# School Administrative Unit 39 

## Comprised of the Amherst, Mont Vernon and Souhegan School Districts

Mathematics Program Review<br>Phase I Report

August 10, 2010

# SAU 39 Mathematics Program Review Committee 

Jen Eccleston, Math Coach (C/W)<br>Liz Alexakos, Kindergarten Teacher (C/W)<br>Shakeh Dagdigian, $3^{\text {rd }}$ Grade Teacher, CFG Coach (MVVS)<br>Sue Blair, Principal (MVVS)<br>Lesli Rendall, Parent (MVVS)<br>Mary Beth Gilpin, $4^{\text {th }}$ Grade Teacher (C/W)<br>Kim Tighe, $4^{\text {th }}$ Grade Teacher, (MVVS)<br>Tiffany Maher, $5^{\text {th }}$ Grade Teacher (AMS)<br>Christine Estabrook, $5^{\text {th }}$ Grade Teacher, CFG Coach (AMS)<br>Karen Oates, Parent (Amherst School District)<br>Corey Cranney, $7^{\text {th }}$ Grade Teacher (AMS)<br>Nancy Monks, $8^{\text {th }}$ Grade Teacher (AMS)<br>Donna Hamel, Math Coach (AMS)<br>Amy McGuigan, Math Coach/Specialist, CFG Coach (SHS)<br>Alan McGuy, Parent (SHS)<br>Joann McDeed, $11^{\text {th }}$ Grade Teacher (SHS)<br>Jane Flythe, Special Education Teacher (SHS)<br>Scott Prescott, Math Coach, CFG Coach (Consultant)<br>Crista Burrel, Parent, Volunteer Math Consultant/Facilitator<br>Nicole Heimarck, Director of Curriculum and Professional Development

## Table of Contents

Executive Summary ..... 1-6
Part I - Overview of Math Program Review (MPR) Process ..... 7-8

* Phase 1 Process ..... 8-10
* Mathematics Review Committee ..... 11
* Data Collection, Research, \& Analysis ..... 13-15
* Vision Development Process \& Related Outcomes ..... 16
Part II - Committee Findings
* Vision ..... 17-19
* Learning Environment ..... 20-21
* Equity ..... 22-23
* Student Identity ..... 23
* Curriculum ..... 24-26
* Instruction ..... 26-27
* Assessment ..... 27-28
* Community ..... 28-29
* Professional Learning ..... 29-30
Appendices
Trends from Math Vision Forums ..... 31
Math Case Study ..... 32-33
Blank Surveys
Student Survey ..... 34-37
Staff Survey ..... 38-42
Parent Survey ..... 43-46
Indicators of a Strong Survey ..... 47-48
SWEEP Protocol ..... 49-51
Vision \& Research Alignment ..... 49-51


## EXECUTIVE SUMMARY

The SAU 39 Math Program Review Committee, encompassing the districts of Mont Vernon (K6), Amherst (K-8) and Souhegan (9-12), engaged in Phase 1 of a review process from October 2009 through June 2010. The purpose of this summary is to communicate the vision principles and highlight program strengths and areas for improvement. The report provides details supporting these findings.

The Math Program Review Committee created a vision statement to guide teaching and learning of Mathematics in SAU 39. The vision is based on the SAU 39 Mission "to engage, support and challenge all learners," the NH State Frameworks, the National Council of Teachers of Mathematics guiding documents, national and international studies, and feedback from parents, staff and students in our district. The vision consists of a general statement and eight principles: Curriculum, Instruction, Assessment, Classroom Environment, Equity, Student Identity, Community, and Professional Learning. These vision elements are listed below along with the committee's findings on program strengths and areas for improvement.

## SAU 39 Mathematics Program Vision (Draft, 6/10)

We envision a community where all learners see the beauty, functionality, and value of Mathematics, and are empowered by the opportunities Mathematics affords.; We envision a community where students approach the study of Mathematics with curiosity and confidence and are supported on their journey by knowledgeable, enthusiastic, and skilled adults.

## Learning Environment

The design of the instructional environment considers both the physical and emotional aspects of learning. An emotionally safe and respectful environment promotes deep inquiry and risk taking, essential elements in the learning process. The physical environment utilizes effective resources, including relevant technology, to promote mathematical learning for all.

Learning Mathematics in the classroom is fun according to most teachers and students. Both home and school environments are embedded in the belief that "All students can learn Math." The SAU 39 learning environment includes Mathematics Coaches (K-8) and a Math Specialist (Grades 9-12) to support student learning.

Areas for Growth and Improvement

* Increase human resources to support student learning.
* Create consistent norms for technology use at the elementary level across the district.
* Create consistent access (for students and teachers) across schools to technology resources that support Mathematics instruction.


## Equity

We are dedicated to meeting the needs of all students at their current level of math development, and to fostering their continued individual growth. All students have equal opportunities to access complex and challenging Mathematics so that they are prepared for future endeavors.

Mathematics Coaches (K-8) and a Math Specialist (9-12) support student learning in the classroom, while programs like Math Modules (SHS) and Math Counts (CW Elementary School) provide additional learning opportunities for struggling students. To provide access to complex and challenging Mathematics, there is a wide range of advanced courses available at grades 7-12, with multiple entry points for students to advance or accelerate their learning. In grades K-6, flexible grouping is designed to provide students the same access to new challenges in Mathematics as they attain mastery of prerequisite skills and knowledge.

## Areas for Growth and Improvement

* Students who fall within special sub-groups (special education, economically disadvantaged, and other demographic groups) routinely do not have their learning needs met within Mathematics programming.
* There is a need for a consistent process across schools for grouping students K-6.
* Teachers need additional support and training to successfully implement differentiated instruction in the classroom.
Add from AMS SINI report


## Student Identity

Students understand where they are on the continuum of learning and advocate for themselves as needed. They challenge themselves to grow beyond their comfortable limits. Learners see themselves as capable, approaching Mathematics with a spirit of perseverance and inquiry.

Two-thirds of SAU 39 students surveyed report high confidence in their ability to do Math, while the other one-third report that they can sometimes do Math. This general "can do Math" attitude is demonstrated by the large numbers of students who take an extra year of Mathematics at SHS, exceeding the number of courses required by SHS and State of NH. Most students at Souhegan High School report that they are challenged by the Mathematics program.

Areas for Growth and Improvement

* Involve students in crafting their own learning goals and opportunities by promoting self-directed learning and in-depth mathematical inquiry beyond the grade-level expectations.


## Curriculum

The SAU 39 Math Curriculum is a K-12 vertically aligned curriculum, informed by state, national, and global standards and designed to facilitate depth of inquiry and understanding. A developmentally appropriate scope and sequence, which scaffolds and spirals, provides the framework for mastery by all students. The integration of math with science, technology, and other content areas is crucial to the success of our learners in the $21^{\text {st }}$ century.

Alignment of curriculum resources with current grade level expectations is complete for most grades in both Amherst and Mont Vernon. Teachers report using a combination of SAU 39 curriculum documents, NH State Frameworks and NCTM Standards when planning lessons. They also report the use of a variety of calculators in classrooms as determined by the teacher. Surveyed parents mention an appreciation for the integration of real world examples in the Mathematics curriculum.

Areas for Growth and Improvement

* Curriculum needs to be updated to meet the following criteria:
o Align with new NH State Frameworks, NCTM Standards \& considers International Benchmarks.
o Communicate clearly the vision for Mathematics education to all stakeholders.
o Promote consistency and smooth transitions across all schools in SAU 39.
o Include opportunities for depth and enrichment.
o Provide a variety of remediation materials.
o Include real world application and inquiry.
o Communicate clearly to students the importance of Mathematics in the world and to their future.
o Place strong emphasis on number sense for K-4.
o Provide resources for support in learning at home.
* Explore existing programs in area schools with a goal of adopting and implementing a common K-6 program for all students in SAU 39.
* Devise a curriculum implementation plan with teacher support to ensure consistency of implementation of curriculum across the district.


## Instruction

Each student has a unique learning style and knowledge base. Instruction is designed to build upon prior knowledge and to make connections to new learning. Differentiated instruction ensures equitable, meaningful Mathematics learning for all students by considering the variety of learners present.

Presently, SAU 39 has a concentrated focus on Differentiated Instruction (DI) as a tool for building from prior knowledge and making connections to new learning. Differentiated Instruction is defined by Carol Ann Tomlinson (as cited by Ellis, Gable, Greg, \& Rock, 2008, p. 32), as the process of "ensuring that what a student learns, how he/she learns it, and how the student demonstrates what he/she has learned is a match for that student's readiness level, interests, and preferred mode of learning". Through training and school-based coaching with DI facilitators, teachers are working toward mastering the techniques in order to improve instruction and student learning. Teachers' survey responses indicate a strong knowledge of grade-level expectations as well as confidence in their ability to meet those expectations. Parents believe that SAU 39 is comprised of many skilled teachers.

## Areas for Growth and Improvement

* Increase consistency in instructional practices among grade-levels and courses.
* Use assessment to inform instruction. Currently assessment is used primarily as a summative tool to describe student achievement.
* Provide staff development to support the use of differentiated instruction techniques specifically in Mathematics.


## Assessment

The purpose of assessment is to inform instruction, as well as to measure and celebrate individual growth. The assessment process promotes individual goal setting and encourages self-directed learning. Assessments in themselves are learning opportunities and, as such, are worthy of students' time and attention.

Presently, a wide range of assessments are offered to students to showcase their mastery and achievement within Mathematics classes. Recent progress has been demonstrated in developing and committing to the use of common assessments outside of the standardized tools already used. This is most evidenced in grades 7-10 within the Integrated Mathematics Program.

## Areas for Growth and Improvement

* Use assessment to inform instruction, individual goal setting, and future learning. .
* Ensure a consistent approach to providing student support during summative assessments.
* Consistently use common assessments across the district and within a grade level.
* Presently SAU 39 relies heavily on NECAP and NWEA data to communicate schoolwide trends in Mathematics. What would you want to be different? What improvements do you hope to see?


## Community

The broader community, in partnership with the schools, plays a significant role in promoting mathematical inquiry. The partnership between home and school will develop a strong connection for students through informational exchanges and respectful communication. Collaboration with the community provides real world application.

Presently, there are several ways in which the broader community supports student learning. Extra-curricular activities that support the development of Mathematical understanding exist for students K-12, including programs like Robotics, Family Math Night, Summer Math Camp, and Chess Club. Clark/Wilkins has provided Math Fun packets designed to engage students while traveling on summer vacation. At home, students are supported in their learning by highly educated parents, most of whom feel capable of helping with homework through post-secondary curriculum. According to the SAU 39 parent survey, parents value Mathematics education and enjoy learning and doing Math. Parent response indicates that communication is important in maintaining the home-school connections. Most parents feel comfortable initiating communication with their child's teacher, according to the survey.

Areas for Growth and Improvement

* Provide resources to support student learning at home.
* Identify additional ways to further involve the community in collaborative Mathematics learning (i.e. - extra-curricular enrichment opportunities).
* Improve communication with caregivers to strengthen the home-school connection.


## Professional Learning

Professionals engage in deep inquiry about their practice. They feel supported and challenged in their endeavors to meet the ever-changing and increasing needs of their students. A variety of collaborative and reflective practices are embedded within the professional learning community. Learning opportunities are based on both individual and district goals which are designed to improve student learning.

Teachers feel that their understanding of Mathematics supports student learning, the SAU survey findings indicate. Faculty members continue to deepen their understanding of Mathematics pedagogy and content through professional learning experiences. Most teachers view themselves as part of a collaborative team working to improve student learning. The district has carved out common time for professional learning through monthly "late-start" sessions. Teachers in Critical Friends Groups at SHS and Professional Learning Communities at AMS support each others' teaching and learning through deep inquiry into aspects of teaching practice and student
performance data. At Clark/Wilkins and the Mont Vernon Village School, collaborations are organized informally among staff or through work with the Mathematics coach.

Areas for Growth and Improvement

* Improve consistency in evaluation processes across the district to support and measure professional growth and learning as it impacts student learning.
* Create a focused, district-wide professional development plan to support changes in curriculum and teaching practices suggested through the Program Review Process.
* Continue professional learning in the area of differentiated instruction with a focus on teaching and learning Mathematics.


## Part I - Mathematics Program Review Process

## Program Review Process Cycle



School Administrative Unit (SAU) 39, comprising the Amherst, Mont Vernon, and Souhegan School Districts continuously strives to improve programs which impact teaching and learning for all students.

We are a collaborative learning community built upon the belief that opportunities for students and the related outcomes must demonstrate steady growth over time. To ensure continued progress, SAU 39 has created a Program Review Process, which periodically and formally evaluates programs impacting the quality of teaching and learning within and across our schools.

The shift to a "Program Review" model highlights a redesign in SAU 39's practice of "Curriculum Revision." Program Review is a process that produces continuous, systematic improvement through a data inquiry model fostering a strong professional collaborative culture within and across our school communities. The method involves all stakeholder groups and makes public both the process and outcomes of the committee work. A Program Review Committee (PRC) completes four phases: Study, Plan, Implementation, and Review.

## Phase 1: Vision and Self Study

The committee commences the review with a discussion of its program vision. It addresses the question, "What is our vision for a program that prepares students for the $21^{\text {st }}$ century?" This discussion is informed by national and international literature that highlights current best practice. Once the committee has collectively identified a program vision, it begins assessing the current condition of the program, asking, "What does our current data say about where we are?" Phase 1 concludes with the publication and public presentation of a Self-Study Report. Ultimately, the report details the gaps between where the program is and where the committee envisions it being. Forums are then held to solicit public input on making the transition from Phase I to Phase II of the Program Review Process.

## Phase 2: Develop a Program Improvement Plan

The Program Improvement Plan is designed to target areas for growth and improvement; also included in the plan are strategies, resources, funding, priorities, a timeline for implementation, and indicators of success.

## Phase 3: Implementation

Administration, Curriculum Coordinators, Coaches, and other designated leaders are charged with putting Phase II plans into action with the support of the school boards, appropriate funding, and professional development. It is the responsibility of these leaders to ensure faculty has the support to implement the recommendations with fidelity and integrity. Implementation is periodically and formatively assessed.

Phase IV - The final phase is comprised of a two step process in which both the method of Program Review and the content of the particular review are assessed. The program under review receives a summative evaluation to contrast with or confirm the indicators of success identified in Phase II. This analysis and reflection is designed to improve the process but also ensure efficacy in and accountability for the actions and implementation documented by the Program Review Committee.

Updates on Program Review Committee work are periodically offered to the full administrative team and SAU 39 School Board. More detailed information on the Program Review process may be accessed by visiting the curriculum link on the SAU website, www.sprise.com.

## B. Mathematics Program Review

Phase 1
Mathematics officially entered the Program Review cycle in October of 2009 when the Facilitator and Co-facilitator began mapping the scope of the work for Phase I. The full committee launched their work in November 2009. A series of six full-day meetings involving the complete committee were held during the 2009-2010 instructional year. Sub-committee work occurred intermittently between full committee meeting dates.

The committee posed the following question of inquiry: "What is our vision for a Mathematics program that prepares students for the $21^{\text {st }}$ century?" National and international literature highlighting current best practices informed the discussion. The committee posed questions about current SAU 39 practices and about what the available data reveals about the status of the district’s Math program.

Phase 1 concluded with the publication and public presentation of a Self-Study report, published spring of 2010. The report details the gaps between where the program is and where the committee envisions it being.

The committee then held a series of forums in the winter of 2010 to seek public input before transitioning to Phase II of the Program Review Process.

The summer of 2010 will mark the transition between Phases I and II of the Mathematics Program Review. Two full-day committee meetings (July $7^{\text {th }}$ and $8^{\text {th }}$ ) will be financially supported by all three school boards within their operating budgets. The subject of these meetings will focus on "Areas for Further Inquiry" identified within the Self-Study report. The committee will also use the time to develop a scope and sequence for work to be completed during Phase II of the Mathematics Program Review. The full report may be accessed on both our SAU and school websites www.sprise.com.

## Phase I Meeting Schedule

| Meeting Date | Agenda |
| :---: | :---: |
| 11/23/09 | Group Norms <br> National and International Literature Review 2010 Mathematics Vision Development |
| 12/10/09 | Text-based discussion: sample vision statements from other districts <br> Text-based discussion: survey research and perception survey development (students, staff, and parent/community) <br> Discuss and plan a process for collecting stakeholder feedback on draft vision <br> Process and analyze Performance Tracker data |
| 1/15/10 | Text-based discussion: Peter Senge <br> Build criteria for a vision from reading existing vision statements <br> Measure current vision work against the criteria <br> Craft "draft vision" <br> Create questions for whole committee tuning |
| 1/29/10 | Tune and build committee consensus on new Mathematics Vision Plan process for collecting stakeholder feedback: vision forums Draft parent and staff perception survey; evaluate responses using common rubric |
| 5/14/10 | Process and analyze parent and staff survey data <br> Identify areas of strength and weakness within vision categories and in contrast to SAU 39 mission statement (preliminary review) <br> Identify outstanding data needed for June meeting and completion of self study report |
| 6/10/10 | Data processing and analysis of student surveys, longitudinal NWEA data, assessment data, resource data, curriculum support (personnel), and challenge data <br> Definitive identification of areas of strength, areas for growth/improvement, and areas for further inquiry among each of the vision elements |

Please reference appendices and archives to view documents in support of the above meeting schedule.

## C. Committee Membership

Membership on the Mathematics Program Review Committee was solicited through an application process. The process for community members and staff mirrored one another, ensuring equity across the stakeholder groups. A process for student application was not created because of the commitment level required; rather, it was decided that student voice would be secured through other methods within the review process itself. Student feedback was sought from all students currently enrolled in SAU 39.

The opportunity to apply for committee membership was announced and advertised through school newsletters, targeted e-mail blasts to stakeholder groups, and individual communications when families did not have computer access.

An application process was created to ensure that participation requirements could be met. Those requirements included: a diverse and proportionate representation of our community and staff, a two year commitment to see Phases I and II to completion, a commitment to meeting dates which were provided in the application itself, a willingness to enter the process with openness and a spirit of inquiry, the ability to maintain confidentiality and foster a professional learning environment where all participants were comfortable offering insights and ideas.

The response to the application process was overwhelming. Vast faculty and community interest was demonstrated. For manageability and productivity reasons not all applicants could be included on the committee. In an effort to cast a wide net promoting inclusion of all voices, community and staff forums were facilitated during the winter months followed by anonymous parent and staff surveys.
D. Mathematics Program Review Committee Membership 2009-2011

Grades K-3
$>$ Jen Eccleston, Math Coach (C/W)
$>$ Liz Alexakos, Kindergarten teacher (C/W)
$>$ Shakeh Dagdigian, $3^{\text {rd }}$ grade teacher, CFG Coach (MVVS)
$>$ Sue Blair, Principal (MVVS)
> Lesli Rendall, Parent (MV School District)

Grades 4-6
$>$ Mary Beth Gilpin, $4^{\text {th }}$ grade teacher (C/W)
$>$ Kim Tighe, $4^{\text {th }}$ grade teacher, (MVVS)
$>$ Tiffany Maher, $5^{\text {th }}$ grade teacher (AMS)
$>$ Christine Estabrook, $5^{\text {th }}$ grade teacher, CFG Coach (AMS)
> Karen Oates, Parent (Amherst School District)
Grades 7-9
$>$ Corey Cranney, $7^{\text {th }}$ grade teacher (AMS)
$>$ Nancy Monks, $8^{\text {th }}$ grade teacher (AMS)
$>$ Donna Hamel, Math Coach (AMS)
$>$ Amy McGuigan, Math Coach/Specialist, CFG Coach (SHS)
> Alan McGuy, Parent (SHS)
Grades 10-12
$>$ Joann McDeed, $11^{\text {th }}$ grade teacher (SHS)
$>$ Jane Flythe, Special Education (SHS)
> Scott Prescott, Math Coach, CFG Coach (Consultant)

## Co-facilitators

> Crista Burrel, Parent Volunteer
> Nicole Heimarck, Director of Curriculum and Professional Development
Occasionally community members and educational consultants with targeted expertise were brought in to assist with specific committee tasks. Much of the outside expertise fell into the category of data collection and analysis.

## E. Data Collection, Research and Analysis

The 2010-2011 Mathematics Program Review Phase I process marked the first time SAU 39 conducted a formalized, comprehensive data collection process across all schools. Many lessons were learned within this process which will be highlighted in a later section of this report.

## Data and Research Resources

* Literature Review - Current literature relating to the teaching and learning of Mathematics content was vetted by individuals and a small sub-committee. A comprehensive list was compiled for review by all committee members during Phases I and II of Program Review. Selections from this research is available on the main page of the SAU 39 website www.sprise.com (please view the bottom left of the page).
* Goals 2000 - The original revision to SAU 39’s Mathematics program occurred in 2000 with the publication of a new curriculum titled Goals 2000. This document was used to resurrect the history of Mathematics education across SAU 39. Within this document a curricular scope and sequence was outlined detailing the body of research which informed it. Absent from the report were specific recommendations on how to achieve the goals of the revision, a detailed roll-out plan, and a system-wide collaborative decision-making model involving all stakeholders. A Case Study of Math Curriculum Review Implementation was created in April of 2010 as an access point to this historical detail. It provides a summation of this history and implies lessons that may be learned. (See appendix for document.)
* Mathematics Personnel Resources and Support - The Mathematics Program Review Committee reviewed the personnel resources allocated to the teaching of Mathematics across our schools. This information was provided to the SAU by each building principal in collaboration with Mathematics Curriculum Coordinators. Concurrently, the full administrative team reviewed the job descriptions, time allocations, and actual practices of Mathematics Coaches in contrast to Literacy Coaches. Within this study it was discovered that school-based literacy resources in personnel are far richer than those in Mathematics. For this reason, SAU 39's coaching model in Mathematics cannot be actualized to levels witnessed within literacy.
* Mathematics Material Resources - Each building-based Mathematics Curriculum Coordinator was tasked with compiling a list of the Mathematics resources utilized at the building level. The guiding question in collecting this data was, "What are our current resources in each building and how are they used?" Narrative information was submitted, supplemented by discussions within Program Review Committee meetings. It was discovered that there may be a wealth of material collected over time, however consistency between core and supplementary resource materials is lacking. The actual materials used by buildings and grade levels were not viewed by the committee.
* Assessment Data - Each building-based Mathematics Curriculum Coordinator was asked to write a narrative detailing information on building-based assessment practices and artifacts. The Coordinators were provided with a list of guiding questions in an effort to collect data on consistent indicators:
- What Mathematics assessments are common by grade level and/or course?
- Are these assessments implemented?
- Approximately how long have the assessments existed?
- How are common assessments used within your building?
- Which assessments are not common?
- What methods are used to ensure that expectations for student learning are shared by grade levels and/or courses if common assessments do not exist?
* Challenge Data - Each building-based Mathematics Curriculum Coordinator was asked to write a narrative detailing methods used within their buildings to challenge learners within the Mathematics program. The coordinators were provided with a list of guiding questions in an effort to collect data on consistent indicators:
- How do we currently challenge all learners?
- What structures are in place in the building to deliver challenging Mathematics programming?
- Where are challenge opportunities consistent and where do they vary? Why?
* Longitudinal Assessment Data - Longitudinal standardized (NWEA) and criterionreferenced (NECAP) assessment data was accessed at the SAU level and reviewed by the full committee in an effort to track trends, patterns, and gaps in Mathematics performance over time. Five years of grades $3-8$ NECAP data was reviewed and analyzed. Three years of grade 11 NECAP data was reviewed and analyzed, and four years of NWEA data was reviewed and analyzed (4 years for grades $2-8$ and 2 years for grades 9 and 10). The varying timeframes in assessment data represent the amount of time the designated assessment has existed at each grade span. What was available was accessed. NWEA data was easily accessed and formatted to track trends across our SAU over time. Because of the NECAP reporting system, data review and analysis was far more challenging.
* Survey Data - Surveys are typically used to collect an individual's perceptions about a program under review. Essential to SAU 39's Program Review model is the collection of and value placed on stakeholder perception data. The Mathematics Program Review Committee spent an enormous amount of time discussing, designing, administering, processing and analyzing stakeholder perception data. A total of three stakeholder groups were asked about their perceptions of an ideal vision for the future of Mathematics instruction. The groups were also asked for a candid evaluation of current Mathematics practices. Question structure was heavily focused on school-based practices. These stakeholder groups included: staff, parents, and students. Where possible, synergy was secured within and across the three different surveys. Variations
across surveys existed due to differences in target audiences' experience, knowledgebase, and lens for entering the survey.

The research, collection, and analysis process of survey data presented the most formidable challenge for the Program Review committee. The level of challenges faced in this endeavor has significant implications for future Program Review processes. The committee and parents faced the greatest level of difficulty in completing their responsibilities related to the surveys. Challenges included but were not limited to: software glitches, accessibility, user friendliness, management of data processing, time, and two-way communication. There was a $75 \%$ rate of return on the staff survey, $15 \%$ rate of return on parent survey. Nearly all classrooms completed the student survey with the exception of four teachers all concentrated in one building.

## F. Vision Development Process and Related Outcomes

The Mathematics Program Review committee used three sources to inform the proposed vision for Mathematics programming across SAU 39: Current research, SAU 39 and school-wide mission statements, and input from students, community, and staff residing in the towns of Amherst and Mont Vernon. Stakeholder forums were facilitated soliciting feedback from the community and staff. Approximately 50 individuals attended a Community Forum on the evening of March $2^{\text {nd }}$. Both the staff and community meetings were similarly structured and included both a knowledge-building component about the process of Program Review and a collaborative work session. First, a presentation provided information about the Math Review Process and second, an active work session allowed community members to provide ideas and suggestions to inform the development of a vision.

Individuals reflected on their visions for Mathematics education and then worked in small groups to identify priorities and build a collective vision. The common definition used when crafting the Mathematics vision for SAU 39 was adopted from the National Council of Teachers of Mathematics. It reads:

> A vision statement is a guiding image of an organization's success and the resulting contribution to society. A vision statement describes the best possible outcome and what the future consequently looks like. The purpose of the vision statement is to inspire, energize, motivate, and stimulate creativity. (NCTM, 2009)

The priorities from the stakeholder forums are included in the appendix of this report. These priorities were carefully and deliberated incorporated into the vision statement developed and ratified by the full Mathematics Program Review Committee.

Student's thoughts about Mathematics were collected through surveys and class discussions. Students were asked to respond to the prompt "Math is...". Their thoughts about Mathematics were consistent with the draft vision.

Forum participants were asked to provide feedback on the processes used throughout the evening. They overwhelming response was positive. Participants felt both heard and included in the decision-making process.

# Part II: Committee Findings and Recommendations 

SAU 39 Mathematics Program Review

## A. Proposed 2010 Vision for SAU 39 School Board Adoption

A mission statement encapsulates an organization's purpose and communicates its essence to members, stakeholders, and the public. It states why the organization exists, what it seeks to accomplish, what it does to achieve this end and the ultimate result of its work. (NCTM, 2009)

## SAU 39 Mathematics Mission Statement

To engage, support and challenge all SAU 39 learners in the study of Mathematics.

## NCTM Vision Statement

"A vision statement is a guiding image of an organization's success and the resulting contribution to society. A vision statement describes the best possible outcome and what the future consequently looks like. The purpose of the vision statement is to inspire, energize, motivate, and stimulate creativity" (NCTM, 2009).

## SAU 39 Vision Statement

We envision a community where all learners see the beauty, functionality, and value of Mathematics and are empowered by the opportunities Mathematics affords: a community where students approach the study of Mathematics with curiosity and confidence and are supported on their journey by knowledgeable, enthusiastic and skilled adults.

## Focus areas

The vision for Mathematics is comprised of eight focus areas.

## Learning Environment

The design of the instructional environment considers both physical and emotional aspects of learning. An emotionally safe and respectful environment promotes deep inquiry and risk taking, essential elements in the learning process. The physical environment utilizes effective resources, including relevant technology, to promote mathematical learning for all.

## Equity

The SAU is dedicated to meeting the needs of all students at their current level of math development and fostering their continued individual growth. All students have equal opportunities to access complex and challenging Mathematics. Students are prepared for future endeavors.

## Student Identity

Students understand where they stand on the continuum of learning and they advocate for themselves as needed. They challenge themselves to grow beyond their comfortable limits. Learners see themselves as capable, approaching Mathematics with a spirit of perseverance and inquiry.

## Curriculum

The SAU 39 Math Curriculum is a K-12 vertically aligned curriculum, informed by state, national, and global standards and designed to facilitate depth of inquiry and understanding. A developmentally appropriate scope and sequence, which scaffolds and spirals, provides the framework for mastery by all students. The integration of math with science, technology, and other content areas is crucial to the success of our learners in the $21^{\text {st }}$ century.

## Instruction

Each student has a unique learning style and knowledge base. Instruction is designed to build upon prior knowledge and to make connections to new learning. Differentiated instruction ensures equitable, meaningful Mathematics learning for all students by considering the variety of learners present.

## Assessment

The purpose of assessment is to inform instruction, as well as to measure and celebrate individual growth. The assessment process promotes individual goal setting and encourages self-directed learning. Assessments in themselves are learning opportunities and, as such, are worthy of students' time and attention.

## Community

The broader community, in partnership with the schools, plays a significant role in promoting mathematical inquiry. The partnership between home and school will develop a strong
connection for students through informational exchanges and respectful communication. Collaboration with the community provides real world application.

## Professional Learning

Professionals engage in deep inquiry about their practice. They feel supported and challenged in their endeavors to meet the ever-changing and increasing needs of their students. A variety of collaborative and reflective practices are embedded within the professional learning community. Learning opportunities are based on both individual and district goals which are designed to improve student learning.

## B. Self Study Results - Identifying gaps between the current program and the vision

The goal of Phase 1 Mathematics Program Review is to assess the disparity from where we want to be to where we currently are. To effectively identify areas of program strength, areas for program growth and improvement, and areas requiring further inquiry, we used the proposed 2010 vision statement as a baseline from where we measure.

## Learning Environment

The design of the instructional environment considers both physical and emotional aspects of learning. An emotionally safe and respectful environment promotes deep inquiry and risk taking, essential elements in the learning process. The physical environment utilizes effective resources, including relevant technology, to promote mathematical learning for all.

Areas of Strength:

* Mathematics Coaches support both teachers and students within the K-8 classroom (Coordinator and Building Principal Reports on Resources).
* Mathematics Specialist support students in grades 9-12 at the high school level (Coordinator and Building Principal Reports on Resources).
* Eighty-three percent of staff report that learning math is fun in their classroom (Teacher Perception Survey).

Eighty-seven percent of parents report a belief that every student can learn math; 95.5\% of teachers agree, given the same prompt (Parent Perception Survey and Teacher Perception Survey).

Areas for Growth and Improvement

* While the presence and availability of Mathematics Coaches in our schools is an asset, the intent of a true coaching model cannot be fully actualized within the content area of Mathematics. This is evidenced by the disparity of resources human and material allocated to literacy versus mathematics (Administrative Team and Coaches PD Work session, April 2010; narrative resource data collected by Mathematics Curriculum Coordinators).
* Technology resources are inconsistent across schools; the inconsistency is seen in volume of resources, availability, and what is used. There is no agreement on grade-
level standards for technology use across the district as it relates to teaching and learning mathematics.


## Equity

We are dedicated to meeting the needs of all students at their current level of math development and fostering their continued individual growth. All students have equal opportunities to access complex and challenging Mathematics. Students are prepared for future endeavors.

## Areas of Strength

* The range of advanced courses available at grades 7-12 allows students to pursue advanced levels of mathematical learning (Parent Perception Survey).
* The multiple entry points for students to advance/accelerate through courses within the Mathematics course of study at grades levels 7-12 (Mathematics Course Advancement Мар).
* In some classes, flexible grouping is used effectively to support student learning (Parent Perception Survey).
* A wide range of assessments are offered to students to showcase their mastery and achievement within Mathematics classes (Narrative Assessment Data provided by Mathematics Curriculum Coordinators).
* Individual schools have implemented programs and classes throughout the district to support student growth and learning. Clark/Wilkins Schools uses "Do The Math", a Marilyn Burns intervention program. Souhegan High School programs include the "Summer Math Skills" and "Math Modules" classes. Students can elect enrichment opportunities through Math Superstars (K-4), Math Counts (AMS) or the Math Team (SHS) or enter local and national contests.


## Areas for Growth and Improvement

* Students who fall within special sub-groups (special education, economically disadvantaged, and other demographic groups) routinely do not have their learning needs met within Mathematics programming (Teacher Perception Survey, 2009 and 2010 AYP reports, MVVS DINI Plan, Clark Wilkins SINI Plan).
* SAU39 employs flexible grouping to help provide access to students as they progress in their understanding of Mathematics. The current process for grouping students in grades K-6 varies greatly across schools and grades. A need for norms and consistency is the desired (Teacher Perception Survey, K-4 flexible grouping survey, Parent Perception Survey, Teacher self-reporting).
* While SAU 39’s focus on Differentiated Instruction training is highly valued, teachers need greater training in how to differentiate Mathematics instruction in an effort to meet the diverse needs of learners. Teacher perception survey data reports a need for greater training in remediating and accelerating the needs of special needs students (Teacher Perception Survey and Curriculum Coordinator Data).

Areas for Further Inquiry

* Continue pursuing research on the most effective grouping strategies for students at the elementary, middle, and high school levels.
* Identify the percentage of students pursuing advanced Mathematics courses. Is it representative of SAU 39's community demographics? What process should be used in identifying such a number?
* Identify how to establish equitable support and challenge learning opportunities at all grade levels while balancing our system's philosophy on education.


## Student Identity

Students understand where they stand on the continuum of learning and advocate for themselves as needed. They challenge themselves to grow beyond their comfortable limits. Learners see themselves as capable, approaching Mathematics with a spirit of perseverance and inquiry.

## Areas of Strength

* Nearly all students report that learning math is a fun activity.
* Eighty-seven percent of parents report a belief that every student can learn math; 95.5\% of staff agreed with the same prompt.
* Sixty-five percent of students report that they can always do math; 33\% of students report that they can sometimes do math (Student Survey Data).
* Most students at Souhegan High School report that they are challenged by the Mathematics program.
* The majority of students at SHS take four years of Math exceeding the graduation requirement.

Areas for Growth and Improvement

* Involve students in crafting their own learning goals and opportunities by promoting self-directed learning and in-depth Mathematical inquiry.

Areas for Further Inquiry

* Address the question of how the committee develops an understanding of how students interpreted the word "challenge" in the administration of the student survey. Review
class-wide survey results and corresponding discussion notes. Discussion notes evidence varied definitions of the word challenge in both a positive and negative context.
* How do we promote a culture of inquiry and perseverance with regard to Mathematics and learning in general?


## Curriculum

The SAU 39 Math Curriculum is a K-12 vertically aligned curriculum, informed by state, national, and global standards and designed to facilitate depth of inquiry and understanding. A developmentally appropriate scope and sequence, which scaffolds and spirals, provides the framework for mastery by all students. The integration of math with science, technology, and other content areas is crucial to the success of our learners in the $21^{\text {st }}$ century.

## Areas of Strengths

* Teachers use a combination of SAU 39 Curriculum documents, NH State Standards and NCTM frameworks when planning.
* Opportunities/entry points for advancement in Mathematics at grades 7-12 are appropriate and abundant (Parent and Teacher Perception Surveys).
* Some support opportunities exist for students who struggle with Mathematics; those specifically cited include: Math Modules (SHS) and Math Counts Program (Clark Wilkins Elementary School) (Parent and Teacher Perception Surveys).
* Mathematics is integrated into other areas of the curriculum (Parent Perception Survey).
* Alignment of curriculum resources with current grade level expectations is complete for most grades in both Amherst and Mont Vernon. (Curriculum Coordinators)
* Schools are creating a variety of resources to supplement programs when gaps between grade level expectations and textbooks are identified. The Clark/Wilkins school now houses a "Math Sign-out Room" and library. Each Clark/Wilkins teacher has received a binder of materials.

Areas for Growth and Improvement

* The current vision for Mathematics programming developed in 2000 lacks detail, understanding, and clarity for parents and staff alike.
o Teacher Perception Survey
- $48.5 \%$ of teachers think the current vision was clear;
- $25 \%$ of teachers communicate neutrality;
- $25 \%$ of teachers report the vision was unclear.
o Parent Perception Survey
- $18 \%$ of parents think the current vision was clear;
- $32.9 \%$ of parents communicate neutrality;
- $46.1 \%$ of parents report the vision was unclear.
* Student expectations and/or outcomes within the Mathematics program imply a lack of clarity among parents and faculty alike (Teacher and Parent Perception Survey ).
o Teacher Perception Survey
- $72 \%$ of teachers communicate that student outcomes are clear to them as an instructor;
- $12.5 \%$ of teachers communicate a neutral response on the same question;
- 14.1\% of teachers communicate a lack of clarity surrounding outcomes;
- $67 \%$ of teachers report that outcomes were clear to students;
- $23 \%$ of teachers report a neutral response on the same question;
- $8 \%$ of teachers report outcomes lacked clarity for students.
o Parent Perception Survey
- $40 \%$ of parents report that student expectations are clear to their children;
- $35 \%$ of parents communicate a neutral response on the same question;
- $29 \%$ of parents report that student expectations lack clarity for their students.
* There is a lack of opportunities for enrichment and or advancement in Mathematics at grades levels 1-6 (Parent Perception Survey).
* There is a need for more real world application and inquiry within the formalized Mathematics curriculum (Parent Perception Survey).
* There is an absence of a middle school textbook to support the formalized curriculum and home - school connection ( Parent Perception Survey, Mathematics Curriculum Coordinator Narrative on Resources, Teacher Perception Survey, Mathematics Case Study)
* There is inconsistent implementation of curricular materials within and across the schools (Curriculum Coordinator Narrative on Resources, Teacher Perception Survey, and Mathematics Case Study)
* There is a problem with implementation of different Mathematics textbook programs across the schools of SAU 39 in support of the formalized curriculum (Curriculum Coordinator Narrative on Resources, Teacher Perception Survey, 2000 Curriculum Case Study).
* A variety of curriculum was adopted by individual school boards as a result of the Goals 2000 Mathematics Curriculum Revision (Current Curriculum Documents, and Mathematics Curriculum Case Study).
* There is a need for a wider variety of remediation materials to support struggling learners (Teacher Perception Survey).
* There is a need to provide an appropriately rigorous and challenging program for all students (Teacher Perception Survey, Parent Perception Survey).
o Teacher Perception Survey
- $55 \%$ of teachers agreed the current Mathematics program was challenging for ALL students;
- $17 \%$ of teachers communicated neutrality;
- $28 \%$ of teachers communicated disagreement.
o Parent Perception Survey
- $47 \%$ of parents agreed the current Mathematics program was challenging for ALL students;
- $33 \%$ of staff communicated neutrality;
- $39 \%$ of parents communicated disagreement.
* Staff survey results imply faculty does not have a common understanding and/or definition for the term "curriculum." This was evidenced in survey question responses 21 and 14 (Teacher Perception Survey).
* Approximately $20 \%$ to $30 \%$ of staff report that they did not know the Mathematics curriculum that precedes or follows the grade level they teach.
* Longitudinal data extracted from four years of NWEA data demonstrates that mastery of basic number sense is a strand area of weakness for students at grade levels K-4
(Longitudinal Data Report NWEA, supported by Clark Wilkins SINI Plan and MVVS DINI Plan).
* Half of the students reporting that math is a fun activity identified it as a necessary and meaningful discipline for success in the $21^{\text {st }}$ century. This may imply a need to provide more real world application of Mathematics in our formalized curricular program.


## Areas for Inquiry

* Within Areas for Growth and Improvement there is a need for remediation materials. Evidence of a lack of resources or lack of communication about what is available to all staff is also needed.
* Within Areas for Growth and Improvement there is a lack of clarity concerning student outcomes and expectations. Is this evidence of an insufficient curriculum, a lack of communication, both, or other?
* What is best practice in terms of establishing norms and process for providing remedial and challenge services in the area of Mathematics?
* How do we more clearly and effectively assess staff understanding of curriculum? What process and or questions should we pose to ascertain faculty understanding and perception?
* What is best practice in teacher knowledge and understanding of vertical Mathematics content and curriculum?
* How do faculty and administrators make decisions about modifications to curriculum and/or a student's course of study (i.e., challenge and remediation)?


## Instruction

Each student has a unique learning style and knowledge base. Instruction is designed to build upon prior knowledge and to make connections to new learning. Differentiated instruction ensures equitable, meaningful Mathematics learning for all students by considering the variety of learners present.

## Areas of Strengths

* Teachers communicate and exhibit a high level of confidence in teacher instructional expectations and being able to meet those expectations. Additionally they communicate an overwhelming willingness to make the necessary instructional changes to improve learning outcomes for students.
- $93 \%$ of teachers report that quality math instruction is expected of all teachers (Teacher Perception Survey);
- $90 \%$ of teachers report that they have a deep understanding of Mathematics pedagogy (Teacher Perception Survey );
- $97 \%$ of teachers self report that they are willing to make changes in practice to support student learning (Teacher Perception Survey).
* Parents report that SAU 39 is comprised of many skilled teachers (Parent Perception Survey).


## Areas for Growth and Improvement

* The consistency of instructional practice within and across grades levels emerges as an area of significant question and concern. The degree of inconsistency appears to vary by grade level or course (Teacher Perception Survey and Parent Perception Survey).
* Though faculty communicates that quality Mathematics instruction is expected of teachers, they communicate a level of concern in the quality of instruction students received from their colleagues. A disparity in perception was reported between self and colleague (Teacher Perception Survey).
* Little to no evidence exists displaying that assessment is used for instructional purposes rather than summative evaluations and reports on students.

Areas for Inquiry

* Does the Mathematics Program Review Committee need to pursue one last attempt in gathering data on school wide practices regarding formative assessment?
* What is best practice in striking a balance between formative and summative assessment?
* The Mathematics program review committee should review data from student survey Question 2, "What activities and resources help support your learning in Mathematics?" This data was collected in an effort to proactively plan for Phase II.
* What are the MOST effective research-based strategies for delivering Mathematics instruction? How do these strategies align or contrast with what our student population self reports as effective modes for learning Mathematics content and skill?


## Assessment

The purpose of assessment is to inform instruction, as well as to measure and celebrate individual growth. The assessment process promotes individual goal setting and encourages self-directed learning. Assessments in themselves are learning opportunities and, as such, are worthy of students' time and attention.

Areas of Strength

* SAU 39 has available to it a wide variety of assessments addressing the varying needs of students and their learning styles (Curriculum Coordinator Narrative Data on Assessments, Teacher Perception Surveys).
* Recent progress has been demonstrated in developing and committing to the use of common assessments outside of the standardized tools already used. This is most evidenced at grades 7-10 within the Integrated Mathematics Program (Curriculum Coordinator Narrative Data on Assessments).
* In the elementary grades recent progress has been made toward aligning unit tests with GLEs (CW grades K-3) and Math Dibbles was piloted in 2009-10 (Clark, Wilkins and Mont Vernon Village School).


## Areas for Growth and Improvement

* Significant inconsistency exists within and across schools in the administrative procedures linked to assessment. Concern was communicated that some classrooms provide significant staff support to students when summative assessments are administered, whereas other classrooms provide little to no direct student support. This inconsistent administrative practice sends students conflicting messages and provides an unfair test environment when they encounter assessments where little to no student support is permitted (i.e., NECAP, NWEA, Summative Evaluations). Furthermore, this dynamic has significant equity implications for grouping and placement practices.
* If common assessments exist, they are not always utilized by all teachers at the same grade level.
* Presently SAU 39 relies heavily on NECAP and NWEA data to communicate schoolwide trends in Mathematics.
* Little to no evidence was provided displaying that assessment is used for instructional purposes rather than summative evaluations and reports on students.

Areas for Inquiry

* How does the course competency work completed at Souhegan High School intersect with the work of the Mathematics Program Review Committee during Phase 2?
* How does the philosophical framework of "gradual release of responsibility" apply to assessment practices?


## Community

The broader community, in partnership with the schools, plays a significant role in promoting mathematical inquiry. The partnership between home and school will develop a strong connection for students through informational exchanges and respectful communication. Collaboration with the community provides real world application.

Areas of Strength (question: change "parent" to "care giver?")

* The initiation of the Program Review Process has improved and opened communication with the community regarding Mathematics programming in SAU 39.
* Available extra-curricular learning opportunities related to Mathematics content exists at grade levels 5-12. In the elementary grades, parents and community members organize and run several programs including the Math "Super Star" program at Clark/Wilkins School and Family Math Nights.
* Seventy-two percent of the parent community reports they are comfortable initiating communication with their child's teacher (Parent Perception Survey).
* Seventy-six percent of our parent community reports that they enjoy learning and doing Mathematics (Parent Perception Survey).
* Ninety-two percent of the parent community reports that they believe math education is important (Parent Perception Survey).
* Ninety-nine percent of the parent community reports that they have obtained at least a college degree, indicating a community of highly educated individuals. When asked if they are able to support their children's math learning at home, $65 \%$ respond that they can support their children through post-secondary Mathematics concepts; 80\% report that they can support learning through high school concepts, while 88\% report that they are able to support learning through middle school concepts (Parent Perception Survey).

Areas for Growth and Improvement

* Identify additional ways to further involve the community in collaborative Mathematics learning. For example, additional extra-curricular enrichment opportunities should be explored. The community has abundant resources for extra-curricular learning in the Amherst Public Library and the Amherst Recreation Department that might be utilized for specific Math-related endeavors.
* Improve communication with caregivers to strengthen the home-school connection. Provide additional resources and suggestions for ways that parents can support learning at home.
* Multiple data points indicate a lack of availability of resources for parents to use in supporting their learners at home.


## Areas for Inquiry

* Deepen understanding about how that the home-school partnership is essential to student success and learning. Explore the question of how we efficiently and effectively communicate with care-givers while preserving the bulk of our time for planning, assessing and direct student support?
* Is it valid to use the 392 parent respondents to the parent perception survey as a proxy for determining demographic data that comprises the community of Amherst? What is the risk in using these respondents as a proxy? The survey implies that a highly educated portion of our parent population engaged in the completion of the survey. What implications does this offer for the overall parent survey results?
* What are indicators of effective two-way communication? How do we increase readability of the multiple modes of print communication (i.e., newsletters, e-mail blast, websites, and the use of the Amherst Citizen and the Milford Cabinet)?


## Professional Learning

Professionals engage in deep inquiry about their practice. They feel supported and challenged in their endeavors to meet the ever-changing and increasing needs of their students. A variety of collaborative and reflective practices are embedded within the professional learning community. Learning opportunities are based on both individual and district goals which are designed to improve student learning.

## Areas of Strength

* Ninety-two percent of staff report that they engage in professional learning to deepen their understanding of Mathematics pedagogy.
* Ninety percent of staff report that they engage in professional learning to deepen their understanding of Mathematics content.
* Eighty-five percent of staff members see themselves as a member of a collaborative learning team.
* SAU 39 focuses on differentiated instruction by training and imbedding multiple DI Facilitators within each school building (Narrative Challenge data provided by Mathematics Curriculum Coordinators).
* District-wide monthly "late-start" session designed to provide common time for teachers to engage in focused, collaborative professional learning.
* Job-imbedded professional learning communities (CFG at SHS and PLC at AMS) where teachers make their work transparent and receive feedback from colleagues in order to improve teaching and learning. Peer coaching is another practice imbedded in our district.


## Areas for Growth and Improvement

* Connect evaluation to professional growth and learning using a consistent and regular district-wide process
* Create a focused, district-wide professional development plan to support changes in curriculum and teaching practices suggested through the Program Review Process.
* Though faculty communicates that quality Mathematics instruction is expected of teachers, they communicate a level of concern in the quality of instruction students received from their colleagues. A disparity in perception was reported between self and colleague (Teacher Perception Survey).


## Areas for Inquiry

* What is best practice in providing math-based professional learning for all staff? How do we insure that what is learned is translated into systemic practice?

How do we ensure that teachers of Mathematics in SAU39, both regular and special educators, have a deep understanding of Mathematics concepts in order to support student learning? How do we support a professional culture of Mathematics inqury?

## Appendices

## Trends from Math Vision Forums

## Essential Question - What are the best possible outcomes for students?

Introduction - During the months of February and March of 2010, six Mathematics Vision Development forums ${ }^{1}$ were held to collect stakeholder feedback on the future of Mathematics education across SAU 39. During the forums, participants were asked to prioritize Mathematics vision elements. The Mathematics Program Review Committee analyzed the results from all six forums and identified the items of greatest repetition, indicating priority. The committee made observations from the data and specifically sought patterns and trends across all six forums. The patterns and trends include:

| Community Feedback | Staff Feedback |
| :---: | :---: |
| - Challenge: including vertical opportunities, enrichment, flexible instruction, and differentiation | - Challenge: challenging but attainable, differentiated instruction, personal progress |
| - Preparation: college, career, lifelong learning, skilled, unlimited opportunities (competitive, Ivy League pursuits) | - Mastery of concepts and skills, supported by review and practice |
| - Student Attitude towards Mathematics Learning: confident, competent, skilled, happy, empowered, motivated, not fearful, inspired | - Student Attitude towards Mathematics Learning: confidence, risk-taking |
| - Staff: well-trained, quality, love math, love children, teacher as coach | - Problem Solving: real life, real world applications |
| - Technology should be integrated | - Technology should be integrated |
| - Parent Support: improve parent ability to support their children, resources, communication | - Parent Support: parent supporting and serving as resources for homework |
| - Communication: parent -student, student to student, teacher to student |  |
| - Assessment: informs instruction, intervention, growth, ability |  |

[^0]
## Case Study: 2002 Math Curriculum Review Implementation

Essential Question - What can we learn from this case study to inform our K-12 Mathematics Program Review, commenced 2010?

During September of 2000 a Math Curriculum Revision Committee was enacted and charged with evaluating and revising the current mathematics program across SAU 39. This revision was supported by 2 of the 3 districts within the SAU and came to be known as Goals 2000. During the same instructional year the Mont Vernon School District opted to facilitate their own mathematics revision void of vertical collaboration and faculty input. The Amherst and Souhegan Goals 2000 revision was completed in June 2002 and subsequently distributed to faculty and staff. The Mont Vernon Math Curriculum was completed through grade 4 by June of 2001 and never fully addressed grades 5 and 6.

While the curriculum underwent revision, the Amherst School District (K-4) simultaneously piloted several mathematics programs from leading publishers (2000). The pilot was conducted in a parallel fashion without benefit of the Goals 2000 document (adopted 2002). New textbook programs were under review in Amherst because of community dissatisfaction with the current program, Quest (1997), a conceptually-based, hands-on approach to the teaching and learning of mathematics. This program was relatively new to the system. During Amherst's pilot of texts, 2 textbook programs emerged as favorites, Harcourt Math and UCMP University of Chicago's Everyday Mathematics Program. Much conversation erupted around UCMP as it was another conceptually-based program. Because of community dissatisfaction with conceptual programs the Amherst School Board in 2002 moved forward and adopted Harcourt Math, a textbook program which struck modest balance between "skill and drill" and open-ended problem solving. Approximately half the staff supported the decision to adopt Harcourt Math K-5. Supportive of this decision or not, staff was asked to learn a new curriculum document and new math textbook program at the same time (2002).

While this pilot and adoption (2002) addressed the elementary grades in Amherst, the middle school decided to stay with their current program 6-8, Glencoe. In 2004 money became available in the Amherst School District operating budget to purchase middle school math texts. At that time, the Impact series (6-8) was purchased without the support of a pilot and staff consensus. The series was not used by many staff members because it represented a style change that was too significant.

Significant curriculum revisions at the middle level included the shift of Integrated 1 to the $8^{\text {th }}$ grade level. $6^{\text {th }}$ and $7^{\text {th }}$ grade teachers were asked to teach the old curriculum, including $1 / 2$ of the new curriculum each year. In 2004-2005 $8^{\text {th }}$ grade teachers began teaching Integrated 1 to most students. At the close of the instructional year staff felt this shift was unsuccessful and returned to the earlier model.

In September of 2004 the Mont Vernon School District decided to partially implement a new mathematics text, UCMP University of Chicago's Everyday Mathematics Program. This program was formally adopted by the school board during the 2004-2005 instructional year and was slowly rolled out grades 1-6 over a series of years.

During the same instructional year the NHDOE published the New Mathematics Curriculum Framework, which was formally adopted by the State Board of Education in June of 2005. With state adopted curriculum frameworks realignment of SAU 39's core mathematics expectations immediately began. This involved matching new state standards with what was being taught. Fewer curriculum adjustments occurred at the elementary level, with the greatest change occurring at grade levels $7-10$. This process of realignment included great focus on Integrated 1 and 2 mathematics seeking continuity and consistency between the Amherst Middle School and Souhegan High School. Since spring of 2008 alignment between the middle school and high school is discussed annually.

Since Souhegan was founded 18 years ago they have implemented an Integrated Mathematics series. Over time they have added courses that benefit all students. Courses include Math Modules, AP Calculus AB, AP Calculus BC, Statistics, and AP Statistics.

## Where we are Today

- The MVVS is in full implementation of Everyday Mathematics K-6, with staff resistance that has quieted with time.
- The Amherst School District is in full implementation of Harcourt Math K-5.
- The Amherst School District has Impact Math series at grade levels 6-8. This series is not widely supported nor used by staff.
- SAU 39 is currently in Phase 1 of Program Review, with a Self Study Report due to the SAU 39 School Board in June 2010.


# Math Program Review 2010 Elementary Student Survey Questions 

Current Course: $\qquad$ Grade level: $\qquad$

Instructions:

- Engage students in a class discussion using the following prompts.
- Ask them to think about the prompt and record their responses.
- If a response is repeated, write the number of times it is repeated next to the response. (i.e. fun (3))
- Record all responses, even if they do not seem to answer the question

1) Math is...
2) What activities and resources help support your learning? (games, projects, manipulatives, computer, teacher, group work, independent work, flash cards, telling stories)
3) Why do you want to learn math?

## Class Continuum Activity:

Elementary: Post the words Never, Sometimes, Always on the wall. Ask students to respond to each question by standing at the word that shows how they feel. Record the number of students at each below.

1. I can do math.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

2. Math is challenging.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

## Math Program Review 2010

## Secondary (7-12) Student Survey Questions

Current Course: $\qquad$ Grade level: $\qquad$

Instructions:

- Engage students in a class discussion using the following prompts.
- Ask them to think about the prompt and record their responses.
- If a response is repeated, write the number of times it is repeated next to the response. (i.e. fun (3))
- Record all responses, even if they do not seem to answer the question

4) Math is...
5) What activities and resources help support your learning? (games, projects, manipulatives, computer, teacher, group work, independent work, flash cards, telling stories)
6) Why do you want to learn math?

## Directions:

Check the box that represents how you feel. Please return to your teacher.
I can do math.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

Math is challenging.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

## Directions:

Check the box that represents how you feel. Please return to your teacher.
I can do math.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

Math is challenging.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

## Directions:

Check the box that represents how you feel. Please return to your teacher.
I can do math.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

Math is challenging.

| 1 ( Never) | 2 (Sometimes) | 3 (Always) |
| :--- | :--- | :--- |
|  |  |  |

## Staff Perception Survey

Mathematics Program Review 2010
Purpose - To collect perceptual data that systematically contributes to the improvement of mathematics education across the schools of SAU 39.

- Identify where we are presently
- Identify pts. of program strength
- Identify pts. of program weakness
- Identify inconsistencies between written curriculum and practiced curriculum


## Equity and Identity

1. Every student can learn math

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

2. The mathematics instructional program at my school is challenging for ALL students

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

3. My classroom provides an atmosphere where every student can succeed in math
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree 5
4. Quality work is expected of all students at this school in math class
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree
5
5. Quality mathematics instruction is expected of me

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

6. Quality mathematics instruction is expected of all the adults working at this school
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree 5
7. The vision for mathematics programming is clear
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree 5
8. The vision for mathematics programming is shared by all staff
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree
5
9. Student outcomes for math c1ass(es) are clear to me

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

10. Student outcomes for math class(es) are clear to my students

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

11. Learning math is fun in my classroom

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

## Open Response

Please respond using a bulleted list and short statements.
12. List three tools you use to communicate with students about their learning outcomes and progress?

## Curriculum and Instruction

13. I use the SAU curriculum documents to inform my instruction
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree 5
14. I use the state standards to inform my instruction

Strongly Disagree
1

Disagree
2

Neutral
3

Agree
4

Strongly Agree
5
15. I use formative assessments to verify student mastery of the mathematics curriculum

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

16. I know the curriculum that precedes the grade level or course I teach

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

17. I know the curriculum that follows the grade level or course I teach

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

18. Teachers at my grade level/content area are teaching the same mathematics curriculum

19. Teachers across grade levels are teaching the mathematics curriculum

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

20. Which of the following statements describes how you use the curriculum to design daily mathematics instruction?
(Select one statement that best applies.)
I teach the curriculum our school/district has adopted
I follow the textbook (program), and believe it is aligned to the state standards
I take my existing instructional plans and indicate where the standards are being taught
I study the standards and create instruction to take students from where they are to where they say they
should be by the end of the year
I study the standards, determine outcomes related to the standards, frequently assess where students are with respect to the standards, and adapt my lesson plans to create instruction to take students to where they need to be by the end of the year
Other

## Open Response

Please respond using a bulleted list and short statements.
21. Identify the TOP 3 teaching strategies you use to deliver mathematics instruction.
22. Identify the TOP $\mathbf{3}$ assessment strategies you use to evaluate student learning in the mathematics classroom

## Professional Learning

23. I engage in professional learning to deepen my understanding of mathematics in order to support student learning.
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree
5
24. I engage in professional learning to deepen my understanding of math pedagogy in order to support student learning.

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

25. I have a deep understanding of mathematics (skills, concepts, and applications) that supports student learning

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

26. I have a deep understanding of pedagogy that supports student learning in math

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

27. I feel I am a member of a team that works together to improve student learning in mathematics

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

28. Which opportunities describe the professional learning experiences you have found most helpful in supporting student learning in mathematics? (Select ALL opportunities that apply.)

Collegial support<br>Critical Friends Groups<br>Teaching teams<br>Grade level teams<br>Professional learning communities<br>Data teams<br>Self-reflection<br>Peer observations<br>Student feedback<br>Workshop/conference

## Open Response

Please respond using a bulleted list and short statements. Consider but do not be limited by the following categories: curriculum, instruction, assessment, learning environment, student identity, equity, professional learning, and communication
29. What are the strengths of the current math program in SAU 39?
30. What are the areas for growth in the current math program in SAU 39?

## Change

31. I am willing to make necessary changes to instruction in order to support student learning in mathematics

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

32. I believe my colleagues are willing to make the necessary changes to their instructional practices in order to support student learning in mathematics
Strongly Disagree
1
Disagree Neutral
3
Agree
4
Strongly Agree
5
33. I believe staff and leadership are willing and able to work collaboratively to improve student learning in mathematics
Strongly Disagree Disagree Neutral Agree Strongly Agree

## Parent Perception Survey <br> Mathematics Program Review 2009

Purpose - To collect perceptual data that systematically contributes to the improvement of mathematics education across the schools of SAU 39.

- Identify where we are presently
- Identify points of program strength
- Identify points of program weakness
- Identify inconsistencies between written curriculum and practiced curriculum


## Equity and Identity

I believe every student can learn math

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe the mathematics instructional program at my child's school is challenging for ALL students

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe my child's school provides an atmosphere where every student can succeed in math

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe quality work is expected of my child in math class

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe quality mathematics instruction is expected of all the adults working at my child's school

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe the current vision for mathematics programming is clear

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe the current vision for mathematics programming is shared by the community

| Strongly Disagree |  | Disagree | Neutral |  | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: | :---: | :--- |
| 1 | 2 |  |  |  | 4 | 5 |

I believe student outcomes for math c1ass(es) are clear to parents

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe student outcomes for math class(es) are clear to students

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I enjoy learning and doing math

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe I have a sufficient understanding of mathematics to support my child's math learning

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

I believe I have a sufficient understanding of teaching to support my child's math learning

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

Identity - Family and Student Perceptions about Math

## Response scale

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

My child enjoys learning and doing math
My child feels intimidated when learning and doing math
My child feels confident when learning and doing math
My child feels positive about his/her experiences in math class
My child is challenged by the level of math instruction provided
I support my child in learning and doing math at home
I feel confident in my ability to help my child to learn and do math

I feel comfortable/confident in my math knowledge through the elementary level
I feel comfortable/confident in my math knowledge through the middle school level
I feel comfortable/confident in my math knowledge through the high school level
I feel that a strong math education is important for overall success in life

## Curriculum and Instruction

I am familiar with the math program/curriculum currently used by SAU 39
I am satisfied with the existing math program at my child's school
The school/district math program is realistic in its goals and objectives
The school/district sets high standards for learning math
The school/district succeeds at preparing students for future work in math
Math assessment practices of the school/district are fair
The topics covered and depth of math instruction are appropriate
My child's math education has followed a consistent continuum
My child's math education has been fragmented and has gaps
The current math program transitions smoothly between grades
The current math program transitions smoothly between schools
The current math program is consistent within individual grade levels
The current math program is consistent among schools
The SAU 39 math program incorporates international best practices

Open Response Please respond using a bulleted list and short statements. Consider but do not be limited by the following categories: curriculum, instruction, assessment, learning environment, student identity, equity, professional learning, and communication

What are strengths of the current math program?

What are areas for growth in the current math program?

The top 3 strategies you use to support your child's math learning while at home are:

The top 3 methods you use to evaluate the progress of your child's math learning are:

## Communication

What methods are used to communicate with you about student math learning?

I feel comfortable/confident about initiating communication regarding my child's math learning

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |

My child's teacher(s) communicate effectively with me regarding my child's math learning
Strongly Disagree
1
Disagree
2
Neutral
3
Agree
4
Strongly Agree 5

## Demographic Data

Years lived in Mont Vernon/Amherst $\circ$ less than $1 \quad \circ 1 \quad \circ 2 \quad \circ 3 \quad \circ 4 \circ 5 \quad \circ 6$ more

Years of experience with/in the SAU 39 school system
 more

Have had children attend the following schools:
$\circ$ Mont Vernon Village School $\circ$ Clark/Wilkins School $\circ$ Amherst Middle School $\circ$ Souhegan High School

Highest level of mathematics education achieved (person filling out the survey):

- Elementary school ○ Middle school ○ High school ○ College/university ○ Graduate school

Highest level of mathematics education achieved (in household):
$\circ$ Elementary school $\circ$ Middle school $\circ$ High school $\circ$ College/university $\circ$ Graduate school

Professions of adults in household:
Either provide options to choose from, or allow them to write it/them in.

## Indicators of a Strong Perception Survey

| Indicators | Met | Not <br> Met |  |
| :---: | :---: | :---: | :---: |
| Questions are essential to the <br> objectives of the survey |  |  |  |
| Questions align with respondents' <br> knowledge base |  |  |  |
| Engaging |  |  |  |
| Survey title attracts interest |  |  |  |
| Survey begins w/interesting questions |  |  |  |



| Survey length is manageable and not <br> burdensome |  |  |  |
| :---: | :--- | :--- | :--- |
|  |  |  |  |
| Survey is not solution-seeking, it is <br> only information gathering |  |  |  |

## Data Analysis Protocol (Based on the S.W.E.E.P.)

We have collected data about different areas in the Mathematics Program in SAU39. It's important to remember that we are using this data not to analyze the individual responses; the purpose is to figure out what the responses as a whole can tell us about the perceptions of our Mathematics Program and to measure how those perceptions compare to our vision.

Select a focus for the analysis from the vision: (i.e.- We are looking to see that our curriculum challenges all learners)


Write down your "look fors":

- What perceptions would we look for from stakeholders to show success in this area?
- What best practices in our district would we look for? (i.e. - differentiating instruction, challenge component...)
$\square$
$\square$

Examine the data for evidence of the "look fors".

| Your name: <br> Question: | Survey: T P | Question \# | Survey |
| :---: | :---: | :---: | :---: |
| Circle relevant vision area: |  |  |  |
| Curriculum Instruction Equity Identity | Assessment Community | Learning Enviro Prof. Learnin |  |


| Response | Tally |
| :--- | :--- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |


|  |  |
| :--- | :--- |
|  |  |
|  |  |
|  |  |
|  | Pg |

Examine the degree to which the approach/response is consistent with the vision. List strengths \& weaknesses of the program based on this data. In addition, list other data you would like to collect to further explore this focus.

## Strengths

## Weaknesses

What other data might we collect? Suggest a collection process.

## Math Program Vision \& Research Alignment 2009-10

| Data Sources | Math Vision Statement |
| :---: | :---: |
| NCTM. Vision "We envision a world where everyone is enthused about mathematics, sees the value and beauty of mathematics, and is empowered by the opportunities mathematics affords." | We envision a community where all learners see the beauty, functionality, and value of mathematics and are empowered by the opportunities mathematics affords; a community where students approach the study of mathematics with curiosity and confidence and are supported on their journey by knowledgeable, enthusiastic and skilled adults. |
| Community Vision Forum Priorities: Preparation, college, career, lifelong learning, skilled, unlimited opportunities ( competitive, Ivy League pursuits) |  |
| NCTM Vision "ensuring that all students have access to the highest quality mathematics teaching and learning" |  |
| Community \& Staff Vision Forum Priorities: Student Attitude towards Mathematics Learning, confident, competent, skilled, happy, empowered, motivated, not fearful , inspired, risk taking |  |
| Community Vision Forum Priorities: Staff, welltrained, quality, love math, love children, teacher as coach |  |
| Community \& Staff Vision Forum Priorities: Student Attitude towards Mathematics Learning , confident, competent, skilled, happy, empowered, motivated, not fearful, inspired, risk taking | The design of the instructional environment considers both physical and emotional aspects of learning. An emotionally safe and respectful environment promotes deep inquiry and risk taking, essential elements in the learning process. The physical environment utilizes effective resources, including relevant technology, to promote mathematical learning for all. |
| Faculty \& CommunityVision Forum Priorities Technology should be integrated |  |
| The Opportunity Equation, Carnegie Institute for Advanced Study Commission for Math \& Science Education, 2008 - "Research on resiliency also makes clear the factors that can be built into schools...caring relationships with adults who provide them with high expectations and demonstrate investment in their success, engaging activities where they have opportunities to practice skills and recover from errors, opportunities to make contributions to a group...." |  |


| Benchmarking for Success: Ensuring U.S. Citizens Receive a World-Class Education, National Governor's Association. "...it is not enough to produce high-achieving elite; a nation's economic success also depends on closing achievement gaps to ensure that all students attain a solid foundation of knowledge and skills." | Equity <br> We are dedicated to meeting the needs of all students at their current level of math development and fostering their continued individual growth. All students have equal opportunities to access complex and challenging mathematics. Students |
| :---: | :---: |
| Benchmarking for Success: Ensuring U.S. Citizens Receive a World-Class Education, National Governor's Association. "Education systems in the United States tend to give disadvantaged and low-achieving students a watered-down curriculum in larger classes taught by less qualified teachers - exactly the opposite of what high performing countries do." |  |
| SHS and AMS mission statement "challenge themselves beyond their comfortable limits" |  |
| For a Flat World, Hersh ASCD 9/2009 students must learn "to think critically and solve problems...embrace diverse ideas and people, working cooperatively with others, tolerating ambiguity, possessing the resilience to bounce back after setbacks." | Students understand where they are on the continuum of learning and advocate for themselves as needed. They challenge themselves to grow beyond their comfortable limits. Learners see themselves as capable, approaching mathematics with a spirit of perseverance and inquiry. |
| Mathematics Curriculum - Core Concepts, Skills and Procedures, Sharma 2009 - "The curriculum and instruction should make it clear to children that effort in Mathematics is crucial. Children from high achieving countries believe that effort is responsible for success." |  |
| Mathematics Curriculum - Core Concepts, Skills and Procedures, Sharma 2009 - "The curriculum should emphasize competence, fluency and proficiency rather than just exposure." | Curriculum <br> The SAU 39 Math Curriculum is a K-12 vertically |
| Benchmarking for Success: Ensuring U.S. Citizens Receive a World-Class Education, National Governor's Association. - "World-class content standards cover a smaller number of topics in greater depth at every grade level." | global standards and designed to facilitate depth of inquiry and understanding. A developmentally appropriate scope and sequence, which scaffolds and spirals, provides the framework for mastery by |
| Benchmarking for Success: Ensuring U.S. Citizens Receive a World-Class Education, National Governor's Association. - Rigor... "By the eighth grade, students in top-performing nations are studying algebra and geometry." | all students. The integration of math with science, technology, and other content areas is crucial to the success of our learners in the $21^{\text {st }}$ century. |
| For a Flat World, Hersh ASCD 9/2009 - "We need learning that stimulates the imagination and teaches how to construct meaning and make disparate information coherent..." |  |


| College and Career Readiness Standards for |
| :--- |
| Mathematics, July 2009 - Students must be able |
| to "make sense of complex problems and persevere |
| in solving them, construct viable arguments, care |
| about being precise, look for structure, look for and |
| express regularity in repeated reasoning and make |
| strategic decisions about the use of technology." |
| Benchmarking for Success: Ensuring U.S. |
| Citizens Receive a World-Class Education, |
| National Governor's Association. |
| Coherence..."Math and Science standards in top- |
| performing countries lay out an orderly progression |
| of topics that follow the logic of the discipline, |
| allowing thorough and deep coverage of content." |
| The Opportunity Equation, Carnegie Institute for |
|  |
| Science Education, 2008 - "Establish common |
| mathematics and science standards that are fewer, |
| clearer and higher ... lead the way toward |
| preparing all American students for a global |
| economy." |
| Faculty Vision Forum Priorities : Problem |
| Solving, real life, real world applications Mastery |
| of concepts and skills, supported by review and |
| practice |
| Faculty \& CommunityVision Forum Priorities |
| Technology should be integrated |
| The Opportunity Equation, Carnegie Institute for |
|  |
| Science Education, 2008 - "Incorporate math and |
| science learning as part of the expected learning |
| outcomes of initiatives in other areas, including |
| literacy, social studies, art and service learning." - |
| "Learning math and science from textbooks is not |
| enough; students must also learn by struggling with |
| real-world problems, theorizing possible answers, |
| and testing solutions." |

Curriculum continued...

The SAU 39 Math Curriculum is a K-12 vertically aligned curriculum, informed by state, national, and global standards and designed to facilitate depth of inquiry and understanding. A developmentally appropriate scope and sequence, which scaffolds and spirals, provides the framework for mastery by all students. The integration of math with science, technology, and other content areas is crucial to the success of our learners in the $21^{\text {st }}$ century.

| Community \& Faculty Vision Forum Priorities: <br> Challenge , including vertical opportunities, <br> enrichment, flexible instruction, and differentiation | Instruction |
| :--- | :--- |
| Each student has a unique learning style and |  |
| knowledge base. Instruction is designed to build |  |
| upon prior knowledge and to make connections to |  |
| new learning. Differentiated instruction ensures |  |
| equitable, meaningful mathematics learning for all |  |
| students by considering the variety of learners |  |
| present. |  |$|$| Community \& Faculty Vision Forum Priorities |
| :--- | :--- |
| Assessment, informs instruction, intervention, |
| growth, ability |

$\left.\begin{array}{|l|l|}\hline \text { The Opportunity Equation, Carnegie Institute for } \\ \text { Advanced Study Commission for Math \& } \\ \text { Science Education, 2008 - "The division between } \\ \text { professional learning about math and science and } \\ \text { teaching math and science needs to be diminished, } \\ \text { if not erased." }\end{array} \quad \begin{array}{l}\text { Professional Learning } \\ \text { Professionals engage in deep inquiry about their } \\ \text { practice. They feel supported and challenged in } \\ \text { their endeavors to meet the ever-changing and } \\ \text { increasing needs of their students. A variety of } \\ \text { collaborative and reflective practices are embedded } \\ \text { within the professional learning community. }\end{array}\right\}$


[^0]:    ${ }^{1}$ The PowerPoint presentation from the forums, and strategies for how to pose essential questions and promote collaborative work can be found on the SAU website under Mathematics Program Review. Additional data is also posted.

