Lino Lakes STEM Initiative

Strand Strategy (Nine components)

I. *The Change we will make....*

A. In accordance with the Forest Lake Area Schools Strategic Plan and Lino Lakes Elementary Mission Statements, the change we seek is to transition from a traditional delivery of instruction to an integrated STEM (Science, Technology, Engineering, and Math) problem/project-based method of instruction. The STEM curriculum will be phased in, gradually increasing STEM instruction beginning in the 2011-2012 school year with the goal of 33% of curriculum content being taught using STEM pedagogy within the next three years.

II. *The Reason the Change is needed....*

A. This change is necessary in order that we better prepare our students for the world in which they will live. Key 21st Century skills our students will need include:

1. Creativity and Innovation
2. Communication and Collaboration
3. Research and Information Fluency
4. Critical Thinking, Problem Solving, and Decision Making
5. Digital Citizenship
6. Technology Literacy
7. Motivation and Self-direction

B. STEM pedagogy creates the opportunity for student-driven inquiry, which motivates students to "dig deep" and develop passions for discovery to nurture their innate love of learning. This methodology enhances whole brain development and "hooks" learners who have traditionally been difficult to engage, encouraging them to take ownership for their learning. STEM is an ideal tool for differentiating instruction to include all learning styles and to more actively involve students in their learning.

C. This change will give students the method and the practice in essential skills that the educational community as well as business and political leaders have been calling for in educational reform since the publishing of the 1984 report, *A Nation At Risk.*

D. STEM education involves the collaboration of numerous stakeholders including teachers, parents, political and business leaders, university staff, engineers, scientists, government organizations like NASA, and experts in various fields of study throughout the world. This collaboration is an exemplary "real life" modeling of what will be

expected of our children when they enter their professional lives. Our students will see, experience and practice the very skills that will enable them to be successful as a 21st Century citizen.

E. This model shares the responsibilities of preparing our children for the future. It significantly increases valuable resources to schools in the communal task of educating our children.

F. The engineering component of the STEM model will seamlessly incorporate the new engineering standards as set by the State of Minnesota.

III. *Things we will do...*

A. Gain consensus of teaching staff to transition to a STEM model
B. Make site visits to STEM schools to research and aid in planning for the transition
C. Seek feedback from various stakeholders
D. Develop collaborative relationships with:
    a. Business community, both local and corporate
    b. University of Minnesota STEM Education Center
    c. University of Minnesota TERI Project
    d. Engineering community (The Works, Engineering is Elementary)
E. Design and plan for:
    a. Professional development
    b. Marketing strategy (signage and dissemination of information)
    c. Purchases and requests for materials
    d. Work spaces for projects and storage of materials

IV. *Things we need to make the change.*

A. Commitment from stakeholders listed in III D.
B. Upgraded technology (computers, handheld learning devices, software ie. CAD)
C. Resources for Staff Development, Marketing and Materials
D. Re-organized school schedule
E. Development of adjunct after school programming (i.e. Lego League)
F. STEM Coordinator for staff collaboration and materials and curriculum management

V. *We should not look for change until we are able to observe...*

A. Authentic collaborative teaching
B. Increase in student engagement
C. Increase in student-driven inquiry
D. Organic differentiated instruction
E. Decrease in student off-task behavior
F. Decrease in classroom behavior referrals and classroom management problems
G. Increase in an inter-generational presence in the school setting
H. Achievement growth demonstrated via rubrics on 21st Century Skills

VI. Indicators that this change has occurred...

A. The student is an engaged learner (observable passion for learning)
B. Students are generating ideas and hypotheses to be tested
C. An increase in independent adjunct reading, interviewing, researching and writing on a topic
D. Increase of inter-generational presence in our learning community
E. Increased growth in 21st Century Skills as outlined by appropriate rubrics
F. Increase of peer evaluation
G. Growth in acceptance of peer feedback
H. Project completion and attempts to find better solutions when hypotheses fail
I. Decrease in discipline referrals
J. Higher scores on standardized tests

VII. The way we'll collect the indicators...

A. Tools
   a. Surveys
   b. Metrics created by PLT's
   c. Existence of something new

B. Methods
   a. Observations
   b. Interviews
   c. Activity Logs and Skill Sheets
   d. Peer evaluation
   e. Tests
   f. Progress toward project completion
   g. Scale of interpersonal collaboration (team work, respectful interaction etc.)

C. Sources
   a. Participants
   b. Parents/Guardians
   c. Contributing professionals
   d. Teachers

VIII. When we will collect indicators...

A. The student is an engaged learner (observable passion for learning)-**Quarterly**
B. Students are generating ideas and hypotheses to be tested-**Phased in with STEM projects**
C. An increase in independent adjunct reading, interviewing, researching and writing on a topic-**Quarterly**

D. Increase of inter-generational presence in our learning community-**Phased in throughout the year**

E. Increased growth in 21ˢᵗ Century Skills as outlined by appropriate rubrics-**Phased in with STEM projects**

F. Increase of peer evaluation-**Phased in throughout the year**

G. Growth in acceptance of peer feedback-**Quarterly**

H. Project completion and attempts to find better solutions when hypotheses fail-**Project Based**

I. Decrease in discipline referrals-**End of the Year**

J. Higher scores on standardized tests-**Summer 2012**

IX. *Who will collect indicators....*

A. The student is an engaged learner (observable passion for learning)-**Teaching staff and contributing professionals**

B. Students are generating ideas and hypotheses to be tested-**Teaching staff and contributing professionals**

C. An increase in independent adjunct reading, interviewing, researching and writing on a topic-**Teaching staff, parents and contributing professionals**

D. Increase of inter-generational presence in our learning community-**Principal and Community members**

E. Increased growth in 21ˢᵗ Century Skills as outlined by appropriate rubrics-**Teaching staff and contributing professionals**

F. Increase of peer evaluation-**Teaching staff, students and contributing professionals**

G. Growth in acceptance of peer feedback-**Teaching staff, Students and contributing professionals**

H. Project completion and attempts to find better solutions when hypotheses fail-**Teaching staff, students and contributing professionals**

I. Decrease in discipline referrals-**Principal and teaching staff**

J. Higher scores on standardized tests-**Principal and teaching staff**