogy, resource availability, and/or curriculum appropriateness.
2. Review current assessment practices and align those with grade level outcomes, ensuring a balance between formative and summative assessments.
    a. Work to establish a common vocabulary, K-12, on the topics of evaluation, assessment, and grading.
    b. Conduct further study in grading vs. achievement practices. Create systems to align grading practices to assessment practices.
3. Provide ongoing parent education opportunities to increase parent awareness of and abilities to assist in increased mathematics achievement.

a. Conduct focus groups to further identify parent needs based on survey results.

b. Design parent resources and assistance programs based on results.

LIMITATIONS

Throughout the program evaluation process, several surveys were used to increase the evaluation teams' understanding about certain areas of the K-12 math program and the developing skills and understanding of the students. In some instances, standardized survey administration protocols were followed. These include utilizing valid, reliable instruments and ensuring maximum response rate by providing the survey to all impacted individuals. These standards were adhered to for the teacher survey which inquired about perceptions of curriculum development, instructional and assessment practices. For the surveys administered to the post-graduate population and the parents, standards were not so closely adhered to due to the nature of the sample population. Because of this, responses cannot be generalized to the entire K-12 population. In addition, survey instruments for the parent survey were developed in-house and had not been validated against any other populations.

Another possible limitation to the program evaluation process and resulting data has previously been mentioned. This potential involves the problem sets that were created for the students in grades 2, 5 & 8 to assess attainment of skill for Dimensions 2 and 3. Problems were created in-district by math specialists on staff. While every effort was made by these individuals to create problems which would effectively assess students at the respective grade levels for the intended behaviors, one must consider the validity of the results given that the individual problems were not standardized against a larger population. This limitation should be considered especially in light of the findings for students in grade 8.

Appendix A.: Timeline of Implementation

1997 – 1998	Piloted 2 Connected Mathematics Units in Math 7 and Math 8
1998 – 1999	All CMP in Math 7 & 8
1999 – 2000	Began use of CMP units in Math 6 and in 7ES program
2000 – 2001	Added use of CMP units in Math 6ES and Math 7ES
2001 – 2002	FRES Piloted 1 Geometry Investigations units at grades 3-5 + Piloted CMIC in Algebra 1ES at TCMS
2002 – 2003	Added in 1-2 Investigations units per grade level K-6; Core-Plus piloted in 2 Geometry classes at BHS
2003 – 2004	Added in 1-2 Investigations units per grade level K-6; All Algebra 1 and Regular Geometry classes implemented Core-Plus at BHS
2004 – 2005	Full implementation of Investigations K-6 (5-6 units per grade level); Added in Core-Plus implementation in Algebra 2 w/ the exception of 1 section + Algebra IIES
2005 – 2006	Core-Plus implemented in all Algebra I, Geometry, and Algebra II sections + Geometry ES + Pre-CalcES
2006 – 2007	Added in Core-Plus implementation in Geometry ES + Algebra IIES
2007 – 2008	All classes had Core-Plus experiences except students AP Classes
2008 – 2009	Core-Plus implemented in all classes

Class of 2009 is the first graduating class that had all CMP + CMIC (+ 2 Inv. Units only in 5th grade)

Appendix B. NYS Definition of Similar School

What is a Similar School?

Note: This material was developed to explain Similar School groups as they were developed for prior school report cards. The groupings are substantially the same in definition for the May 2006 School Report Card (for results through the 2004-2005 school year). There were certain enhancements to the algorithm for this latest year that are not yet fully explained in this document. A revised version with a full description of the steps used to identify this year's groups will soon be available.

The first question any person interested in education at a local level is likely to ask is "How is this school doing?" After seeing a statistical summary of test results, attendance rate, and so on, the immediate follow-up question is very likely to be, "OK, but what I really want to know is how is this school doing, compared to other schools?" When a statewide average for the various statistics is presented, the response is almost sure to be, "This is interesting, but I know that there are many different schools in the State which face a wide range of problems. What I really meant to ask is, how is this school doing, compared to other similar schools?"

Many people are unsure of how to evaluate performance statistics. Without comparison, the numerical values say little about how well the school might be expected to do. In the modern age of high-speed computers, it is relatively straightforward to compare a given statistic to a district-wide and statewide figure, or, for that matter, to an aggregate based on any other grouping of buildings. The task is to develop groupings of schools that allow reasonable comparison based on the challenges facing the particular schools. Our goal is to find a balance between having too many groups with too few schools in each, and too few groups, where schools are less fairly comparable. If the groupings are well selected, the "similar schools" statistics will help everyone to more fairly evaluate a school's performance in the context of other schools' efforts.

This document presents the grouping model used in the New York State School Report Card. The model is based on the following three factors:

- Grade Range of Students Served by the School
- School District Capabilities
- Needs of the School Student Population

As with any mechanistically derived comparison value, all comparisons made using "similar schools" should be made in a spirit of inquiry. There are many other factors that can contribute to differences in performance among schools; there may be very good reasons for these differences. Every group average will be higher than some schools in the group and lower than others. Only large differences from the group average involving more than a few pupils' performance are likely to be statistically significant. Any differences from the group values should be explored with concern and interest. They should not be used to make immediate judgments about the school's programs.

Readers of the *New York State School Report Card* may well be reminded that the most similar school is the school itself. This is why three years of performance are presented. The year-to-year self-comparison is a very important part of evaluating school performance.

Grade Range Served by the School

Most people agree that schools serving the same grade range are, in a simple way, similar. The Department classifies school buildings according to their grade level organization as shown in Table 1. To facilitate comparisons, these organization types are grouped into the general categories of elementary, middle, and secondary schools, forming the three major similar categories shown. This table also shows a few small exception groups that fall outside the common conception of public schools.

There are a wide variety of different grade level groupings used in schools across New York State. Local school districts have developed different schemes that incorporate local factors such as population density, neighborhood focus, racial integration concerns, economies of scale, and other historical factors. As a result, schools with slightly different grade organizations will likely be compared.

Some elementary schools serve only grade levels less than 3. There are no state assessments administered in these grade levels. Some elementary schools serve no grades higher than 3, and may seem somewhat different than other elementary schools with which they are compared. These schools, however, all offer a grade 3 program. Some other elementary schools include grade levels now commonly associated with middle schools, particularly grades 5 through 8. Many junior-senior high schools serve grades 7 and 8. In these cases, similar school performance for those grades is computed for schools of the same general category that serve those grades.

The most extreme example of this school organization variation is found in schools that serve all grade levels from kindergarten through grade 12. These K-12 schools are compared to three distinct groups of schools. For K-12 schools, grades K-4 are considered as an elementary school, grades 5-8 are considered as a middle school, and grades 9-12 are considered as a secondary school. In this way, each K-12 school is a member of three different groups.

Table 1: Grade Organization -- Student Population Age Range in Schools

Similar Category	Grade Organization	Number of Schools Statewide, 2002-2003	
		Grade Org.	Similar Category
Elementary	K-12 Schools	75	2,571
	Elementary Schools	2,496	
Middle	Middle Schools	580	774 (Includes K-12 schools)
	Jr. High Schools	119	
Secondary	Jr. Sr. High Schools	212	906 (Includes K-12 schools)
	Sr. High Schools	619	
Alternative	High Schools - NYC only	66	66
Special Act Districts	Institutional Schools	24	24
Special Schools	Special Schools	63	63
Other	Other Schools	23	23
Charter	Charter Schools	38	38

Total	All Schools	4315	

School District Capabilities

The Annual Report to the Governor and Legislature on the Educational Status of the State's Schools, a legally mandated document, introduced the concept of a need-to-resource-capacity (N/RC) index. This amalgam of demographic data for the school districts combines the best indicator of educational need (school district student poverty) with the financial resources of the school district, district enrollment and district land area, to place districts into six distinctly different categories. Each category is generally accepted as containing a distinct type of district. Each district in a category faces similar challenges, and is able to draw on comparable levels of resources. Districts in different categories are less comparable.

These six categories were originally defined in the second half of 1993, based on 1990 federal census data and the most recent State education data then available. For this year's New York State School Report Card, the Department recomputed the N/RC statistics using the most recent available data. A handful of districts showed significant changes in their economic circumstances. As a result, the N/RC index group identification for these districts changed. The N/RC Index categories, and the number of schools from each, are shown in Table 2.

Table 2: Need / Resource Capacity -- An Indicator of District Capabilities

District Need / Resource Capacity Category	Count of Schools -- 2002-2003
New York City	1,225
Other Large Cities (Buffalo, Rochester, Syracuse, Yonkers)	206
High Need / Resource Capacity - Other Urban and Suburban	357
High Need / Resource Capacity - Rural	414
Average Need / Resource Capacity	1,447
Low Need / Resource Capacity	628
Charter Schools	38

Needs of the School's Students

Within the need-to-resource-capacity (N/RC) index groups, there is marked variability between schools in the demographics of their students. As found in the development of the N/RC index, of those data available, the single factor most highly correlated with educational need is population poverty. The Department routinely collects counts of children eligible for the federal free lunch program from all public schools. Additional analysis of school performance measures used in the first New York State School Report Card confirmed that the proportion of students with limited English proficiency is also strongly related to school performance. Taken together, these two factors can account for much of the variability in school performance. A regression model of 1995-96 aggregate school performance with these two factors yields an R2 of 0.538.

Not all school districts offer federally supported free lunch programs for eligible children. As a result, not all schools reported free-lunch-eligible pupil counts. Because free lunch is an important factor in identifying appropriate school comparisons, the Department estimated these values for these schools. Using the 2000 federal census information about school district school-age poverty rates in combination with the data for schools which did report free lunch eligible pupil counts in 1996, an estimated 1996 free lunch participation was computed for schools without free lunch programs.

Using standard statistical procedures, the Department determined the relative impact of the proportion of pupils with free-lunch eligibility and the proportion of pupils with limited English proficiency on school performance in public schools statewide. By combining these two factors in the appropriate ratio, a measure of pupil need was created and used to rank-order schools within the categories defined by grade-range served and school district capabilities.

For "similar schools" comparison, the Department places the schools of each category into relatively low (lowest quartile), relatively high (highest quartile), and typical (mid-range) groups based on this pupil need measure. This identifies similar schools across the state without regard for school district boundaries. New York City has identified five groups (quintiles) within each category for use in the Annual School Report. Certain other types of schools serve unique student populations. Because these populations are defined to be high need, these other school categories do not merit the third level of distinction. The disposition of similar school groups is shown in Table 3.

Table 3: Similar Schools -- Identified by District and School Demographics

District Need/Resource Capacity (N/RC) Group	Relative Needs Indicated by Pupil Needs Statistic														Alt	Special	Other
	Elementary Schools					Middle Schools				Secondary Schools							
	Low	Mid			High	Low	Mid		High	Low	Mid		High				
New York City [2]	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11	C-12	C-13	C-14	C-15	C-16	C-17	C-18
Other Large Cities	#4	#5			#6	#22	#23		#24	#40	#41				#42	--	#55	#59
High N/RC Urban/ Suburban	#7	#8			#9	#25	#26		#27	#43	#44				#45			#60
High N/RC Rural	#10	#11			#12	#28	#29		#30	#46	#47				#48			#61
Average N/RC	#13	#14			#15	#31	#32		#33	#49	#50				#51			#62
Low N/RC	#16	#17			#18	#34	#35		#36	#52	#53				#54			#63
Special Act Institutions	#56																	

Summary

At first, the many different kinds of "similar school" might seem overly complicated. After looking at the data, however, and after considering the wide diversity of communities and student populations in the State of New York, this set of comparison groups seems to be a very reasonable compromise. It balances the need to consider each school's particular circumstances and the need to evaluate the performance of the school in comparison with schools in other communities. The model presented here encourages reasonable comparisons based on many of the challenges which districts and schools face.

Appendix C.: AP Results

CALCULUS AB		2005			2006			2007			2008		
SCHOOL	Av. # of Grads	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3
BRIGHTON H S	**295**	**24**	8%	**75%**	**21**	7%	**81%**	**20**	7%	**65%**	**46**	16%	**83%**
E. IRONDEQUOIT-EASTRIDGE H S	**207**	9	4%	67%	8	4%	100%	10	5%	60%	11	5%	73%
EAST ROCHESTER H S	**70**	17	24%	88%	15	21%	73%	16	23%	88%	23	33%	52%
FAIRPORT H S	**518**	0	0%	0%	56	11%	80%	61	12%	82%	48	9%	79%
HONEOYE FALLS-LIMA H S	**195**	35	18%	91%	31	16%	97%	49	25%	84%	34	17%	82%
PENFIELD SENIOR H S	**361**	34	9%	76%	16	4%	50%	19	5%	68%	24	7%	100%
PITTSFORD MENDON H S	**233**	0	0%	0%	69	30%	74%	72	31%	68%	70	30%	71%
PITTSFORD SUTHERLAND H S	**226**	0	0%	0%	42	19%	93%	45	20%	91%	45	20%	96%
RUSH-HENRIETTA SENIOR H S	**416**	38	9%	87%	37	9%	86%	51	12%	92%	80	19%	66%
WEBSTER SCHROEDER H S	**331**	9	3%	100%	3	1%	100%	9	3%	100%	0	0%	0%
WEBSTER THOMAS H S	**301**	21	7%	71%	16	5%	94%	16	5%	100%	15	5%	93%
W. IRONDEQUOIT-IRONDEQUOIT H S	**302**	31	10%	90%	31	10%	97%	24	8%	58%	24	8%	71%
BROCKPORT H S	**315**	23	7%	100%	13	4%	100%	23	7%	87%	23	7%	96%
CHURCHVILLE-CHILI SR. H S	**347**	32	9%	66%	36	10%	86%	27	8%	67%	30	9%	70%
GATES-CHILI SR. H S	**353**	18	5%	56%	27	8%	89%	34	10%	79%	9	3%	44%
GREECE ARCADIA H S	**276**	19	7%	53%	10	4%	50%	18	7%	11%	26	9%	50%
GREECE ATHENA H S	**307**	36	12%	33%	37	12%	54%	46	15%	50%	32	10%	66%
GREECE ODYSSEY H S	**107**	0	0%	0%	0	0%	0%	18	17%	11%	12	11%	58%
GREECE OLYMPIA H S	**260**	18	7%	56%	15	6%	73%	33	13%	48%	33	13%	21%
HILTON CENTRAL H S	**347**	49	14%	53%	47	14%	72%	52	15%	38%	39	11%	44%
KENDALL H S	**79**	0	0%	0%	0	0%	0%	3	4%	0%	6	8%	50%
SPENCERPORT H S	**300**	20	7%	55%	21	7%	62%	15	5%	47%	35	12%	54%
WHEATLAND-CHILI CENTRAL	**67**	9	13%	56%	6	9%	100%	9	13%	89%	5	7%	100%

CALCULUS BC		2005			2006			2007			2008		
SCHOOL	Av. # of Grads	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3
BRIGHTON H S	**295**	**38**	**13%**	**79%**	**47**	**16%**	**96%**	**54**	**18%**	**80%**	**46**	**16%**	**78%**
E. IRONDEQUOIT-EASTRIDGE H S	**207**	0	0%	0%	0	0%	0%	7	3%	43%	0	0%	0%
EAST ROCHESTER H S	**70**	1	1%	100%	0	0%	0%	0	0%	0%	0	0%	0%
FAIRPORT H S	**518**	0	0%	0%	32	6%	94%	30	6%	87%	55	11%	91%
HONEOYE FALLS-LIMA H S	**195**	9	5%	100%	12	6%	100%	0	0%	0%	0	0%	0%
PENFIELD SENIOR H S	**361**	45	12%	58%	39	11%	62%	17	5%	76%	14	4%	100%
PITTSFORD MENDON H S	**233**	0	0%	0%	34	15%	82%	37	16%	76%	30	13%	73%
PITTSFORD SUTHERLAND H S	**226**	0	0%	0%	15	7%	100%	59	26%	95%	51	23%	94%
RUSH-HENRIETTA SENIOR H S	**416**	0	0%	0%	0	0%	0%	32	8%	97%	15	4%	80%
WEBSTER SCHROEDER H S	**331**	11	3%	82%	0	0%	0%	26	8%	73%	18	5%	67%
WEBSTER THOMAS H S	**301**	1	0%	100%	1	0%	100%	18	6%	67%	29	10%	93%
W. IRONDEQUOIT-IRONDEQUOIT H S	**302**	14	5%	93%	13	4%	92%	34	11%	79%	27	9%	70%
BROCKPORT H S	**315**	0	0%	0%	0	0%	0%	0	0%	0%	0	0%	0%
CHURCHVILLE-CHILI SR. H S	**347**	0	0%	0%	3	1%	100%	14	4%	79%	34	10%	65%
GATES-CHILI SR. H S	**353**	22	6%	86%	13	4%	92%	18	5%	89%	22	6%	77%
GREECE ARCADIA H S	**276**	3	1%	100%	22	8%	36%	48	17%	25%	34	12%	41%
GREECE ATHENA H S	**307**	0	0%	0%	0	0%	0%	18	6%	78%	15	5%	67%
GREECE ODYSSEY H S	**107**	0	0%	0%	0	0%	0%	1	1%	100%	18	17%	44%
GREECE OLYMPIA H S	**260**	0	0%	0%	0	0%	0%	14	5%	50%	16	6%	13%
HILTON CENTRAL H S	**347**	0	0%	0%	1	0%	100%	42	12%	50%	53	15%	40%
KENDALL H S	**79**	0	0%	0%	0	0%	0%	0	0%	0%	0	0%	0%
SPENCERPORT H S	**300**	16	5%	100%	15	5%	100%	21	7%	43%	27	9%	70%
WHEATLAND-CHILI CENTRAL	**67**	0	0%	0%	0	0%	0%	0	0%	0%	0	0%	0%

AP STATISTICS		2005			2006			2007			2008		
SCHOOL	Av. # of Grads	TTL EXAMS (N)	% of Class	% GRS 3 OR >3	TTL EXAMS (N)	% of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3	TTL EXAMS (N)	Est. % of Class	% GRS 3 OR >3
BRIGHTON H S	**295**	**59**	**20%**	**68%**	**47%**	**16%**	**80%**	**54**	18%	**80%**	**23**	8%	**78%**
E. IRONDEQUOIT-EASTRIDGE H S	207							7	3%	43%	0	0%	0%
EAST ROCHESTER H S	70							0	0%	0%	0	0%	0%
FAIRPORT H S	518							30	6%	87%	55	11%	91%
HONEOYE FALLS-LIMA H S	195							0	0%	0%	0	0%	0%
PENFIELD SENIOR H S	361							17	5%	76%	14	4%	100%
PITTSFORD MENDON H S	233							37	16%	76%	30	13%	73%
PITTSFORD SUTHERLAND H S	226							59	26%	95%	51	23%	94%
RUSH-HENRIETTA SENIOR H S	416							32	8%	97%	15	4%	80%
WEBSTER SCHROEDER H S	331							26	8%	73%	18	5%	67%
WEBSTER THOMAS H S	301							18	6%	67%	29	10%	93%
W. IRONDEQUOIT-IRONDEQUOIT H S	302							34	11%	79%	27	9%	70%
BROCKPORT H S	315							0	0%	0%	0	0%	0%
CHURCHVILLE-CHILI SR. H S	347							14	4%	79%	34	10%	65%
GATES-CHILI SR. H S	353							18	5%	89%	22	6%	77%
GREECE ARCADIA H S	276							48	17%	25%	34	12%	41%
GREECE ATHENA H S	307							18	6%	78%	15	5%	67%
GREECE ODYSSEY H S	107							1	1%	100%	18	17%	44%
GREECE OLYMPIA H S	260							14	5%	50%	16	6%	13%
HILTON CENTRAL H S	347							42	12%	50%	53	15%	40%
KENDALL H S	79							0	0%	0%	0	0%	0%
SPENCERPORT H S	300							21	7%	43%	27	9%	70%
WHEATLAND-CHILI CENTRAL	67							0	0%	0%	0	0%	0%

Appendix D.: Post Graduate Student Survey

Post Graduate Survey

Thank you for taking the time to give your input about our district and to provide us information about your Brighton school experience. The purpose of the survey is to supply district staff information regarding the extent to which you believe your time at Brighton prepared you for future success. We will be collecting information until April 3, 2009.

1. Name (Optional)

2. Email address:

3. Gender

- ○ Male
- ○ Female

4. Graduation Year

- ◉ 2008
- ○ 2007
- ○ 2006
- ○ 2005
- ○ 2004

5. Future Plans - What have been your major activities since high school graduation (check all that apply)

- ☐ Attended four year college
- ☐ Attended two year college
- ☐ (Intended) Major?
- ☐ Military
- ☐ Worked full time
- ☐ Other - Specify

5. **Academic Preparation - How well do you believe your Brighton education prepared you to enter the world after high school?**

- ○ Very Prepared
- ○ Prepared
- ○ Somewhat Prepared
- ○ Not Prepared
- ○ Not Applicable

How useful were your high school courses in preparing you for the following skills? (Questions 7-21)

7. Writing for critical analysis and evaluation

- ○ Extremely Useful
- ○ Useful

- Somewhat Useful
- Not Useful
- Not Applicable

8. Reading for critical analysis and evaluation

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

9. Speaking/listening for critical analysis and evaluation

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

10. Understanding and applying mathematical concepts to solve problems

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

11. Understanding and applying scientific concepts to solve problems

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

12. Obtaining, processing and applying information using appropriate technologies

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

13. Being an independent, effective decision maker

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

14. Being a responsible global citizen

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

15. Understanding major historical ideas, themes, developments and turning points

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

16. Contributing to the economic well-being of society

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

17. Maintaining physical and emotional well being

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful
- Not Applicable

18. Being creative

- Extremely Useful
- Useful
- Somewhat Useful
- Not Useful

- [ ] Not Applicable

19. Using languages other than English to communicate

- [ ] Extremely Useful
- [ ] Useful
- [ ] Somewhat Useful
- [ ] Not Useful
- [ ] Not Applicable

20. Using knowledge and skills to establish and maintain physical fitness, participate in physical activity and maintain personal health.

- [ ] Extremely Useful
- [ ] Useful
- [ ] Somewhat Useful
- [ ] Not Useful
- [ ] Not Applicable

21. Engaging in creation and performance in the arts

- [ ] Extremely Useful
- [ ] Useful
- [ ] Somewhat Useful
- [ ] Not Useful
- [ ] Not Applicable

22. To what extent did your high school course work engage you and challenge you to achieve your maximum potential?

- [ ] Very Engaging/Challenging
- [ ] Engaging/Challenging
- [ ] Somewhat Engaging/Challenging
- [ ] Not Very Engaging/Challenging
- [ ] Not Applicable

23. When/if needed, did you receive extra academic support at Brighton to be successful?

- [ ] Yes - Specify _____
- [ ] No - If no, could you have benefited from extra support? In what subject area(s)? _____

24. To what extent have you needed to receive academic support while in college?

Questions 25 -27 are specific to math.

25. What was the last math course taken at Brighton? _____

26. My high school math courses prepared me for my college math courses.

- [ ] Agree

- Somewhat Agree
- Somewhat Disagree
- Disagree
- Not Applicable

27. What math courses have you taken since leaving Brighton?

Questions 28-29 are specific to information technology.

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28. My training to use computers and associated software and online resources adequately prepared me to accomplish the tasks I've faced since leaving Brighton.

- Strongly Agree
- Agree
- Not Sure
- Disagree
- Strongly Disagree

29. What other type of training/experiences would you have benefited from in the area of information technology?

Appendix E.: Parent Survey

Brighton Central School Math Parent Survey

As part of our K-12 curriculum evaluation process, we are collecting insights from parents about their child's math instruction and his/her growing mathematical literacy. Thank you for taking the time to answer the following questions and contributing to our program evaluation. (Note: For parents with children in different buildings, you may either complete a single survey or multiple surveys for each of your children.)

For what level of student(s) will you be answering questions on this survey? (Check all that apply)
_____ K-2
_____ 3-5
_____ 6-8
_____ 9-12

Overall, I see my child choosing to actively engage in mathematical thinking and problem solving.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

I see my child using strategies to attempt difficult mathematical tasks.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

My child has a reasonably good attitude toward math.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

I believe the mathematics program meets the learning needs of my child and enables him/her to advance to the next level.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

I believe the mathematics program allows my child to develop basic mathematical concepts.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

I clearly understand the math materials (textbooks, worksheets, etc) and their purposes.
_____ Strongly Agree
_____ Agree

_____ Not Sure
_____ Disagree
_____ Strongly Disagree

I clearly understand what the math assignments are.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

I am able to assist my child with his/her homework.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

I have enough information about the math curriculum and expectations for my child.
_____ Strongly Agree
_____ Agree
_____ Not Sure
_____ Disagree
_____ Strongly Disagree

Based upon your answer to the previous question, how would you like additional information to be shared?

Please share any comments about how well your child's needs are being met in math class.

Appendix F.: Teacher Survey

Mathematics K-12 Indicators of Organizational Effectiveness

Experience Level	The Majority of Your Time is Spent Teaching	Role in Your School
○ Less than 1 year	○ K – 2	○ Teacher
○ 1 – 3 years	○ 3 – 5	○ Co-Teacher (Sp. Ed.)
○ 4 – 10 years	○ 6 – 8	○ Sp.Ed. (Self-Contained)
○ 11 – 20 years	○ 9 – 12	
○ More than 20 years		

Directions: As you review the following set of indicators of instructional and organizational effectiveness you need to consider to what extent each of these indicators is reflected in the work of your school. On the following 5-point scale determine the level of implementation of these indicators of quality and mark your response in the bubble adjacent to each statement of the indicators.
A = Exemplary level
B = Fully functioning and operational
C = Evidence of progress, but not fully operational
D = Low level of development and/or implementation
E = No evidence of the indicators of quality

Curriculum: The curriculum is designed to support students' achievement of standards.

○○○○○	The design of the curriculum includes the development of tasks that are based on sound and significant mathematics.
○○○○○	The curriculum is designed to engage students' intellect.
○○○○○	The curriculum is designed to develop students' mathematical understandings and skills.
○○○○○	The curriculum stimulates students to make connections and develop a coherent framework for mathematical ideas.
○○○○○	The curriculum calls for problem formulation, problem solving and mathematical reasoning.
○○○○○	The curriculum promotes communications about mathematics.
○○○○○	The curriculum represents mathematics as an ongoing human activity.
○○○○○	The curriculum reflects sensitivity to, and draws on, students' diverse background experiences and dispositions.
○○○○○	The design of the curriculum reflects knowledge of students' understanding, interests, and experiences.

□□□□□ The design of the curriculum reflects an understanding of the range of ways that diverse students learn mathematics.

□□□□□ The curriculum promotes the development of all students' dispositions to do mathematics.

□□□□□ The mathematics curriculum is clearly articulated and enables students to access course/grade level standards.

□□□□□ The curriculum is organized into large units of study with a focus on rich connections, depth of conceptual development, and specific end products (data studies, investigations, design challenges).

□□□□□ The curriculum enables students to make conceptual connections to real-life applications, other disciplines, and other areas within the discipline.

□□□□□ The curriculum promotes rich mathematical discourse through activities integrating multiple representations, models, symbols, patterns, relationships and inquiry.

□□□□□ Mathematics is evidenced in integrated programs incorporated in the educational program.

□□□□□ Explicit planning takes place to ensure the effective use of technology is integrated across the curriculum to support, reinforce, and extend math learning.

□□□□□ The school provides regular opportunities for teachers to review and refine mathematics curriculum using observable and quantifiable data to inform their work.

Instruction: The design of teaching strategies and learning activities for mathematics instruction should take into account the quality of the learning tasks, discourse and classroom environment, and should incorporate systematic reflection.

□□□□□ Teachers orchestrate discourse by posing questions and tasks that elicit, engage and challenge each student's thinking.

□□□□□ Teachers listen carefully to students' ideas and ask students to clarify and justify their ideas orally and in writing.

□□□□□ Teachers orchestrate discourse by deciding what to pursue in depth from among ideas that students bring up during a discussion.

□□□□□ Teachers carefully decide when and how to connect mathematical notation and language to students' ideas.

□□□□□ Teachers effectively decide when to provide information, when to clarify an issue, when to model, when to lead, and when to let a student struggle with a difficulty.

□□□□□ Teachers monitor students' participation in discussions and decide when and how to encourage each student to participate.

□□□□□ Teachers promote classroom discourse in which students listen to, respond to, and question the teacher and one another.

□□□□□ Teachers encourage students to use a variety of tools to reason, make connections, solve problems, and communicate.

□□□□□ Teachers encourage students to initiate problems and questions.

□□□□□ Teachers encourage students to make conjectures and present solutions.

□□□□□ Teachers encourage students to explore examples and counterexamples to investigate a conjecture.

□□□□□ Students are encouraged to try to convince themselves and one another of the validity of particular representations, solutions, conjectures, and answers.

□□□□□ Teachers encourage students to rely on mathematical evidence and argument to determine validity.

□□□□□ In order to enhance discourse, teachers encourage and accept the use of computers, calculators, and other technology.

□□□□□ Teachers encourage the use of concrete materials used as models, and pictures, diagrams, tables, and graphs.

□□□□□ Teachers encourage and accept the use of invented and conventional terms and symbols, metaphors, analogies and stories, written hypotheses, explanations, and arguments, and oral presentations and dramatizations.

□□□□□ Teachers create a learning environment that fosters the development of each student's mathematical power by providing and structuring the time necessary to explore sound mathematics and grapple with significant ideals and problems.

□□□□□ The learning environment is designed to use the physical space and materials in ways that facilitate students' learning of mathematics.

□□□□□ The learning environment provides a context that encourages the development of mathematical skill and proficiency.

□□□□□ The learning environment fosters the value of respecting students' ideas, ways of thinking, and mathematical dispositions by consistently expecting and encouraging students to work independently or collaboratively to make sense of mathematics.

□□□□□ The learning environment supports students' development of mathematical competence by validating and supporting ideas with mathematical arguments.

□□□□□ The classroom environment offers a secure place for students to take risks and make mistakes.

□□□□□ Teachers engage in ongoing analysis of teaching and learning by observing, listening to, and gathering other information about students to assess what they are learning.

□□□□□ Teachers frequently examine the effects of the tasks, discourse, and learning environment on students' mathematical knowledge, skills, and dispositions.

□□□□□ Teachers focus on ensuring that every student is learning sound and significant mathematics.

□□□□□ Teachers provide learning opportunities designed to challenge and extend students' ideas.

□□□□□ Teachers adapt or change activities while teaching to respond to the learning needs of students.

□□□□□ Teachers describe and comment on each student's learning to parents and administrators, as well as to the students themselves.

□□□□□ Teachers enable students to connect new work to previous learning.

□□□□□ The integration of ideas and concepts is sustained through a variety of activities and tools.

□□□□□ Attention to math language and its explicit meaning is reinforced regularly.

□□□□□ Students have time to construct meaning and make sense of mathematical ideas and concepts.

□□□□□ The instructional time provided for learning is flexible and is scheduled to meet the needs of students.

□□□□□ Teachers design instruction recognizing the developmental challenges of students and tailor activities to maximize their learning opportunities.

□□□□□ Teachers are cognizant of the social and affective development of students, and are sensitive to diverse cultures by creating a caring and affirming environment.

□□□□□ Students are encouraged to persist on problems, try a variety of solution techniques, and to help each other.

Assessment: The assessment system should be based on a process of gathering evidence about students' knowledge of, ability to use, and disposition toward mathematics, and of making inferences from that evidence for a variety of purposes.

□□□□□ Assessments reflect the mathematics that all students need to know and be able to do so.

□□□□□ Assessments of student learning enhance learning.

□□□□□ Assessments promote equity by expecting that all students, including those with special needs or talents, reach high levels of accomplishment. Each student is given opportunities to reach those levels and the necessary support to do so.

□□□□□ Assessments are conducted as an open process by informing students about what they need to know, how they will be expected to demonstrate that knowledge, and what the consequences of the assessment will be.

□□□□□ Assessments promote valid inferences about mathematics learning.

□□□□□ Assessments reflect a coherent process by matching the assessment with the purpose for which it is being done.

□□□□□ Methods and tasks for assessing students' learning are aligned with the curriculum's goals, objectives, mathematical content, relative emphases given to various topics, and instructional approaches and activities, including the use of calculators, computers, and manipulatives.

□□□□□ Decisions concerning students' learning are made on the basis of a convergence of information obtained from a variety of sources. These sources encompass tasks that demand different kinds of mathematical thinking, and present the same mathematical concept or procedure in different contexts, formats and problem situations.

□□□□□ Assessment methods and instruments are selected on the basis of the type of information sought, the use to which the information will be put, and the developmental level and maturity of the student.

□□□□□ Assessments are used for the purpose they were designed for and not for multiple purposes.

□□□□□ Assessment is provided on a continuous basis and feedback is used as a source of information to improve teaching and learning.

□□□□□ Models and exemplars of accomplishments on specific ideas, concepts, and task assist students' planning for learning.

□□□□□ Opportunities are provided for students' revision of their work.

Appendix G: NCTM Rubric

	Problem Solving	Reasoning and Proof	Communication
NOVICE	No strategy is chosen, or a strategy is chosen that will not lead to a solution Little or no evidence of engagement in the task present.	Arguments are made with no mathematical basis. No correct reasoning nor justification for reasoning present.	No awareness of audience or purpose is communicated. - or – Little or no communication of an approach is evident - or – Everyday, familiar language is used to communicate ideas
APPRENTICE	A partially correct strategy is chosen, or a correct strategy for only solving part of the task is chosen. Evidence of drawing on some previous knowledge is present, showing some relevant engagement in the task.	Arguments are made with some mathematical basis. Some correct reasoning or justification for reasoning is present with trial and error, or unsystematic trying of several cases.	Some awareness of audience or purpose is communicated, and may take place in the form of paraphrasing of the task. - or – Some communication of an approach is evident through verbal/written accounts and explanations, use of diagrams or objects, writing, and using mathematical symbols. - or – Some formal math language is used, and examples are provided to communicate ideas.
PRACTITIONER	A correct strategy is chosen based on mathematical situation in the task. Planning or monitoring of strategy is evident. Evidence of solidifying prior knowledge and applying it to the problem solving situation is present. Note: The practitioner must achieve a correct answer.	Arguments are constructed with adequate mathematical basis. A systematic approach and/or justification of correct reasoning is present. This may lead to... ▪ clarification of the task. ▪ exploration of mathematical phenomenon. ▪ noting patterns, structures and regularities	A sense of audience or purpose is communicated. - and/or - Communication of an approach is evident through a methodical, organized, coherent sequenced and labeled response. Formal math language is used throughout the solution to share and clarify ideas.
EXPERT	An efficient strategy is chosen and progress towards a solution is evaluated. Adjustments in strategy, if necessary, are made along the way, and / or alternative strategies are considered. Evidence of analyzing the situation in mathematical terms, and extending prior knowledge is present. Note: The expert must achieve a correct answer.	Deductive arguments are used to justify decisions and may result in formal proofs. Evidence is used to justify and support decisions made and conclusions reached. This may lead to... ▪ testing and accepting or rejecting of a hypothesis or conjecture. ▪ explanation of phenomenon. ▪ generalizing and extending the solution to ▪ other cases.	A sense of audience and purpose is communicated. and/or Communication at the practitioner level is achieved and communication of argument is supported by mathematical properties. Precise math language and symbolic notation are used to consolidate math thinking and to communicate ideas.

Appendix H. Principles of Instructional Effectiveness of Schools of Quality

Principles of the Instructional Effectiveness of Schools of Quality

I. **Curriculum**
- **Develops a Quality Curriculum**
  The curriculum is based on clearly defined standards for student learning and is focused on supporting and challenging all students to excel in their learning.
- **Ensures Effective Implementation and Articulation of the Curriculum**
  The curriculum implementation plan ensures the alignment of teaching strategies and learning activities, instructional support and resources, and assessments of student learning with the curriculum. The coordination and articulation of the curriculum leads to a shared vision for student learning held by teachers at each grade level, and parents and community members.
- **Evaluates and Renews the Curriculum**
  There is a systematic process in place for monitoring, evaluating and renewing the curriculum that reflects a commitment to continuous improvement.

II. **Instruction Design**
- **Aligns Instruction with the Goals and Expectations for Student Learning**
  Instructional strategies and learning activities are aligned with the goals and expectations for student learning.
- **Employs Data-Driven Instruction Decision Making**
  The instructional and assessment functions of the teaching process are integrated to support data-driven instructional decision making.
- **Actively Engages Students in their Learning**
  Students' engagement in their learning is maximized by employing effective classroom management and organizational strategies, by establishing a positive academic learning climate, and by emphasizing both essential knowledge and skills for student learning and higher order thinking skills.
- **Expands Instructional Support for Student Learning**
  Students are provided with a variety of opportunities to receive additional assistance to improve their learning, beyond initial classroom instruction.

III. **Assessment**
- **Clearly Defines the Expectations for Student Learning to be Assessed**
  Assessments of student learning are aligned with clearly specified and appropriate achievement expectations.
- **Establishes the Purpose of the Assessment**
  Assessments arise from and are specifically designed to serve instructional purposes specified by the users of the results of the assessments.
- **Selects the Appropriate Method of Assessment**
  Assessments are developed using a method that can accurately reflect the intended goals for student achievement and serve the intended purpose.
- **Collects a Comprehensive and Representative Sample of Student Achievement**
  The student learning assessment system provides for the collection of a comprehensive and representative sample of student performance that is sufficient in scope to permit confident conclusions about student achievement and yield generalizable results.
- **Develops Fair Assessments and Avoids Bias and Distortion**
  Assessments are designed, developed, and used in a fair and equitable manner that eliminates any source of bias or distortion which might interfere with the accuracy of results.

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