STEM in the Middle:

A Grade 5-8 Lab School for the 21st Century

A NH Chartered Public School Application Revision

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Table of Contents

Page	Section	
	Contact Information	
4	(A)	Vision, Mission, Core Values
4	(B)	Governance, Organizational Structure, and Plan
5	(C)	Methods by which trustees and their teams are determined
6	(D)	Potential location of facility
6	(E)	Maximum number, grade or age levels
7	(F)	Curriculum that meets or exceeds state standards in subjects offered, including Special Curriculum Features
8	(G)	Academic and other learning goals and objectives
10	(H)	Achievement tests to be used to measure pupil academic and other goal achievement
11	(I)	For Schools offering high school.... NA
11	(J)	Staffing overview ....
15	(K)	Personnel compensation plan
16	(L)	Pupil Transportation
17	(M)	Statement of assurances related to non-discrimination
17	(N)	Method of coordinating with pupil's local educational agency (LEA) for matters pertaining to any special education programs of compliance with all federal and state laws
18	(O)	Admission and enrollment policy and procedure
19	(P)	Philosophy of student governance and discipline, and age-appropriate due process procedures to be used for discipline matters including suspension and expulsion
21	(Q)	Method of administrating fiscal accounts and reporting, including a provision requiring fiscal audits and reports to be performed by an independent certified public accountant
22	(R)	Annual budget, including all sources of funding (including a proposed five-year budget containing revenue and expenditures)
22	(S)	School calendar arrangement and the number and duration of pupils are to be served pursuant to RSA 194-B. 8, III
23	(T)	Provision for evidence of adequate insurance coverage
23	(U)	Identity of consultants to be used for various services, if known
25	(V)	Philosophy of parent involvement and related plans and procedures
25	(W)	A plan to develop and disseminate information to assist parents and pupils with decision-making about their choice school
25	(X)	Global hold harmless clause
26	(Y)	Severability provision and statement of assurance that any provision of the charter school contract found by competent

	authority to be contrary to applicable law, rule, or regulation shall not be enforceable
26	(Z) Provision for dissolution of the charter school including disposition of assets
26	(AA) In the case of the conversion of a public school ....
26	(BB) A plan for education of the school's pupils in the event the charter school cease operation
27	(CC) In addition to an application, each charter school applicant, in consultation with the local school board, shall prepare a proposed contract
27	(DD) An outline of the proposed accountability plan that clarifies expectations for evaluating the school's programs and acknowledges that a full accountability...
	(Appendix A) List of Writing Committee Members
	(Appendix B) Potential Planning Committee Members: List of those expressing an interest in participating in planning or advising for Year One
	(Appendix C) Proposed 5 Year Budget
	(Appendix D) Explanations and Examples relating to Curriculum/Instruction/Assessment

A. Vision, Mission and Core Values

Mission: The Mission of the STEM in the Middle Lab School (SMLS) is to provide excellence in STEM education to middle school learners, and to adults who support them in their project-based learning environment that encourages inquiry, discovery, creative problem solving, collaboration and demonstration of learning.

Vision: The STEM in the Middle Lab School for the 21st Century will be an inclusive student-centered middle school, organized around STEM curriculum, demonstrating leadership in both student achievement and professional development for educators.

SMLS proposes four major design components, reflecting the core values of its vision, mission and curriculum:

1. Student ownership of learning in an individualized, STEM project-based learning model for young adolescents
2. Community partnerships with STEM leaders (e.g. Boston Museum of Science, UNH) to bring specific knowledge, experience and resources to the design and implementation of SMLS
3. Unique approach to development of STEM curriculum, instruction and assessment framework to reflect NH CCRS and 21st century learning, knowledge, skills and dispositions, in partnership with community partners
4. A lab school component, providing a culture of real time, embedded, high quality, research-based community of professional learners including faculty, teacher interns, institutes of higher education, community, parents and others as relevant

B. Governance, Organizational Structure, and Plan

In accordance with the provisions of RSA 194-B:3,V, the STEM in the Middle Lab School (SMLS) is being submitted by the Southeastern Regional Education Service Center (SERESC), a non-profit organization.

SERESC is a non-profit educational organization with 40 years of experience in New Hampshire, governed by 8 public school districts from the south central region of the State. The Application Team is comprised of a group of highly experienced educators from SERESC with extensive background in K-12 general and special education with specific program experience at the middle school level in program teaching, administration and program development. (Appendix A)

The role of SERESC is to:

- Prepare the application for approval, and facilitate financial, planning and resources to planners;
- Propose curriculum, instruction and organizational components that constitute a 21st Century STEM based program;
- Provide organizational and technical assistance during the planning phase, including the convening of an Advisory Team of content providers, school district representatives, business, industry, IHE, and community members;
- Provide ongoing support to future Boards of Trustees of the independent Charter School, its administration and staff relating to curriculum design, financial management, facility, contracted services, and operations;
- Once the Chartered School is established as an entity, SERESC will remain as fiscal agent, and will provide contracted services to support operations, curriculum, and instruction, with gradual release of responsibility to School officials and Trustees, to develop its own identity.

The established charter school will be governed by a Board of Trustees. The Board of Trustees shall include a chairperson, vice chairperson, secretary, and treasurer. Officers will be elected by majority vote of the board at the annual organizational meeting, and shall serve until the next organizational meeting. If a replacement officer is needed, the replacement officer serves out the unexpired term of the departing officer.

C. Method by which trustees and their terms are determined

The Board of Trustees, in accordance with RSA 194-B:5 will be governed by nine members. The Board will have general supervisory control and authority over operations of the charter school.

Trustee selection will be based on personal and professional background and a commitment to the school's mission, support and sustainability. Trustees shall represent a diversity of stakeholders and contributors.

(1) member will be Superintendent or designee from one of the SERESC Districts
(2) members will be parents of enrolled students
(1) member will be an educator
(2) members may be from the business community
(1) member may be an attorney
(1) member may be knowledgeable in marketing/fundraising
(1) member may be a technology professional

The initial group of trustees will be nominated by the Planning Committee for two or three year terms. Trustees may nominate and elect members to future terms. Trustees may resign prior to the expiration of their term; if resignations occur, current Trustees will nominate and elect a new Trustee to complete the term at the next scheduled organizational meeting. Board members not supporting the mission and vision of SMLS may be removed by a quorum majority vote. Board members may be removed by majority vote if involved in activities considered illegal or damaging to the reputation of the SMLS.

The Board of Trustees will develop advisory subcommittees to pursue specific topics and report back for action of the full Board. On occasion, the Board may vote to authorize a subcommittee to act. Initial subcommittees shall include: Start-up, Finance, Curriculum, Personnel, Facilities, Governance, and Admissions.

D. General description and proposed or potential location of facilities to be used

The proposed location for the STEM in the Middle Lab School is the former Brentwood School Building at 1 Brentwood Drive in Merrimack NH. The property, which housed the Brentwood School until its closing in June 2014, is owned by SERESC. While the space is currently appropriate for the population to be served and for project based learning a review of facilities and suggestions for renovations prior to the opening of school will be addressed as part of the planning process. During the planning process, the Planning Team will also look ahead to the use of the space to incorporate a "real time" laboratory school.

E. Maximum number, grade or age levels; and, as applicable, other information about pupils to be served

SMLS will serve up to 120 young adolescent learners in grades 5-8. Applicants will ideally demonstrate an interest in STEM subjects, and will include learners of diverse abilities, interests and learning styles.

Young adolescents are in the process of discovering their own identity. They are often curious, energetic, peer conscious and caring. " Research Summary: Young Adolescents' Developmental Characteristics", Association for Middle Level Education, http://www.amle.org/BrowsebyTopic/WhatsNew/WNDet.aspx?ArtMID=888&ArticleID=300. (Caskey and Anfara), Young adolescents are easily engaged when challenged and interested. Providing these students with choice, active learning opportunities and the ability to work with their peers addresses the basic tenets of this school. Middle school level STEM teachers who are expert in understanding these learners will incorporate basic skills but will guide and coach them in their learning as they pursue projects and topics of interest within designated parameters.

F. Curriculum that meets or exceeds State standards in subjects offered, including Special Curriculum Features

State and national standards will be met as the scope and sequence of curriculums are developed/adopted by the Planning Team and implemented with the oversight of the Trustees and school officials. Standards will be evident in instruction, through project based units and lessons. The Planning Committee will include two more experts in STEM and Project Based Curriculum and Instruction, and in related Competency-Based Assessment. Those experts will provide curriculum related recommendations, and future instructional guidance.

Research in STEM learning over the past several decades has much to offer about what makes effective, engaging STEM education. Among the key factors: it capitalizes on students' early interests and experiences, identifies and builds on what they know and provides opportunities to engage in the practices of science, technology, engineering and mathematics to sustain their interests. In other words, through the curriculum and instruction provided, the students learn and investigate questions about the world that they encounter each and every day, in much the same way that scientists and mathematicians do.

In New Hampshire, educators are optimistic that important work to implement STEM has begun with the adoption of the national Common Core State Standards (CCSS), in New Hampshire known as College and Career Ready Standards (NH CCRS). With such curriculum guidelines and the work of the Next Generation Science Standards there is ongoing focus upon interactive engagement with the college level, business and industry, problem solving and allowing students to fully engage in their observations, and investigations through project based learning.

AT SMLS, NHCCR standards in ELA/Literacy, Mathematics, Science, Social Studies and the Arts, form the basis for the expected outcomes for student achievement. As part of the curriculum implementation SMLS will be partnering with several organizations, two of which have already been identified: The Boston Museum of Science and the Gateway Foundation, which currently works nationwide, and The University of New Hampshire STEM Lab, which has taken the lead in NH for STEM education. Students enrolled at SMLS will have the opportunity to focus their energies on Science, Technology, including digital and media arts, Engineering and Mathematics (STEM) while becoming literate at the same time. This will be accomplished in the following ways:

- Relating science/technology/engineering/math to students' daily lives
- Utilizing hands-on project based learning
- Implementation of authentic learning activities through authentic demonstration of learning
- Incorporating student decision making and ownership for learning
- Ensuring that STEM curricula is the most important focus across all disciplines

Aligned with the standards based curriculum, is the "Negotiated Integrated" Curriculum proposed by James Beane and Barbara Brodhagen, in which standards based curriculums are, in their terms, "Coherent, and Permeable". The Coherent Curriculum "presents a coherent and holistic picture rather than a set of fragmented, unrelated topics"; the "Permeable Curriculum provides room for student voice and choice." Beane and Brodhagen, http://coe.winthrop.edu/blackburnb/EDCI%20600/Beane.pdf Please see the Appendix of this document, plus Section G. for more information on how these principles are seen instructionally.

The Planning Committee, in its development year, will make use of existing STEM curriculums of member districts to strengthen the blended/integrated curriculum.

As the work begins on curriculum design and instructional implications, in the planning stage of this proposed Chartered School, student products will show clear examples of the Coherence of Standards; of the consideration the variety of student learning styles and abilities; of best practices in student centered learning, project based learning, and competency based assessment of learning.

G. Academic and other learning goals and objectives

The ultimate goal of the SMLS Charter School is to prepare SMLS middle school students for successful high school science, technology, engineering and math paths, and ultimate Career and College Readiness, and to prepare at the same time, educators from other schools to implement similar instruction in the schools in which they teach through the SMLS lab school professional development.

Lesson goals and objectives, and student learning plans will reflect the project-based learning definition from the Buck Institute for Education (BIE) **http://bie.org/** :

Project-Based Learning (PBL) is a teaching methods in which students gain knowledge and skills by working for an extended period of time to investigate and respond to a complex question, problem, or challenge. Essential Elements of PBL include:

- **Significant Content** - At its core, the project is focused on teaching students important knowledge and skills, derived from standards and key concepts at the heart of academic subjects.
- **21st Century Competencies** - Students build competencies valuable for today's world, such as problem solving, critical thinking, collaboration, communication, and creativity/innovation, which are explicitly taught and assessed.
- **In-Depth Inquiry** - Students are engaged in an extended, rigorous process of asking questions, using resources, and developing answers.

- **Driving Question -** Project work is focused by an open-ended question that students understand and find intriguing, which captures their task or frames their exploration.
- **Need to Know -** Students see the need to gain knowledge, understand concepts, and apply skills in order to answer the Driving Question and create project products, beginning with an Entry Event that generates interest and curiosity.
- **Voice and Choice -** Students are allowed to make some choices about the products to be created, how they work, and how they use their time, guided by the teacher and depending on age level and PBL experience.
- **Critique and Revision -** The project includes processes for students to give and receive feedback on the quality of their work, leading them to make revisions or conduct further inquiry.
- **Public Audience -** Students present their work to the greater community.

Implementation of goals and objectives are tied to focus on Personalization.

- Students will have an Individual Learning Plan (ILP) or contract developed and revised over the course of the school year as they grow, mature and become more engaged in projects.
- Students will manage their own learning goals through a process that will be intentionally taught. The teachers operate in the role of mentors supporting the idea that "The one who does the work does the learning."
- Student interest is the primary focus of ILP/contract. Resources include Beane and Brodhagen, who have written extensively on student-generated curriculum http://coe.winthrop.edu/blackburnb/EDCI%20600/Beane.pdf .
- The teacher suggests the broad topic (ex. Environment) and the students develop the questions and pursue them with the support of the teacher providing "just in time" learning to help their quest. While students may work independently on some parts of a project, the goal is collaboration.
- The ultimate goal for a student completing four years of this school is to be a self-actualized learner. The intention is to scaffold learning in such a way that is structured, helping students gradually from dependence to independence in their learning. Teachers will use the gradual release of responsibility instructional model through intentional planning providing students first with modeling, then significant support and collaboration, and finally with independence.

The SMLS is committed to the needs of all learners and respects diversities in learning styles, abilities and interests.

Universal Design for Learning (UDL) is an instructional model for educators that will provide a foundation for curriculum development for all students. *"**Universal Design for Learning** is a set of principles for curriculum development that give all individuals equal opportunities to learn. UDL provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone--not a single, one-size-fits-all solution but rather flexible approaches that can be customized and adjusted for individual needs."* Definition from Center for Applied Special Technology (CAST) *website* http://www.cast.org/udl/

Professional development regarding the components, process, and assessment of **Universal Design, Personalization, and Project-Based Learning** will take place prior to school opening and will be reviewed and supplemented regularly.

Once the SMLS Charter School is operational, Application and Advisory Teams expect to see the following Core Components of Curriculum and Instruction at work every day at SMLS:

- **Collaboration** among all partners to promote rich STEM learning experiences.
- **Dynamic learning experiences** through instruction that is globally recognized and serves our students and society at large
- **Personalization and ownership of learning**
- **Inclusive opportunities** for all students to succeed, to become critical thinkers, and to learning he characteristics of GRIT- perseverance and determination.
- **Engagement** through challenging and active learning experiences and enriching student-faculty interactions.
- **Science, Technology, Engineering and Math** (STEM) are the focus areas that areas that support student learning.
- **Literacy in English, Science, Technical Subjects and Social Studies** emphasis, including reading and writing across the curriculum, close reading, writing to sources.

H. Achievement tests to be used to measure pupil academic and other goal achievement

Student and school related achievement test data are widely available measures used for individual student achievement and growth, and as an accountability indicator. However, achievement test scores do not tell the whole story of individual student success. At SMLS achievement tests will be utilized as one of a number assessment practices to measure specific skill levels for all students and to inform instructional decisions.

SMLS will utilize a universal screening tool to gauge students' current level of performance and determine specific instructional needs; formative and progress monitoring tools, to measure ongoing learning; and summative demonstration assessments to evaluate mastery of learning.

All students will participate in the criterion referenced Smarter Balanced state assessment or the Dynamic Learning Maps (DLM) alternate assessment, as appropriate.

Those students who may require targeted or intensive interventions will be provided with specific diagnostic assessments, as needed. Mastery of learning for students will be defined in multiple ways, will occur in logical experiential real life settings, and will be aligned to their own personalized learning goals.

The primary measure of STEM learning at SMLS will be designed as authentic assessment of student growth and will include regular formative assessments and intentional descriptive feedback to both the teachers and the students on the teaching and learning outcomes. Feedback and formative assessment practices are among the top ten highly effective instructional practices as identified by John Hattie in Visible Learning: a Synthesis of over 800 Meta-Analyses Relating to Achievement Feedback, 2009. Feedback will be descriptive, intentional, frequent, in real time, and consistent on daily/weekly learning with information from students to teachers on how effective the instruction was for each unit or learning target and from teachers to students on progress toward their individual learning targets.

In addition to regular ongoing formative feedback there will also be a shift of summative measures of learning from paper and pencil tests to student led demonstration of mastery through a wide range of mediums, expression and presentations. While we traditionally think of assessment of student learning as a standardized assessment or end of unit test or a final exam the students and teachers at SMLS will embrace feedback on learning as a regular and expected practice. Once the faculty and staff have been hired SMLS will determine the specific assessments to be utilized in order to demonstrate a variety of student outcomes, return on investment, and impact upon individual students.

I. NA

J. Staffing overview including qualifications sought for professionals and paraprofessionals

SMLS is committed to recruiting highly qualified staff with a diverse range of skills, teaching and administrative expertise, cultural and ethnic backgrounds. Other desired qualities include: a commitment to the Mission and Vision of the school, a strong knowledge of early adolescent learners and project based learning, and the ability to work collaboratively with colleagues, parents, business and industry and the community at large. All staff will be expected to be lifelong learners and committed to their own professional growth.

SMLS will have a unique configuration of educators, full time and part time, to ensure that teachers have a high capacity to instruct in their discipline. As part of the staffing design, instruction will be provided by certified educators, as well as professionals from fields of science, technology, engineering and math who will be expected to share content, research and instruction in ways that will inspire and deepen STEM content across the curriculum.

Unique to SMLS will be relationships with Institutes of Higher Education (IHEs) to include master's level educator interns, and the Boston Museum of Science which will assist in the design and implementation of innovative STEM practices in a variety of settings and provide professional development.

All of the professionals working at SMLS will be purposefully brought together to ensure there is strong content in Science, Technology, Engineering and Math and that all staff will be fully trained in project based learning. Teachers will work in teams to develop, organize and promote STEM education, through authentic project based learning.
The administrator of SMLS will have an in-depth knowledge and understanding of STEM and can support the implementation of STEM education in the middle grades.

SMLS will meet all charter school requirements related to teacher certification, and will ensure that criminal background checks are conducted on all individuals who will be working with the middle school students.

School Director

The SMLS Director will be responsible for the leadership, day-to-day business operations, and school operation as delegated by the Board of Trustees. The SMLS director will collaborate with teachers to organize and promote project based learning activities through the successful integration of Science, Technology, Engineering and Math. The SMLS director reports to the board of trustees.

Responsibilities

- Develop, organize, promote STEM education through authentic project-based learning experiences at the middle school level
- Support student and faculty in maximizing their personalized goals
- Assist in searching out funding sources, grant opportunities
- Monitor the effective implementation of STEM curriculum, instruction and assessment
- Create and maintain relationships with all relevant partners
- Assume responsibility for supervision and evaluation of all staff
- Oversee the class scheduling process in collaboration with staff and students
- Supervise required state assessments

- Promote safety and good health practices while adhering to public codes/regulations
- Participate in public relations and school fund-raising
- Promote safety and good health practices through adherence with public life/safety codes/regulations

Qualifications

- Meet all NH regulations for teaching in NH charter schools
- Possess at minimum a Master's Degree from an accredited university
- Knowledge and experience with STEM Education
- Minimum of 5 years teaching and/or administrative experience
- Experience with administrative duties in a school, not-for-profit, or related business
- Background in middle school education, preferred
- Demonstrated collaborative leadership, and experience with business management/school finance
- Experience with working with Institutes of Higher Education and Knowledge of Lab School Settings
- Such other qualifications as the Board may find appropriate

Business Manager

Responsibilities:

- Setting up the school financial system
- Working with the Director to prepare budgets and other financial reports
- Prepare and process purchase orders and banking business
- Filing all proper financial paperwork as needed and required
- Oversight of the annual audit
- Support grant writing and management
- Such other qualifications as the Board may find appropriate

Qualifications

- Bachelor's Degree from an accredited university, business and accounting preferred
- No less than three years of experience as a Business/Operations manager
- Experience preparing purchase orders and bank deposits
- Experience preparing payroll process
- Knowledge of charter schools and related not-for-profit financial reporting requirements
- Experience with grant writing and management

Special Education Coordinator/Liaison

SMLS recognizes and welcomes students with learning challenges and those children who may be in need of specialized programming that goes beyond what is ordinarily provided in the general education curriculum. SMLS will hire or contract the services of a certified Special Education Professional to oversee special education programming, ensure quality of services and maximum access to the curriculum by all students with special education needs, and compliance with all State and Federal requirements. The Special Education Professional will assure compliance with RSA 194-B: 11.

Responsibilities

- Work in collaboration with the LEA responsible for each student with a disability to ensure that all state and federal special education compliance rules and regulations are met
- Work closely with a student's LEA to ensure a smooth transition and will review all documentation pertaining to the student's educational needs.
- Ensure that students with disabilities reach their maximum potential
- Commit to the success of SMLS students with disabilities and to the mission of the school through collaboration and consultation with all staff, students, parents and LEA's
- Establish relationships with all LEAs and work in collaboration them to ensure coordination and implementation of special education and 504 services
- Assist LEAs in the development, implementation and monitoring of each IEP

Qualifications: Related and required education and experience

STEM Educators

The board of trustees will comply with RSA 194-B: 14. Section IV, which states, "IV. The teaching staff of a charter public school shall consist of a minimum of 50 percent of teachers either New Hampshire certified or having at least 3 years of teaching experience".

SMLS will employ a wide array of educators with a demonstrated record of excellence in science, technology, engineering and mathematics. Additionally staff must have a demonstrated ability to work with early adolescent learners, knowledge of project based learning, and the willingness to work in a lab school setting.

Responsibilities:

- Develop, organize and implement STEM curriculum through authentic project based learning experiences
- Mentor and coach master's level teacher interns

- Collaborate with all partners to include IHE's, business & industry, families
- Assist in the planning and development of professional learning opportunities
- Conduct collegial classroom visitations and provide non-evaluative feedback
- Advise the Director on educational, school culture and discipline matters
- Assist in the hiring of staff
- Other duties as assigned

Qualifications:

- Bachelor's or master's degree in job related area with teaching certification preferred; exceptional experience in STEM disciplines will be considered.
- Knowledge and training in Project Based Learning, Universal Design for Learning
- Experience in development and implementation of STEM Education
- High degree of initiative and independent work ethic
- High level of energy consistent with a positive attitude in working with young adolescent learners

K. Personnel compensation plan, including provisions for leaves and other benefits, if any.

The Director, full time STEM Educators and Administrative Staff will be paid a salary. The salaries of full time or part-time personnel shall be paid on a bi-weekly basis. There may be circumstances where part-time personnel are contracted on an hourly or monthly rate, whichever is deemed appropriate by the director and the part time personnel. All independent contractors, whether full-time or part time, will be paid on an hourly rate based on negotiated rates. *See budget for salary expectations.*

The compensation packages will align with member district contract based agreements so that working at SMLS will be attractive but not in competition with our sending Districts. Compensation shall be negotiated on a person-by-person basis commensurate with experience, performance, and availability.

SMLS will contract all paid staff through SERESC consistent with SERESC compensation strategies for full and part-time employees, including health and dental benefits, 403B retirement opportunities, and leave provisions.

Vacation

SMLS will publish an annual calendar of holidays and vacations during which the school will be officially closed. The calendar will generally coincide with the school district where SMLS shall reside. Full time STEM educators will also receive a maximum of three (3) days of paid

personal leave per year. Personal leave days must be used during the school year in which they are accrued. Vacation time shall be scheduled during school vacation weeks. Employees shall only schedule vacation during official school vacations when the school will officially be closed and not schedule vacation during school operation.

Sick Leave

Sick leave is available to employees, providing full salary and benefits for absences due to personal illness or injury that prevent the employee form working, as follows: Full time staff shall accrue sick leave at the rate of five (5) days per school year. If specified in the employee's contract, part time staff, or staff working part time at the school shall accrue sick leave on a prorated basis to reflect the proportion of time or working months that the employee's schedule represents in relation to full time schedule. Employees may accrue up to a total maximum of ten (10) days of sick leave. All employees shall inform the Director of an anticipated absence as soon as possible, and such leave (other than for unexpected circumstances) must be pre-approved by the Director. The Director may require an employee to verify the claimed reason for any absence and the employee shall be obligated to verify the claim with an official physician's note.

L. Pupil Transportation

Charter school students will have access to transportation to and from SMLS only if they reside in the district where the charter school is located. The charter school will comply with charter law provisions that govern student transportation under Section 194-B: 2, which states:

Attendance at a charter school for the purposes of transportation shall not constitute assignment under the provisions of RSA 189:6 and RSA 189:8. Pupils who reside in the school district in which the open enrollment or charter school is located shall be provided transportation to that school by the district on the same terms and conditions as provided in RSA 189:6 and RSA 189:8 and that transportation is provided to pupils attending other public schools within that district. However, any added costs for such transportation services shall be borne by the charter school.

Students attending SMLS who reside in the host school district shall ride transportation provided by that host district, with the charter school providing for added route cost, if so billed.

For the purposes of open enrollment, neither the sending nor the receiving school district shall be obligated to provide transportation services to pupils attending an open enrollment school outside the pupil's resident district. No transportation will be provided by a sending district or receiving charter school for students whose residence is other than where the school program is located.

SMLS anticipates that students will attend from many different communities around New Hampshire. SMLS will assist, to the extent possible; parents who wish to coordinate shared or contracted rides.

M. Statement of assurances related to non-discrimination according to relevant state and federal laws.

SERSC/SMLS shall not discriminate on the basis of sex, race, color, age, religion, handicap, or sexual/gender orientation, ethnic origin or marital status in the selection of students or staff, or in the administration of its educational program, or in any other way as is prohibited by relevant state and federal law. The Board of Trustees shall develop and adopt a policy and create administrative procedures to address complaints or concerns.

N. Method of coordinating with a pupil's local education agency (LEA) responsible for matters pertaining to any required special education programs or services including method of compliance with all federal and state laws pertaining to educationally disabled pupils.

As a state authorized open enrollment school, SMLS will accept applications from any student who is a New Hampshire resident. In accordance with New Hampshire law (RSA 194-B:8), SMLS will not discriminate against any student with a disability as defined in RSA 186-C. Under New Hampshire's charter school statute, RSA 194-B:11, III, when a child with disabilities attends a chartered public school, all current options available to the parent and the school district are retained. SMLS will operate in compliance with all state and federal laws.

Pursuant to RSA 194-B:II, III, the decision-making responsibility for the special education process for children with disabilities attending a public charter school, remains with the student's sending school district. In addition, RSA 194-B:11, III provides that the sending school district remains responsible for the funding for children with disabilities attending a chartered public school. Any federal funding or other funding available to a sending district related to special education, to the extent and in a manner acceptable to the funding source, shall also be directed to the receiving chartered public school on an eligible per pupil basis pursuant to RSA 194-B:11, IV.

SMLS will work closely with a student's LEA to ensure a smooth transition and will review all documentation pertaining to the student's educational needs. In the event that a student comes with a 504 Accommodation Plan or an Individualized Education Plan, SMLS's Director or designated staff, will meet with the LEA's special education team at scheduled meetings to review and adjust educational goals. The sending district will be required to provide SMLS with a complete copy of each student's IEP for implementation and monitoring purposes.

O. Admission and Enrollment Policy and Procedures

SMLS is committed to building a strong and diverse community of learners. Admission to SMLS shall be open to any student who resides in the State of New Hampshire. Methods of admission shall not be designed, intended or used to discriminate or violate individual rights in any manner prohibited by law. For the success of the school and its students, SMLS will help educate prospective families on the benefits and challenges of attending a public charter school. SMLS will hold multiple, pre-enrollment information sessions, in an effort to allow prospective families to learn more about SMLS and the public charter school experience.

Admission Procedures:

Selection of participants will primarily be the responsibility of the sending districts.

1. Students must articulate their reason for wanting to attend SMLS in a written or recorded statement.
2. Parents must sign a statement indicating their understanding and support of our mission and vision and must agree to support their child by working with the school community.
3. Parents must be able to provide transportation if required by the sending district.
4. Admission shall be blind.
5. Should the number of applicants exceed capacity, students will be chosen by a lottery system, with a wait list developed from the lottery overflow.

Admissions Policy

SMLS is committed to building a strong and diverse community of learners, and admissions will be open to any student who resides in the state of New Hampshire. Methods of admission shall not be designed, intended or sued to discriminate or violate individual rights in any manner prohibited by law. For the success of the school and its students SMLS will help educate prospective families on the benefits and challenges of attending a public charter school. SMLS will hold multiple, pre-enrollment information sessions, in an effort to allow prospective families to learn more about SMLS and the public charter school experience.

Admissions Process Overview:

- Prospective students and their families will be required to attend at least one information meeting at which SMLS's educational approach and expectations of students and their families will be explained, prior to enrollment.
- SMLS will produce application packets for prospective students about the school, its philosophy and expectations of attending students and their families. These and other student related policies will be posted and available online.
- Parents will be asked to sign an agreement indicating their understanding of the School's Mission and other expectations as part of the admission process.

- Interested families will then submit their applications.
- A committee will review applications for completeness.
- Should applicants exceed the number of spaces available, a blind lottery, organized by grade will be held. Those not accepted in the lottery will be placed on a waiting list in the order determined by the lottery.
- All accepted students will receive notification. Those who have been wait-listed will be notified.
- Accepted students and their families will be required to sign a commitment to attend form and return it to SMLS.
- Soon after the enrollment process is complete, SMLS will hold meetings for admitted students and their families and provide an orientation for students and families.

Enrollment Provisions:

- SMLS will offer automatic re-enrollment to its students, provided they are in good standing at the end of each year. Families will be asked to sign a letter of intent to re-enroll by a stated date preceding the lottery.
- SMLS will admit students from the wait-list should space become available after the lottery.
- Siblings of children already enrolled at SMLS will receive preference.
- The Board reserves the right to give preference in enrollment to children of school faculty, administration, and volunteering board members.

P. Philosophy of pupil governance and discipline, and age-appropriate due process procedures to be used for discipline matters including suspension and expulsion.

The procedures for suspension and expulsion of students at SMLA will include appropriate due process, will be specific, clear and will be compliant with state and federal laws governing discipline. The purpose of suspension and expulsion procedures will ensure a safe and effective learning environment.

SMLS will create a school environment, student governance and discipline with age appropriate due process procedures. Faculty and staff will work with qualified staff with experience in these areas as the school moves forward. SMLS discipline procedures address the young adolescent's sense of fair play and are based on the school's core values. It will strive for a culture that includes support vs. punishment, logical and natural consequences which allow students to be responsible for their actions. Mistakes in student choices and behaviors are inevitable, and any necessary restitution will be learning and growing opportunity for a student.

Due to the nature of student ownership and responsibility for their own learning, expectations for a deeper level of students helping students will increase. Behavior expectations regarding student to student or adult to adult interactions, responsibilities to oneself or others in collaborative academic experiences, and being an engaged member of the community will form the basis of the school's philosophy and procedures.

In situations where simple restitution (apologizes when appropriate, cleans up when creating a mess, etc.) are not sufficient, appropriate interventions which follow the guidelines of NH RSAs will be followed.

If a rare situation arises that might result in a suspension, it will be dealt with individually in consultation with parents and administrators from the sending school.

SMLS will develop student governance and discipline and age appropriate due process procedures. We will work with qualified staff with experience in these areas as we move forward. A general outline of how we plan to address these items is outlined below.

- A formal policy and procedure will be developed addressing student governance and age appropriate discipline with a code of honor being a major focus.
- Students will be taught strong communication, self-advocacy, self-discipline and leadership skills as they move through the curriculum.
- The school will provide support to staff and faculty when an incident arises and try to use effective communication for problem solving as the first step.
- Behavioral plans will be developed as needed.
- The procedure will include clear steps for reporting inappropriate behavior to the designated staff/faculty.
- The family will be informed of the behavior and made aware of any future consequences that may occur if the behavior continues.
- The procedure will include steps for proper documentation beginning with the reporting of the behavior and ending with the final decision and outcome.
- If disruptive/disrespectful behavior continues and the options outlined in the procedure are exhausted, expulsion may occur.
- Additional procedures will be outlined for violent behavior or bullying that may occur at the school. The procedure will allow for detention, suspension or expulsion depending on the severity of the incident.

SMLS will account for suspended or expelled students in its average daily attendance accounting as provided by law.

Q. Method of administering fiscal accounts and reporting, including a provision requiring fiscal audits and reports to be performed by an independent certified public accountant.

STEM in the Middle Lab School will follow NH public school accounting guidelines and will put in place internal accounting controls necessary to safeguard its assets and to prevent and detect financial misstatements. The School will maintain accurate financial records in accordance with Generally Accepted Accounting Principles (GAAP) for non-profit corporations. An annual financial report will be provided including an audit by an independent certified public accountant.

The Board of Trustees will appoint a Treasurer to provide the oversight necessary for monitoring the financial status of the School. The Treasurer shall report the financial status of the School to the Board of Trustees at least monthly. The Board shall also adopt policies for the financial management of the School, including policies on conflicts of interest for Board Members, Administration, and Faculty.

The Board will approve an accounting policies and procedures manual to be followed by all employees, contractors and Board Members to ensure the proper tracking and use of school funds. A general account will be set up for the administration of funds and the Treasurer and named members of the Board of Trustees will have check-writing authority. Two signatures will be required on all check manifests. Each individual with check-writing authority will be covered by a fidelity bond in accordance with the guidelines of the New Hampshire Department of Revenue Administration.

Except for emergency purchases approved by the School's authorized personnel (up to a maximum to be established by the Board of Trustees), all expenditures and contracts will be handled through an encumbrance system of purchase orders for clear tracking of expenditures and status of account balances.

Annual Audit

STEM in the Middle Lab School will comply with all reporting requirements specified in New Hampshire Charter School Section (RSA 194-B:10, I-V). Section 194-B: 10, 1-V requires that all public charter schools issue an annual report, perform annual financial audits, program audits, and participate during the annual school budget process. The School will also comply with all requirements set forth in ED 318.07 regarding the contents of its annual report.

As required by law, the annual report will be provided to the state board and any person who requests it. In addition, a summary version of the annual report and periodic reports will be made available to the parent or guardian of each student at the School. The Board will select an external, independent auditor annually to complete the required annual audit and report.

The audit will address accounting practices and review the School's internal controls. The audit will be conducted in accordance will applicable generally accepted accounting principles. It is anticipated that the annual audit will be completed within six months of the close of the fiscal year. The Board of Trustees will review and respond to the audit report, if necessary, and include the audit results in its annual report.

R. Annual budget, including all sources of funding (including a proposed five-year budget containing revenue and expenditures).

STEM in the Middle Lab School will use the state's average middle and high school tuition costs as a basis for shaping its own budget. SMLS will apply for a federal charter school startup grant, which will be used in accordance with US DOE guidelines pertaining to proper charter school startup expenditures.

STEM in the Middle Lab School recognizes that the financial sustainability of a charter school requires a long-term fiscal plan, especially after the expiration of the federal grant. SMLS is committed to working with the Board of Trustees to seek a diverse portfolio of revenue sources to establish and guarantee long-term fiscal sustainability. *Enclosed with this application in Appendix B is the proposed 5-year annual budget plan for the school, outlining the use of budget and start-up grants, as well as donated funds.*

Fiscal Issues

The Director and Business Manager will develop, in partnership with the Finance Committee, a balanced yearly budget. SMLS Board of Directors will review and approve each budget prior to each fiscal year. Annual budgets will contain adequate reserves and will be submitted to the appropriate State Offices, and any other entities as required by law.

STEM in the Middle Lab School may receive funding in accordance with New Hampshire State and Federal law, and will opt to receive funding directly from the State. These funds may include, but are not limited to, general purpose block grants, categorical block and non-block grants; charter school funding from the New Hampshire Department of Education, the federal government or other sources; and any other available or mutually agreeable sources of funding for programs. SMLS expects that any funds received by the charter authorizer and due to the school will be forwarded to SMLS in a timely fashion.

S. School Calendar arrangement and the number and duration of (days) pupils are to be served pursuant to RSA 194-B. 8, 111

The school calendar will reflect those of SMLS's member districts.

SMLS will follow, at a minimum, a 180-day school year in accordance with the RSA 194-B:8, III. SMLS expects to follow the calendar of districts in which the charter school is located in order to best coordinate transportation services and better serve multi-student households. Any school-specific changes to the schedule will be monitored carefully to ensure that our students meet the required number of attendance hours. It is expected that days will begin at approximately 8:30 a.m. and end at 4:00 p.m., though some flexibility may be required to meet our host districts' bus route schedules. Should transportation issues result in lost educational hours, we will address this loss and amend our students' school hours.

T. Provision for evidence of adequate insurance coverage

Pursuant to RSA 194-B:1, SMLS will be a public school afforded the same protections as all other public schools under RSA 507(b), which provides for limited general liability for the charter school and its agents.

The Board will procure and provide evidence of adequate insurance coverage as required by the State, including but not limited to general liability for the School, Workman's Compensation, board errors and emissions, and faculty coverage. The insurance program will be in place as the first Board of Trustees begins its duties, and will be maintained throughout the life of the school.

U. Identity of consultants to be used for various services, if known

During the period of startup and development, SMLS may require assistance by specialists in fields specific to STEM education, as well as essential literacy skills, project based education, and universal design for learning. In addition, consultants and specialists shall be hired as needed during and after the startup period.

The following is a core group of consultants who have expressed an interest in being part of the Planning Group who will deal specifically with Curriculum Development:

> ***Lyn Ward Healy**, Ed.M, CAGS is certified as a teacher, principal and superintendent in New Hampshire. In addition to having served as a middle level teacher, building administrator and district administrator, she was the Associate Director of the New England League of Middle Schools for five years. In that role, she not only planned and provided professional learning experiences, but also was responsible for assessing multiple schools throughout New England. Currently Lyn is consulting and presenting workshops in New Hampshire and throughout New England on topics related to middle level education, literacy, the Common Core State Standards and teacher effectiveness.*
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> **Rose Colby** *is the co-author of **Off the Clock: Moving Education from Time to Competency** (Corwin 2012). She is a Competency Based Learning and Assessment specialist and serves as a national advisor and contributor to CompetencyWorks.org. Rose has been the*

Principal in Residence of the New England League of Middle Schools; Principal in Residence, NH School Administrators Leading with Technology Bill and Melinda Gates Foundation and a former secondary school principal and high school Biology and Chemistry teacher. She has presented at national conferences and forums on competency based learning and digital learning.

For the past eight years, Rose has had the honor of working with many teachers and school leaders across the nation to develop and design a new learning system. Competency education requires a clear vision, bold leadership and educators who are active learners.

Saundra (Sandy) Kent *has a BS in Chemistry and an M.S.T in Biology. She has taught science at the middle, high school and post-secondary levels, has participated on statewide committees to promote science education and has won many awards for her work including NH Secondary Science Teacher of the Year (1994), and Presidential Award for Excellence in Mathematics and Science Teaching (1993). Since leaving her teaching position, Sandy has served as a consultant for State assessment, worked on science content standards, supported teachers seeking Highly Qualified Teacher status, led an effort as a NH Reading Excellence Across the Disciplines (NHREADS) consultant to promote content area comprehension, differentiated instruction, and project based learning.*

Elizabeth (Betty) Ericsson *Betty has been a math teacher and coordinator, and is now a consultant and presenter for many programs and schools, in New Hampshire and beyond. She is an Intel Mathematics Instructor, First Steps in Mathematics Facilitator, and has assisted for the past few years in implementing Common Core Math Practices as part of SERESC projects. She has also been a consultant for the NHREADS Project, providing technical assistance to districts to promote reading and writing comprehension in mathematics. Betty's educational background includes: C.A.G.S., Boston University, Boston, MA Curriculum and Instruction; and ABD, Mathematics Education, Boston University.*

Edward Hendry *is an education consultant at SERESC assisting with the Special Education Program Approval and Improvement Process. He received his undergraduate degree in biology, his master's degree in science education, and his doctoral degree in science educational leadership. Ed has had more than 40 years experience in the field of education. He has been a science teacher in both public and private schools. He has served as a school administrator including positions as director of science; director of curriculum; director of accountability and assessment; associate superintendent of schools; and interim superintendent of schools. Ed worked for over thirteen years at the NH Department of Education as a science curriculum supervisor; a federal grant program administrator; and an administrator in the office of curriculum and assessment. He has had national, state, and local level experiences in science and mathematics curriculum design and student assessment; in establishing educational standards; and in working on large scale state educational assessment design and implementation. He has had extensive experiences in providing leadership in all aspects of the school and school district organization, development, and implementation of staff professional development for all employees that supports the efforts of school districts to improve instruction for all children.*

V. Philosophy of parent involvement and related plans and procedures

Parental involvement is a core philosophy of SMLS. The school will have a well-defined parent involvement initiative through the Parent Steering Committee. The parent steering committee can have up to two representatives on the Board of Trustees. The School Director will regularly attend their meetings. SMLS believes that parents are an integral part of the school community and bring valuable input, energy and skills to the school's success. A Parent Steering Committee will be created within the first few weeks of school. The Committee serves as the communication vehicle between parents, the School Director and Board of Trustees.

Because not all students have parents to share in their academic interests, business and community members who are available as mentors, will be recruited to assist by providing guidance specific to students' interests.

W. A Plan to develop and disseminate information to assist parents and pupils with decision-making about their choice of school

To ensure that all residents have an equal opportunity to apply to SMLS, information will be widely broadcasted through newspapers, websites, libraries and other public places, and social media to ensure that families are aware of SMLS as a choice that is available to them. As students from lower income or minority families may suffer disproportionately due to a lack of access to technology or to advanced curriculum, particular attention will be paid to reaching those students through their schools, communities, and other public services, to ensure their families are aware of SMLS as a choice that is available to them.

During the initial months of planning, information will be disseminated through bulletins, advisories, social media, and posting on informational websites. Materials for a major informational outreach program will be disseminated to public school administrators, school personnel, parents, businesses, and foundations. Upon approval of the charter, SMLS's Board will develop informational brochures describing the school, its mission, its approach to education, and the expectations and opportunities for students who attend. Informational brochures will be distributed to stakeholders and interested parties through the same communication channels listed above.

X. Global Hold Harmless Clause

In accordance with RSA 194-B:3, II(x), SMLS, its successors, and assigns, covenants and agrees at all times to indemnify and hold harmless the host school district and any other school district that sends its students to the charter school, and their school boards, officers, directors, agents, employees, all funding districts and sources, and their successors and assigns, (the

"indemnified parties") from any and all claims, demands, actions and causes of action, whether in law or in equity, and all damages, costs, losses, and expenses, including but not limited to reasonable attorneys' fees and legal costs, for any action or inaction of the charter school, its board, officers, employees, agents, representatives, contractors, guests and invitees, or pupils. The school shall have no obligation to hold harmless the Indemnified Parties for any claims, damages, losses, or expenses resulting from the Indemnified Parties' own acts or omissions.

Y. Severability provisions and statements of assurance that any provision of the charter school contract found by competent authority to be contrary to applicable law, rule, or regulation shall not be enforceable

If any part of the charter contract is determined to be invalid or illegal by a court of competent jurisdiction, such invalidation or illegality shall not affect the remaining portions of the charter contract, which shall remain in full force and effect. Any provision of the charter school contract found by competent authority to be contrary to applicable law, rule, or regulation shall not be enforceable.

Z. Provision for Dissolution of the Charter School Including Disposition of its Assets

Should SMLS cease operation or have its charter revoked by its authorizer, the Board shall consult with an attorney and the Department of Education to assure that contractual and financial obligations are met. Upon dissolution of the corporation all non-committed assets will be donated to public charter schools or other non-profits supporting charter schools as determined by the Board.

(AA)In the case of the conversion of a public school to a charter conversion school.

NOT APPLICABLE

(BB) A plan for the education of the school's pupils after the charter school may cease operation.

A plan for each student's continued education, should the school cease to exist, will be determined individually with each student and his/her parent or legal guardian. Likely options would be: 1) re-integration into the student's assigned public school; 2) application to a different chartered public school, if available; or 3) other available options based on parent and student priorities. Planned transition is estimated to be 3-6 months from announcement of cessation of operation. Upon cessation of operation and as soon as the Board of Trustees become aware, the records of each student would be transferred in a timely manner to the receiving school, and the staff and trustees would work with the receiving school, parents, and students to assure smooth and timely transitions.

(CC) In addition to an application, each charter school applicant, in consultation with the local school board, shall prepare a proposed contract.

NOT APPLICABLE

(DD) An outline of the proposed accountability plan that clarifies expectations for evaluating the school's program and that contains an acknowledgement that a full accountability plan shall be developed and ready to implement prior to the date of opening.

The effectiveness of schools is measured by student results. Therefore, SMLS will develop and implement a specific accountability plan that seeks to report quantitative data and qualitative information that measures the effectiveness of STEM and project-based learning at the middle school level. As the program develops, and the real time lab school plan is constructed, a plan will also be outlined to measure the effectiveness of the professional development offered as part of the SMLS Charter School. The Board of Trustees will develop a timeline for the Director to report data and information that assesses the progress of each goal statement in order to measure effectiveness and provide the opportunity to revise practice, if warranted. If student learning is the broadest and most important goal set by the charter, then the charter itself maintains a distinct obligation to self-declare and request independent assessments to determine the state of affairs of its programming as defined by the following goal statement:

1. SMLS will increase the enrollment of the student body to a sustainable level while not compromising the mission established within the charter.
    a. Reach enrollment determined by Board of Trustees and Director in each successive year of operation.
    b. Operate charter organization with existing fiscal resources, while seeking new resources for current programming and expansion.
    c. Establish, maintain, and grow and endowment fund.

2. SMLS will ensure that all students effectively engage in project-based learning, and are able to demonstrate the following learner qualities every day in their work:
    a. Grit/persistence
    b. Personal commitment to their individual learning goals
    c. Competence in accessing resources and taking responsibility for meeting their individual and collaborative goals
    d. Demonstration of accountability for learning to peers and adults
    e. Collaboration in working toward common goals

3. SMLS will extend the culturally relevant experience of its students.
    a. Connect competencies to student real-world experiences.

b. Connect STEM standards across the curriculum
c. Assess student performance when engaged in off-campus experiences.

4. SMLS will connect students to a real-world experiences by partnering with community, business and public, or non-profit organizations.
    a. Create Extended Learning Opportunities (ELO) to place students with profit and non-profit organizations for mentoring. (this is the first time we have mentioned ELO's)
    b. Create apprenticeship opportunities for students with businesses in the community
    c. Create internship opportunities for students with for profit and with non-profit organizations and local business.
    d. Assess student competency mastery as performed through demonstration of learning in classroom, ELO, apprenticeships, and internships.
    e. Assess student capstone experience.

5. SMLS will develop a variety of evaluation tools for students, staff and parents to use to track each student's progress toward individual and school-wide goals and objectives.

6. SMLS will develop rich and ongoing professional learning to help staff meet their individual, their students', and the SMLS educational goals.

7. Once the school is operational, educators will invited to SMLS to observe instructional methods that integrate all standards through the specific lens of STEM as well as the operation of a student focused middle school.

8. SMLS will assure adequate, accessible facilities to support programming, population needs and professional development.

A plan to measure student outcomes will be established. The measures will include both qualitative and quantitative data and feedback. Baseline data will be established and measurable goals will be designed by the SLMS assessment design team.

Measures may include:

- Student learning outcomes via formative, interim and summative assessments;
- Specific rubrics designed to measure student growth in key content areas of ELA, math, science as well as digital and related arts;
- Regular, specific and intentional feedback from students, parents, teachers, administrators, and Board of Trustees;

Additional measures to contribute to the evaluation of operations and success of the school

- Records of professional development activities for SMLS staff and others;
- Records of parent volunteer engagement and support;
- Growing list of sponsors, technical assistance providers and supporters;
- Records of inquiries and visits by educators outside SMLS that show interest in the design and activities of the school;
- Records of meetings of Board of Trustees and sub-committees,
- Financial audit and annual report;
- Required building, staff and operating certificates in place;
- Formal summative report to the NHDOE and Board of Trustees.

APPENDIX

A: List of Application Writing Team Members

SERESC professionals who participated in the writing of this document:

Richard LaSalle, Executive Director

Maryclare Heffernan

Carolyn Woodman

Jane Bergeron-Beaulieu

Lyn Healy

Richard Ayers

B. List of Potential Planning Committee Members

Members of the Application Writing Committee have suggested a potential team of experienced educators with STEM Education expertise. Those who have been asked if they are interested in being part of the Planning Committee for 2014-15 are listed below. They may also be part of a future ongoing Advisory to support the Board of Trustees.

The following core list will begin the planning work, and will invite others, particularly others from science fields and institutes of higher education to participate in a planning or advisory capacity.

Richard LaSalle

Richard La Salle, who assumed the role of Executive Director of SERESC on August 1, 2012, brings many years of experience as a Principal, Superintendent of Schools, and College Professor. Richard retired from Public School Administration in 2012, having served as Superintendent of Schools in Timberlane Regional\Hampstead (SAU #55) for 7 years and in Nashua (SAU #42) for 30 years in a variety of roles as teacher, building administrator and Assistant Superintendent.

Prior to becoming SERESC's Executive Director, Richard was involved in School District initiatives to improve instruction and implement new curricula, enhance the model of instruction with comprehensive RTI (Response to Intervention) support, design and implement competency-based instruction and assessment systems, deploy "purposeful use" of technology in both instruction and administration services, and design and manage small, medium and large school construction projects.

Maryclare Heffernan

Maryclare Heffernan, an educational consultant with more than 30 years experience in educational systems change, has worked with numerous districts and schools in creating dynamic and viable plans for school improvement. Her professional experience includes teaching, school administration, project management, facilitation, program design, implementation and planning for sustainability. Specific work in the area of program design has included the development and implementation of school-based programs for elementary and

high school students with significant disabilities as well as a highly collaborative inclusion model in the middle school setting.

Maryclare was a member of the NH Response to Instruction (RTI) Task Force and a lead author of the RTI Interactive Guide, Strategic Plan and contributor to the Integrated Instructional Framework for Transformation: NH Response to Instruction Implementation Framework. Additionally as a founding member of Associates for School Change at SERESC she has facilitated the work of multiple school and district teams in the development of School and District in Need of Improvement and School Improvement Grant plans as well as ongoing work with NH Focus and Priority schools.

Since 1997, Maryclare has been a key member of the NH Department of Education's (NH DOE) Special Education Program Approval and Improvement Process's Management Team. In that role she contributed to the development and implementation of the innovative monitoring and approval models utilized by the NH DOE, including the Special Education Case Study and Focused Monitoring Processes. Additional professional experiences include: NH CCRS Implementation Project; Keene State College State Agency for Higher Education (SAHE) RTI trainer, NH Secondary Transition Project Director; Co-Director Statewide Standardization Project for Court Placed Children and Youth, and adjunct faculty member at Plymouth State University.

Her passion for improved student learning has resulted in the development of consultation skills in managing complex change and support of system-wide redesign.

Jane Bergeron

As an education consultant, Jane Bergeron Beaulieu brings more than 30 years of experience designing, managing and leading education projects in the state of New Hampshire. Jane is a strategic leader and recognized for her proactive and progressive thinking. Her portfolio consists of a wide range of work including teaching, leading, professional development, research and design, program evaluation, teacher and leader effectiveness, direct work with charter schools, strategic planning, leadership development and assisting systems in addressing the "learning gap".

For the past 25 years Jane has been an independent consultant and a strategic leader for a variety of statewide initiatives and projects. As an education consultant Jane works with regional and state leaders to develop and support a variety of statewide initiatives, including but not limited to: charter school evaluations, oversight and development of National Science Foundation Grants, consultation to Focus and Priority schools, oversight of the NHDOE Special Education Program Approval Process, as well as serving as a Regional Liaison for the New Hampshire Department of Education. Most recently Jane has taken the lead in partnering with Harvard University in the design of Instructional Rounds in New Hampshire Schools, and has taken on the role of developing a STEM Education Center at SERESC where she serves as the co-chair of the STEM Advisory Committee. Jane has extensive

training in coaching and mentoring, serves on several state professional boards and currently provides consultation services to a variety of New Hampshire School Districts.

Prior to becoming and education consultant, Jane served as a middle school principal and special education administrator, as well as an education consultant to the American School of Kuwait. She currently serves as an adjunct faculty member for Plymouth State University and Southern New Hampshire University. Accountability, improved learning results and inspiring generations of educators are used as a framework for all of her consultation work. Jane promotes teamwork, problem solving and partnerships between educators, non-profit organizations, government agencies and business/industry in order to guide systemic change and improved learning results for all children.

Lyn Healy

Lyn Ward Healy, EdM, CAGS is certified as a teacher, principal and superintendent in New Hampshire. In addition to having served as a middle level teacher, building administrator and district administrator, she was the Associate Director of the New England League of Middle Schools for five years. In that role, she not only planned and provided professional learning experiences, but also was responsible for assessing multiple schools throughout New England. Currently Lyn is consulting and presenting workshops in New Hampshire and throughout New England on topics related to middle level education, literacy, the Common Core State Standards and teacher effectiveness.

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For the past eight years, Rose has had the honor of working with many teachers and school leaders across the nation to develop and design a new learning system. Competency education requires a clear vision, bold leadership and educators who are active learners.

Saundra Kent

Saundra (Sandy) Kent has a BS in Chemistry and an M.S.T in Biology. She has taught science at the middle, high school and post-secondary levels, has participated on statewide committees

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Betty has been a math teacher and coordinator, and is now a consultant and presenter for many programs and schools, in New Hampshire and beyond. She is an Intel Mathematics Instructor, First Steps in Mathematics Facilitator, and has assisted for the past few years in implementing Common Core Math Practices as part of SERESC projects. She has also been a consultant for the NHREADS Project, providing technical assistance to districts to promote reading and writing comprehension in mathematics. Betty's educational background includes: C.A.G.S., Boston University, Boston, MA Curriculum and Instruction; and ABD, Mathematics Education, Boston University.

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Dr. Richard W. Ayers, Ed.D.

Dr. Ayers received his Bachelor of Science degree from Norwich University and his Master's and Doctorate from the University of Colorado. He has over 35 years of experience as an

educator, twenty-five being in leadership positions in New Hampshire. He has held positions as a teacher of mathematics, middle and high school principal, assistant superintendent and superintendent and upon retirement served as the interim executive director for SERESC. Most recently Dr. Ayers has focused consultation in the areas of strategic planning, leadership development, program development, educational program specifications and school finance. Richard currently teaches graduate classes at Plymouth State University and Southern New Hampshire University and resides in Sanbornton, NH.

C. Five Year Budget

			YEAR 1 2014/15	YEAR 2 2015/16	YEAR 3 2016/17	YEAR 4 2017/18	YEAR 5 2018/19
		ANTICIPATED ENROLLMENT	**0**	**99**	**120**	**120**	**120**
1100		**INSTRUCTIONAL SERVICES**					
1100	100	Teacher Salaries - FT	$0	$180,000	$200,000	$200,000	$200,000
	100	Teacher Salaries - PT	$20,000	$40,000	$60,000	$60,000	$60,000
1100	111	Stipends	$2,000	$2,000	$3,000	$4,000	$5,000
1100	112	Aides and Tutors Salaries	$0	$5,000	$5,000	$5,000	$5,000
1100	113	Administrative Support	$0	$5,000	$5,000	$5,000	$5,000
1100	122	Substitutes	$0	$1,000	$1,000	$1,000	$1,000
1100	211	Teacher Benefits	$0	$45,000	$50,000	$50,000	$50,000
	211	Teacher Incentives	$0	$0	$10,000	$11,000	$12,000
1100	214	Workers Compensation	$140	$280	$420	$420	$420
1100	230	Substitute FICA	$0	$77	$77	$77	$77
1100	230	FICA	$2,600	$30,030	$35,230	$35,230	$35,230
1100	240	Staff Development	$3,000	$3,000	$3,000	$3,000	$3,000
1100	260	Unemployment	$0	$0	$0	$0	$0
1100	300	Purchased Services	$0	$2,000	$3,000	$3,000	$3,000
1100	550	Printing	$5,000	$2,000	$2,000	$2,000	$2,000
1100	591	Curriculum Development	$19,000	$15,000	$15,000	$5,000	$5,000
1100	591	Arts, Music, Lang. Prog. Contract	$2,500	$10,000	$12,000	$12,000	$12,000
1100	610	Supplies -- Art, Music, Language	$1,000	$2,000	$2,000	$2,000	$2,000
1100	610	Supplies	$2,500	$2,500	$2,500	$2,500	$2,500
1100	640	Texts & Core Program Materials	$10,000	$5,000	$10,000	$10,000	$10,000
1100	641	Books and Printed Material	$2,500	$1,000	$3,000	$3,500	$4,000
1100	730	Equipment and Furnishings	$10,000	$0	$10,000	$5,000	$5,000
1100	734	Computer Equipment	$2,500	$30,000	$7,000	$25,000	$25,000
1100	738	Peplacement Computers	$0	$1,000	$2,000	$10,000	$15,000
		SUBTOTAL	**$82,740**	**$381,887**	**$441,227**	**$454,727**	**$462,227**

			YEAR 1 2014/15	YEAR 2 2015/16	YEAR 3 2016/17	YEAR 4 2017/18	YEAR 5 2018/19
		ANTICIPATED ENROLLMENT	**0**	**99**	**120**	**120**	**120**
1110		**COMPUTER TECHNOLOGY**					
1110	100	Contracted Services	$2,400	$2,400	$2,500	$2,600	$2,700
1110	111	Salaries	$0	$0	$0	$0	$0
1110	211	Benefits	$0	$0	$0	$0	$0
1110	214	Workers Compensation	$0	$0	$0	$0	$0
1110	230	FICA	$0	$0	$0	$0	$0
1110	260	Unemployment	$0	$0	$0	$0	$0
1110	300	Services	$0	$0	$0	$0	$0
1110	610	Supplies	$0	$500	$1,500	$2,000	$2,000
1110	734	Computers Network	$2,000	$2,000	$2,000	$2,000	$2,000
1110	738	Replacement Computers	$0	$0	$0	$0	$0
1110		Software	$1,000	$5,000	$2,000	$2,000	$2,000
		SUBTOTAL	**$5,400**	**$9,900**	**$8,000**	**$8,600**	**$8,700**
1200		**SPECIAL EDUCATION SERVICES**					
1200	110	Teacher/Liason (Contracted)	$1,200	$20,000	$21,000	$22,000	$23,000
1200	211	Benefits	$0	$0	$0	$0	$0
1200	214	Workers Compensation	$0	$0	$0	$0	$0
1200	230	FICA	$0	$0	$0	$0	$0
1200	260	Unemployment	$0	$0	$0	$0	$0
1200	300	Purchased Services	$0	$0	$0	$0	$0
1200	610	Supplies	$0	$500	$1,000	$1,000	$1,000
		SUBTOTAL	**$1,200**	**$20,500**	**$22,000**	**$23,000**	**$24,000**

			YEAR 1 2014/15	YEAR 2 2015/16	YEAR 3 2016/17	YEAR 4 2017/18	YEAR 5 2018/19
		ANTICIPATED ENROLLMENT	**0**	**99**	**120**	**120**	**120**
2100		**STUDENT SUPPORT SERVICES**					
2100	100	Salaries	$0	$0	$0	$0	$0
2100	200	Benefits	$0	$0	$0	$0	$0
2100	214	Workers Compensation	$0	$0	$0	$0	$0
2100	230	FICA	$0	$0	$0	$0	$0
2100	260	Unemployment	$0	$0	$0	$0	$0
2100	370	Testing/Assessments	$0	$0	$0	$0	$0
2100	390	Contracted Services	$2,500	$15,000	$18,000	$18,000	$18,000
2100	610	Supplies	$0	$500	$1,000	$1,000	$1,000
2100	641	Books and Printed Material	$0	$1,500	$1,000	$1,000	$1,000
2100	643	Information Access Fees	$0	$1,000	$1,000	$1,000	$1,000
2100	320	Busing/Insurance/Maintenenace	$0	$1	$1	$1	$1
		SUBTOTAL	**$2,500**	**$18,001**	**$21,001**	**$21,001**	**$21,001**
2130		**HEALTH SERVICES**					
2130	110	Nurse	$0	$0	$0	$0	$0
2130	214	Workers Compensation	$0	$0	$0	$0	$0
2130	230	FICA	$0	$0	$0	$0	$0
2130	260	Unemployment	$0	$0	$0	$0	$0
2130	300	Purchased Services	$0	$15,000	$16,200	$16,200	$16,200
2130	610	Supplies	$1,000	$500	$1,000	$1,000	$1,000
		SUBTOTAL	**$1,000**	**$15,500**	**$17,200**	**$17,200**	**$17,200**

			YEAR 1 2014/15	YEAR 2 2015/16	YEAR 3 2016/17	YEAR 4 2017/18	YEAR 5 2018/19
		ANTICIPATED ENROLLMENT	**0**	**99**	**120**	**120**	**120**
2222		**LIBRARY MEDIA SERVICES**					
2222	641	Books and Printed Material	$10,000	$2,500	$2,500	$2,500	$2,500
2222	643	Electronic Information Services	$2,000	$2,000	$2,000	$2,000	$2,000
		SUBTOTAL	**$12,000**	**$4,500**	**$4,500**	**$4,500**	**$4,500**
2223		**AUDIOVISUAL SERVICES**					
2223	430	Repair and Maintenance	$0	$0	$1,000	$1,000	$1,000
2223	610	Supplies	$1,000	$500	$1,000	$1,000	$1,000
2223	730	Equipment	$2,000	$0	$1,000	$2,000	$2,000
2223	735	Replacement Equipment	$0	$0	$0	$1,000	$1,000
		SUBTOTAL	**$3,000**	**$500**	**$3,000**	**$5,000**	**$5,000**
2310		**SCHOOL BOARD SERVICES**					
2317		Audit	$1,000	$3,000	$3,000	$3,000	$3,000
2318		Legal	$2,000	$2,000	$2,000	$2,000	$2,000
2319		Board Training	$1,000	$500	$500	$500	$500
		SUBTOTAL	**$4,000**	**$5,500**	**$5,500**	**$5,500**	**$5,500**

			YEAR 1 2014/15	YEAR 2 2015/16	YEAR 3 2016/17	YEAR 4 2017/18	YEAR 5 2018/19
		ANTICIPATED ENROLLMENT	**0**	**99**	**120**	**120**	**120**
2400		**SCHOOL ADMINISTRATION**					
2400	110	Director Salary	$0	$80,000	$85,000	$90,000	$100,000
2400	320	Consultant Director Startup	$50,000	0	0	0	0
2400	110	Busines Manager Salary/Fee	$0	$20,000	$25,000	$25,000	$25,000
2400	320	Consultant Accounting	$0	$0	$0	$0	$0
2400	125	Executive Assistant	$0	$25,000	$25,000	$25,000	$25,000
2400	320	Consultant Executive Assistant	$10,000	$0	$0	$0	$0
2400	211	Benefits	$0	$24,000	$25,500	$27,000	$30,000
2400	214	Workers Compensation	$350	$560	$595	$630	$700
2400	230	FICA	$3,825	$6,120	$6,503	$6,885	$7,650
2400	240	Staff Development	$0	$2,000	$2,000	$2,000	$2,000
2400	260	Unemployment	$0	$0	$0	$0	$0
2400	449	Copier	$2,000	$2,500	$2,500	$2,500	$2,500
2400	534	Postage	$2,000	$1,500	$1,500	$1,500	$1,500
2400	550	Printing and Binding	$2,500	$2,000	$2,000	$2,000	$2,000
2400	580	Travel and Conferences	$0	$2,000	$2,000	$2,000	$2,000
2400	610	Supplies	$2,000	$2,500	$3,000	$3,000	$3,000
2400	730	Equipment	$0	$2,500	$2,500	$2,500	$2,500
2400	735	Replacement Equipment	$0	$0	$0	$1,000	$1,000
2400	810	Dues and Fees	$0	$2,000	$2,000	$2,000	$2,000
		SUBTOTAL	**$72,675**	**$172,680**	**$185,098**	**$193,015**	**$206,850**

			YEAR 1 2014/15	YEAR 2 2015/16	YEAR 3 2016/17	YEAR 4 2017/18	YEAR 5 2018/19
		ANTICIPATED ENROLLMENT	**0**	**99**	**120**	**120**	**120**
2600		**OPERATIONS AND MAINTENANCE**					
2610	117	Custodial Contract	$0	$15,000	$20,000	$20,000	$20,000
2620	411	Water and Sewer					
2620	421	Disposal Services	$400	3000	$3,000	$3,000	$3,000
2620	430	Building and Grounds	$1,000	5000	$5,000	$5,000	$5,000
2620	431	Building Repairs	$20,000	$5,000	$5,000	$5,000	$5,000
2620	441	Rent/Mortgage	$20,000	$90,000	$100,000	$100,000	$100,000
2620	520	Property Libility Insurance	$1,000	$4,000	$4,000	$4,000	$4,000
2620	530	Telephone Service	$600	$3,700	$3,700	$3,700	$3,700
2620	532	Data Communications	$600	$3,000	$3,000	$3,000	$3,000
2620	610	Supplies - Building and Grounds	$500	$2,500	$2,500	$3,000	$3,000
2620	622	Electricity					
2620	624	Heating	$9,000	$45,000	$45,000	$45,000	$45,000
		SUBTOTAL	**$53,100**	**$176,200**	**$191,200**	**$191,700**	**$191,700**
2700		**STUDENT TRANSPORTATION**					
2725	519	Field Trips	$0	$2,000	$2,000	$2,000	$2,000
2725	520	Insurance	$0	$3,000	$3,000	$3,000	$3,000
2725	525	Fee and Registration	$0	$1,500	$1,500	$1,500	$1,500
2725	602	Motor Vehicle Maintenance	$0	$1,000	$1,000	$1,000	$1,000
2725	626	Fuel	$0	$1,500	$1,500	$2,000	$2,000
		SUBTOTAL	**$0**	**$9,000**	**$9,000**	**$9,500**	**$9,500**
		ANTICIPATED COSTS:	**$237,615**	**$814,168**	**$907,725**	**$933,743**	**$956,178**

	YEAR 1 2014/15	YEAR 2 2015/16	YEAR 3 2016/17	YEAR 4 2017/18	YEAR 5 2018/19
ANTICIPATED ENROLLMENT	**0**	**99**	**120**	**120**	**120**
ANTICIPATED REVENUE:					
Local	$0	$0	$0	$0	$0
State Revenue ($5450/pupil)	$0	$539,550	$654,000	$654,000	$654,000
State /Federal Startup Grant	$215,000	$200,000	$160,000	$0	$0
Other Grants	$0	$0	$25,000	$35,000	$40,000
Parent/School Revenue	$0	$25,000	$30,000	$35,000	$40,000
Entrepreneurial Revenue	$20,000	$50,000	$50,000	$50,000	$50,000
Gifts/Philanthropic Contributions	$0	$0	$0	$0	$0
Carry-over revenue	$0	$0	$0	$0	$0
Other revenue	$0	$0	$0	$0	$0
TOTAL REVENUE:	**$235,000**	**$814,550**	**$919,000**	**$774,000**	**$784,000**

D: Explanations and Examples relating to Curriculum/Instruction/Assessment

1. Beane and Brodhagen. PowerPoint: The Beane/Brodhagen Model of Negotiated Integrated Curriculum: *A Curriculum Model for the Middle School Years of Schooling.*

2. Bower, Joe. "Ten Steps to negotiate an integrated curriculum with my students." http://www.joebower.org/2010/09/negotiated-integrated-curriculum.html September, 2010.

3. "Project-Based Learning: Inspiring Middle School Students to Engage in Deep and Active Learning". *New York City Department of Education, Division of Teaching and Learning Office of Curriculum, Standards, and Academic Engagement.* 2009.

Includes the following Excerpts:

- Project Based Learning in Science, p. 36
- Types of Research Projects, pp.38-39
- *Example:* Controlled Experiment Science Project Exit Project Unit, p.50
- *Example:* Field Study Science Exit Project II, p. 52
- Sample Science Exit Project Rubric (pages one and 2) , p.71, 72

The Beane/Brodhagen Model of Negotiated Integrated Curriculum

A Curriculum Model for the Middle Years of Schooling

Two key themes emerge from many of the reviews of middle years curriculum

Coherence

Developing curriculum that presents a coherent and holistic picture, rather than a set of fragmented, unrelated topics.

Permeability

Providing room for student voice and choice.

The Negotiated, Integrated Curriculum Model developed by James Beane and Barbara Brodhagen addresses both these issues fully.

- It is "permeable" as it is based on students' own questions about themselves and about the world and on teachers' understandings of questions the "world poses to students". It is a negotiated curriculum model.
- It is "coherent" as it is not bounded by subject divisions, but reflects the natural relationship between different disciplines of knowledge. It is an integrated curriculum model.

THE MIDDLE YEARS OF SCHOOLING
Curriculum

The process involves ten stages:

Stage one involves students brainstorming a list of questions about themselves. This is an individual activity. We have found it helpful to alert students to this question a day or two beforehand, so they can reflect on their response.

Some typical questions include:

- Will I go to university?
- What jobs will I have in the future?
- Why do people get divorced?
- When will I die?

This last question comes up quite often and is usually a response to a young adolescent's growing sense of self and grappling with the concept of personal mortality for the first time – rather than something more sinister.

- Stage two involves students in small groups sharing their questions about themselves and deciding which of these are common questions. A common question is one that more than one student had written down or that when raised other students say they are interested in that question too. The purpose here is to develop a "common curricul of interest to more than one individual.

Each of the rest of the stages are described on the following slides, with photographs from Wales Street Primary School, which in 1996 used this process to develop the years' integrated curriculum for grades 5 & 6.

STAGE THREE WORLD CONCERNS
Students brainstorm a list of questions they have about their world.

STAGE FOUR FINDING COMMON WORLD QUESTIONS
Students in small groups share their questions about their world and decide which of these are common questions – i.e. of interest to a number of the group members.

It is valuable, but not essential, to have an adult or older student to help with this stage of the process.

STAGE FIVE FINDING THEMES

Small groups (with adult support if possible) consider ways in which some of their personal and social questions may be connected. The words or ideas used to connect these ideas become possible themes.

A number of small groups can be combined for this part of the process to maximise use of adult support. This is the stage of the process that students find the most challenging

THE MIDDLE YEARS OF SCHOOLING
Curriculum

STAGE SIX SHARING THEMES

Small groups come together to share their ideas of themes for study. Themes are rationalised to remove repetition and overlap.

STAGE SEVEN SELECTING THEMES

Students vote on themes. They may vote for as many themes as they like as long as they feel strongly about including that theme in the curriculum. The most popular themes are identified and terms/semesters are negotiated for working on the themes.

In this case, the most popular theme was "relationships". However, as the teachers had already booked the "life education program" for term three, this theme was put off till then. The schedule was negotiated rather than dictated by student voting.

STAGE EIGHT CONNECTING QUESTIONS TO THEMES

A small committee of students look over all the questions, deciding which questions belong with which themes.

The questions have been cut into strips (with one question per strip) to enable them to be bundled more easily.

These are some of the student questions that were included in a unit called "RELATIONSHIPS"

- Why are people homeless?
- Why do people commit crimes?
- How do we help people around the world who suffer from hunger?
- Will all the countries of the world make peace?
- Will there ever be peace around the world?
- Will there always be famine in the world?
- How can we help homeless people?
- Why is Australia so wealthy and Rwanda isn't?
- Why are people violent? and will violence ever stop?
- Why do other countries fight one another?
- How many children will I have?
- Why are boys and girls treated differently?
- Will my personality change?
- How will looks change as I grow up?
- Why do people call it "a man's world"?
- Will I be respected by others when I'm older?
- Will my friends be my best friends in 20 years time?
- Will I still have the same friends at high school?
- What will happen to other members of my family?
- Will my parents' relationship ever be the same as it was before?
- Can your brother/sister affect your life?

THE MIDDLE YEARS OF SCHOOLING
Curriculum

STAGE NINE SELECTING ACTIVITIES

Each question relating to the current theme is written on the top of a separate piece of butcher's paper. Students in pairs and groups of three walk around the room looking at each question and adding ideas for activities.

These are some of the suggested activities for the question, "Can we save endangered species?", which was part of the unit on the environment.

- Find out on the computer, and do research and find how many animals are in danger.
- Draw or find a map of the world and then label where animals are endangered and extinct.
- Sponsor a dolphin.
- Time lines.
- Write to greenpeace and see if they can send some pamphlets about it.
- Make games eg. board games.
- Make a mobile about an endangered animal with info.
- Do a project on whales.
- Make a live animal model.
- Do a project on extinct animals or lots of extinct animals and find out how those animals got extinct.
- Go to the zoo.
- Go to Healesville Sanctuary and find information about endangered species.
- We could go out and catch bugs and see which bug we catch most
- Go to the Museum
- Have guest speakers eg. environmental guest speakers.
- Watch videos and then have a discussion.
- Read books and make a graph on the animals that are extinct.
- Make some pamphlets fliers, poster and hand to people.
- Research in the library about the endangered species.
- Make a model of the ozone layer.
- Find the rarest animal from water, air and land.

THE MIDDLE YEARS OF SCHOOLING
Curriculum

STAGE TEN UNIT PLANNING

Students' suggested activities (and teacher chosen ones) are used as the basis for unit planning (the unit being around the theme chosen by students)

Student suggested activities were plotted onto a Bloom's Taxonomy and Multiple Intelligences grid to make sure that all intelligences and all levels of cognitive functioning were effectively catered for in the curriculum.

Activities were also audited against the CSF to ensure an appropriate coverage of outcomes. Activities were added by the teachers on the basis of this audit.

[redacted] More Next Blog» Create Blog Sign In

for the love of learning

Assessment is not a spreadsheet -- it's a conversation.

Monday, September 6, 2010

Negotiated, Integrated Curriculum

I came across James Beane and Barbara Brodhagen's Negotiated, Integrated Curriculum Model when listening to Alfie Kohn's 2009 lecture for PACE University.

I have quickly summarized the ten steps Beane and Brodhagen provide that I plan on following to negotiate an integrated curriculum with my students:

1 Have students individually brainstorm a list of questions about themselves. I post this question on our class Ning as a discussion forum topic.

2 In small groups, students will share their questions about themselves and group common questions into potential categories and subcategories.

3 Students brainstorm a list of questions they have about their world.

4 In small groups, students will share their questions about the world and group common questions into potential categories and subcategories.

5 In small groups, with adult support, students consider ways to connect their 'self' questions with their 'world' questions. The words used to connect these ideas become possible themes.

6 In small groups, students share their ideas of themes for study. Themes are placed into categories and subcategories to remove repetition and overlap.

7 Students vote on themes and most popular themes are identified as themes to be studied through out the year.

8 A small committee of students examine all the questions and place them with their corresponding theme.

9 Students create activities to accompany each theme.

10 Unit planning is done by the teacher based on the students' input and the mandated curriculum.

11 If some of the mandated curriculum does not fit with the student input, then this is brought to the student's attention to be discussed.

I see an integrated and negotiated curriculum to be at the heart of a democratic classroom that puts student engagement as a priority.

Read my book

De-Testing and De-Grading Schools

Contact Me

joe.bower.teacher@gmail.com

What am I doing here?

I am Joe Bower (and that is Deborah Meier) and I teach in Red Deer, Alberta, Canada. I wish to challenge 'traditional' schooling while exploring more progressive forms of education. I intend on using this blog to uproot some of the most deeply rooted myths that continue to distract people from a love for learning. And I am going to have fun doing it!

Part 6

PROJECT-BASED LEARNING IN SCIENCE

Introduction

Tapping into our students' natural curiosity is the first step toward real science learning. Project-based learning in science nurtures this natural curiosity by sending our students on a journey of discovering and experimenting with the mystery and wonder of science. We want to encourage our students to watch and wonder about forces and living things and to ask WHY?

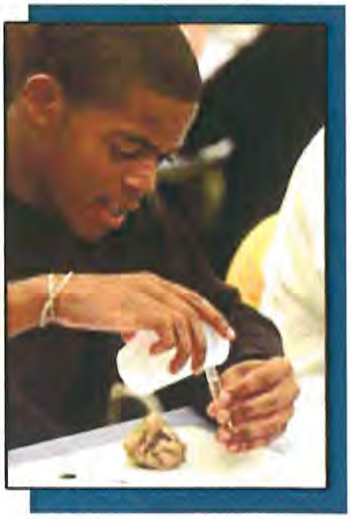
Project-based learning experiences in science motivate students to understand the world differently and ponder why things are the way they are. Students learn much more easily when there is excitement for the subject or topics. This does not mean that we make the science curriculum less challenging, but rather that we focus on deep learning. It means we stress that science is, more than anything, about questions and amazement.

The Science Exit Project became a summer school resource for New York City eighth grade students in 1999. Since that time it has been utilized as a key part of the grade eight science scope and sequence. A project-based approach to learning is in keeping with the notion that student immersion in a specific area of the curriculum, in an in-depth fashion, can yield deep understanding of a subject area.

Students will remember the challenges—as well as the rewards—that come with completion of their projects. They will also gain a deeper understanding of content and process. They will find the research and investigation skills they learned to be useful as they continue their studies in high school and college and pursue their role as lifelong learners.

The materials in this Section, when used in conjunction with the general materials in the first four Sections of this Guide, will provide you with extensive support for the implementation of a rich Project-Based Learning program in science for your school.

Types of Research Projects



Students will receive detailed instruction and support from their science teacher to complete one of the following types of research projects:

Controlled Investigation (Primary Research)

Students manipulate the variable being studied. **Students will:**

- Identify a problem
- Collect background information
- Make an hypothesis
- Determine the materials used
- Design the procedure, including identifying which factor will be varied and what to be controlled
- Ensure that the tools being used are appropriate for the investigation
- Determine how, when and where measurements will be taken
- Collect data and represent the data in multiple ways (charts, graphs, diagrams)
- Replicate the procedure at least three times
- Analyze the data collected
- Form a conclusion based on the data collected and the stated hypothesis
- Be prepared to ask new questions based on the results of the investigation

Examples of Controlled Investigation are:

Plan and implement an experiment to:

- Determine the effect of various coatings on the corrosion of a metal.
- Determine the effect of energy, such as light or heat, on the growth of aquatic or land plants.
- Mimic the effects of acid rain on the environment. Students can explore how liquids of varying pH affect the growth of plants.
- Determine the effect of soil samples from various areas of their neighborhood on plant growth.

Field Investigation (Primary Research)

There are different types of field investigations; these include, but are not limited to, organism behavioral studies, field transects and geological field studies. Students will study the natural or man-made environments or the behavior of any organism such as animals, plants or others. Students will gain practical experience and knowledge through firsthand observations. For all organism behavioral studies, the student is a non-intrusive observer in the environment (i.e., does not interfere in any way with the organism or the environment). Students will answer a question by making and recording observations. **Students will:**

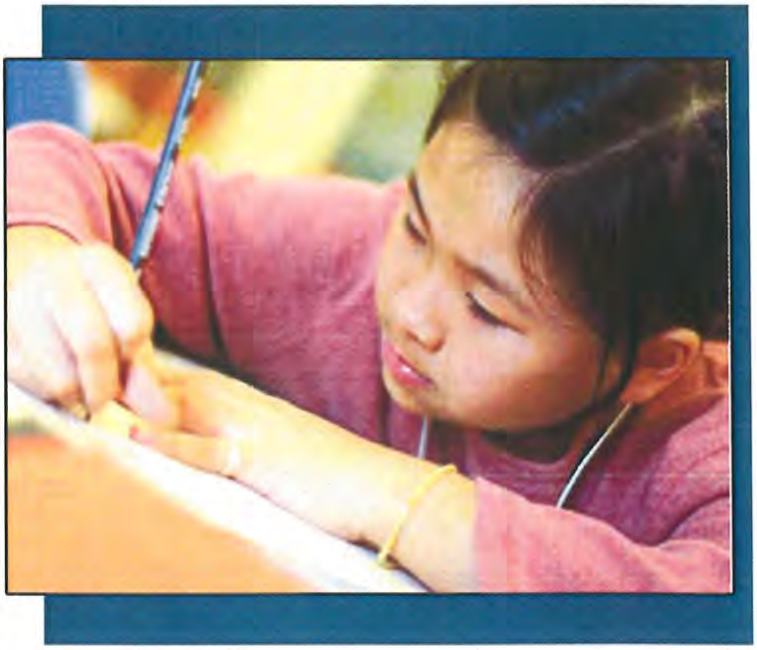
- Identify a problem
- Collect background information
- Make an hypothesis
- Design a schedule of observations to be made
- Identify the data that will be collected
- Identify the method for the collection of data.
- Construct an ethogram (for organism behavior), a transect chart or other appropriate data table
- Observe and record the data
- Collate and represent the data in multiple ways (charts, graphs, diagrams)
- Analyze the data collected
- Form a conclusion based on the data collected and the stated hypothesis

Examples of Field Investigation are:

- Identify variables that affect tree growth in the neighborhood around the school and correlate the variables with observable tree characteristics.
- Observe and record, and then compare and contrast, the behaviors of a male and female animal.
- Test different water sources (such as tap water, bottled water and rainwater) for contamination.
- Observe and record the location of an area within a fish tank or a habitat of an animal. Form an hypothesis, based upon this collected data, as to why that animal might frequent that area of the habitat as opposed to another area.

Science Journal Writing

A science journal enables students to be accountable for their own learning process. It helps in developing writing skills and enhancing communication skills in science. Journal writing also helps students understand how real-world problems can be solved. Scientists regularly use daily journal writing as a means of understanding their thought processes. Journal writing further expands and develops students' abilities to reflect on their own thinking processes.



Purpose of the Science Journal

Teachers should decide on a specific purpose for their student journals. Teachers may choose to have two separate journals – one for exit-project-related investigations/ experimentation/ field trips and one for classwork. This guide will include science journal writing on science exit project investigations; classroom journal writing is equally important but will not be discussed in this guide.

What should students write in their journals?

- Scientific observations
- Thoughts/reflections about observations
- Questions
- Exploration of ideas, questions, and thoughts
- Data collected in experiments
- Connections between observations and science concepts learned
- Notes on experiments
- Labeled graphs, data charts, drawings, images, photographs and/or diagrams with comments
- Sketches on observations from a field trip or lab set up
- Pressed samples or rubbings of gathered objects
- Reflections on reflections

Students are encouraged to record observations, take notes on and sketch anything related to their investigations. Students can write their personal ideas of their observations using words and diagrams. Some of the collected samples can also be included in the journal. Teachers may want an envelope or a re-sealable plastic bag to be stapled to the back of the journal as a means of storing the collected samples.

Students should be taught the differences between facts and opinions (objective vs. subjective statements). In addition, students should be motivated to use all senses in their observations where appropriate.

Illustrations

Encourage students to sketch and draw simple diagrams. Teachers should explain to students that they do not have to be artistically ambitious in their drawings, but that drawings should be labeled as accurately as possible. However, collaboration with the art teacher might at times be possible.

Controlled Experiment Science Exit Project

When Becky visited the Brooklyn Botanic Garden with her class she was impressed by the tall sunflowers she observed growing in the Children's Garden. She did some research on sunflowers and decided that she wanted to investigate which growing conditions would support the growth of the tallest sunflowers. Becky did not have any place to plant sunflowers outdoors but her teacher had a Grow Lab, so Becky understood that she would be growing plants indoors under lights rather than outside in a field under the sun as she had seen at the botanic garden. She knew that plants needed light, water, air, a place to grow and something to grow in, such as soil, and that each type of plant had a particular temperature range that it preferred for growth. In the course of her background research, Becky read about organic farming and she became interested in the use of compost and other organic fertilizers for growing crops. She decided she wanted to test the effect of organic matter, compost in particular, on the germination and growth of sunflowers. Because the soil mixes she found at the nursery and real soil from the school yard all had different ingredients, Becky decided to make her own soil mixes so that she could control the amount of organic compost and non-organic materials very closely.

Becky called the Brooklyn Botanic Garden for advice on soil mix materials. They advised that she use a vermicompost made by worms as her organic component and perlite, an inert 'volcanic' rock as her non-organic component. Becky hypothesized that if the soil contained more compost, the seeds would germinate sooner, plants would grow taller, and the plants would make flowers earlier. She decided to plant some seeds in compost alone, some in the perlite alone, and some in mixtures of the two that contained different amounts of compost and perlite. The 3 mixtures she created were: 75% compost/25% perlite; 50% compost/50% perlite; and 25% compost/75% perlite. This resulted in her planning for 5 different sets of pots. Becky used 3 pots for each soil mixture and 3 pots each for compost and perlite alone. In each of the 15 pots she planted 3 seeds.

Experimental Design of Science Exit Project

Title: The effect of compost on sunflower seed germination and plant growth.

Research Question: How does the amount of compost (organic material) in a soil mixture affect the germination and growth of sunflowers planted from seed?

Hypothesis: If sunflower seeds are planted in a soil mixture that contains 50% compost and 50% perlite then they will grow taller than those seeds in the other soil mixtures because the organic materials in compost provide the plants with nutrients that are beneficial to growth and the perlite will retain water and provide air spaces for the roots to grow.

Independent Variable: Amount of compost added to soil mixture (%)					
Change in independent variable:	100 % Compost	75 % Compost 25 % Perlite	50 % Compost 50 % Perlite	25 % Compost 75 % Perlite	100% Perlite
Number of repeated trials:	3 pots 3 seeds per pot	3 pots 3 seeds per pot	3 pots 3 seeds per pot	3 pots 3 seeds per pot	3 pots 3 seeds per pot

Dependent Variable: Height of stem (centimeters)

Constant Variables: Number of hours of light, amount of water and frequency of watering, type of pots, type of sunflower seeds, temperature, humidity

Field Study Science Exit Project II

While on a class trip to the zoo, a group of students noticed the sea lions were popping up out of the water. They began wondering if that was their common level of activity throughout the day or if it was related to something else such as feeding schedule. On three separate days, students planned to observe the sea lions' activity one hour before feeding time and again 10 minutes before feeding time. They observed the sea lions for 10 full minutes using instantaneous sampling every minute. The behavior was be marked "I" for inactive (not moving around) or "A" for active (moving around).

The students also used the following system to record their activity:

I (Inactive): majority (more than 50% of the sea lions in the exhibit) were inactive (not moving around).
A (Active): majority (more than 50% of the sea lions in the exhibit) were active (moving around).

Experimental Design of Science Exit Project

Title: The effect of proximity of feeding time on activity level of sea lions.

Research Question: How does proximity to feeding time affect the activity level of sea lions?

Hypothesis: If we measure activity level of sea lions close to their feeding time and not close their feeding time, then the activity level of the sea lions should be higher close to the feeding time because the animals are anticipating getting food.

Independent Variable: Number of minutes prior to feeding time		
Change in independent variable:	70 minutes before feeding time	10 minutes before feeding time
Number of repeated trials:	3 observations	3 observations

Dependent Variable: Activity level of the sea lions (inactive or active as described above).

Constant Variables: location, species of animals, number of animals, time of day, intervals (every 1 minute for 10 minutes).

APPENDIX 12 *Sample Science Exit Project Rubric (Page One)*

Dimensions Categories	The Project	Conceptual Understanding of Science	Scientific Process	Written Work	Oral Presentation
Components In Scoring	Collects data to assist in completing a project. Uses appropriate techniques to collect data (e.g., surveys). Evaluates information for completeness and relevance. Shows evidence of research. Uses word processing, graphics, database, and spreadsheet programs to produce project and related material.	Utilizes key concepts in life, earth and/or physical science. Uses scientific concepts accurately to explain observations and/or make predictions. Represents the concept in multiple ways (ex. words, charts, diagrams, graphs or artwork).	States identified problem. States an hypothesis. Explains procedures and observations accurately. Records and organizes data clearly in ways which can be verified by others. Includes clear and accurate graphic representations of collected data (numbers, tables, graphs, artwork, diagrams etc.) States a conclusion that explains observations and inferences. Reflects and defends conclusions and recommendations.	Uses several sources of information in addition to an encyclopedia in developing a research report that may include a brochure, narrative procedure or guide as part of the project. Overall structure has a clear introduction, development and conclusion. Connects, compares and contrasts concepts. Supports concepts with examples, definitions and references to texts. Cites all sources in footnotes. Uses graphics/art to enhance work. Demonstrates an understanding of the English language in written form: grammar, spelling, punctuation and sentence structure.	Organizes presentation in a logical way. Uses notes or other visual aids to structure presentation of project findings. Presents examples, definitions and direct references to text to support concepts. Responds appropriately to questions. Shapes content and information to achieve a specific purpose. Demonstrates an understanding of the rules of the English language in oral presentation (grammar, paragraph and sentence structure, usage). Speaks clearly for more than one minute but not more than two minutes

Sample Science Exit Project Rubric (Page Two)

Dimensions Categories	The Project	Conceptual Understanding of Science	Scientific Process	Written Work	Oral Presentation
4 Exceeds Standard	Excellent project. All components included and the work goes beyond what is expected	Excellent use of scientific concepts to accurately explain observations/ predictions. An array of words, charts, graphs, diagrams or artwork used. All components included, going beyond what is expected.	Excellent presentation. The work includes all steps in the scientific process clearly and accurately using an array of graphic representations. Work goes beyond what is expected.	Excellent overall structure carefully organized from beginning to end. The work connects an array of concepts and supports findings. All components included and work goes beyond what is expected.	Excellent presentation. An array of visual aids used to support ideas. The presentation includes all the components and goes beyond what is expected.
3 Meets Standard	Good project. All components included and meet set expectations.	Good conceptual understanding of key scientific concept shown in multiple ways. All components included and meet set expectations.	Good evidence of the scientific process. All steps follow accurately using multiple representations All components included and meet set expectations.	Good overall structure. Clearly organized work connects multiple concepts. All components are included and meet all set expectations.	Good presentation. Several examples and visual aids used to support ideas. The work includes all of the components and meets all set expectations.
2 Approaching Standard	The project includes many components which meet set expectations.	An understanding of key scientific concept shown in at least one way. Many components included but may not meet set expectations.	Some evidence of the scientific process shown. Many steps included using more than one graphic representation. Many components included that meet set expectations.	Overall structure organized but with some lapses in order. Only one core concept addressed. Most components included and meet set expectations.	Presentation approaching standard. Some examples and visual aids used to support ideas. The work includes most components which meet set expectations.
1 Significantly Below Standard	Project needs overall improvement. Work includes few components that meet set expectations.	Poor understanding of science concepts. Work is unclear or inaccurate. No graphics used to support ideas.	Evidence of the scientific process is missing major components. Components included are inaccurate or unclear.	Poor overall structure and difficult to follow. Few components are included which meet expectations.	Presentation needs improvement. Few examples and visual aids used to support ideas. Some components included. Work meets some expectations.
				Total Score:	