Engineering by Design Toolkit

Part 1 – Introduction and Overview

Welcome to the Engineering by Design Toolkit for NH. The Kit consists of 4 Sections:

1. **Introduction and overview**
2. **Accessing the Website and Curriculum**
3. **Accessing EbD "Etide on Line" Professional Development and EbD Course Assessments**
4. **Application for NH Matching Preengineering funds.**

Engineering by Design Overview

The EbD™ Program is a model used by schools developing themes in the STEM and IT Clusters that are seeking to increase all students' achievement in technology, science, mathematics, and English through authentic learning. The program is built on specific models and creates awareness and competence over time as it builds on learned knowledge and skills—aligning closely with the Cluster Knowledge and Skills in both the STEM and IT Clusters. EbD provides a broad standards-based K-12 program that ensures that all students are technologically literate, as well as providing clear standards and expectations for increasing student achievement in math, science, and technology.

EbD emphasizes that we live in a technological world. Living in the twenty-first century requires much more from every individual than a basic ability to read, write, and perform simple mathematics. Technology affects every aspect of our lives, from enabling citizens to perform routine tasks to requiring that they be able to make responsible, informed decisions that affect individuals, our society, and the environment. EbD provides a program that constructs learning from a very early age and culminates in a capstone experience that leads students to become the next generation of technologists, innovators, designers, and engineers.

The Seven Goals

1.Provide a standards-based K-12 program that ensures that all students are technologically literate
2.Provide opportunities for all students without regard to gender or ethnic origin
3.Provide clear standards & expectations for increasing student achievement in STEM subjects
4.Provide leadership and support that will provide for continuous improvement
6.Restore America's status as the leader in innovation
7.Provide a program that constructs learning from a very early age and culminates in a capstone experience that leads students to become the next generation of technologists, innovators, designers, and engineers.

The Seven Organizing Principles

International Technology Education Association Center to Advance the Teaching of Technology and Science. The program is organized around seven principles. These principles are very large concepts that identify major content organizers for the program. In order of importance, the seven organizing principles are:

- Engineering through design improves life.
- Technology has and continues to affect everyday life.
- Technology drives invention and innovation, and is thinking and doing process.
- Technologies are combined to make technological systems.
- Technology creates issues that change the way people live and interact.
- Technology impacts society and must be assessed to determine if it is good or bad.

• Technology is the basis for improving on the past and creating the future.

Grade K-2 Integrated concepts and lessons
Grade 3-5 Integrated concepts and lessons

The EbD Middle School program:

Grade 6 Exploring Technology
Grade 7 Invention and Innovation
Grade 8 Technological Systems

The EbD High School Pre-engineering Program:

Grade 9 Foundations of Technology
Grade 10-12 Technological Issues and Impacts
Grade 10-12 Technological Design
Grade 11-12 Advanced Design Applications/ProBase
Grade 11-12 Advanced Technological Applications/ProBase
Grade 11-12 Engineering Design (Capstone)
Grade 13-16 Engineering Design Semester

Do We Teach engineering or Engineering?

engineering – little "e" – used as a verb
to *teach all students to think or learn to engineer or use engineering concepts*
Engineering – big "E" – used as a noun
prepare students to be Engineers – career oriented

Engineering byDesign™ is endorsed by the *States' Career Clusters Initiative* (2006).

Flexible!

•EbD™ provides a model for standards-based instruction
•Course guides provide structured strategies for implementation
•Teacher flexibility built in!
•Uses online collaboration (eTIDEonline) to dynamically update courses

Affordable!

•EbD™ does not require large investment in equipment or materials
•Taught in lab environment
•Affordable teacher training
•Requirements
•Design Software (PTC, AutoDesk)
•Office Suite (MS Office, WordPerfect, etc)
•Tools, equipment
•Access to computers

Accountability!

•Online assessments available for schools
•Formative assessments included in course guides
•Summative assessment provided online
•Data used to improve instruction, content strategies, and student achievement

Professional Development Enroll in eTIDEonline
•Attend ITEA Conference for specific training OR collaborate with others in the *"pilot"*
•Participate in eTIDEonline
•Develop and share exemplars of student work
•Develop and share resources
•Collaborate with schools implementing same courses

Part 2. Accessing the Website and Curriculum

EbD NH Website access

http://www.iteaconnect.org/EbD/CATTSresources/StateEbDWebsites/NH/CATTSresourcesNH08.htm

Here is the website for the New Hampshire EBD course guides. You will need these two passwords to get in.

The first will get you into the website:

The second is for the actual Course guides.

For access to the New Hampshire EbD(tm) page, please use:

User Name: NHEBD
Password: NHvector08
(Case Sensitive)

To access the EbD(tm) model course guides, please use:

User Name: USEBD
Password: USconnect51
(Case Sensitive)

EBD Course Sequence List

Grade	*Sequence*	*Course Title*	*Duration*
Middle School			
6	MS-1	Exploring Technology	18 weeks
7	MS-2	Invention and Innovation	18 weeks
8	MS-3	Technological Systems	18 weeks
High School			
9	HS-1	Foundations of Technology	36 weeks
10-12	HS-2/3	Technological Issues and Impacts	36 weeks

10-12	HS-4	Technological Design	36 weeks
11-12	HS-5	Advanced Design Applications	36 weeks
11-12	HS-6	Advanced Technological Applications	36 weeks
11-12	HS-7	Engineering Design (Capstone)	36 weeks
13-16	CL	Engineering Design	Semester

Part 3. Participation in the EbD Network (EbD "Etide on Line" Professional Development and EbD Course Assessments)

FY 2009 – FY2011 A G R E E M E N T and A P P L I C A T I O N
Engineering byDesign™ Network (EbD™)

This Agreement between _____ of the _____ located in, _____ and the **International Technology Education Association's (ITEA) Center to Advance the Teaching of Technology and Science (CATTS**,) Reston, Virginia, will serve to identify what each party is expected to perform over the time that the school is a member of the *EbD™ Network* of Schools. The total term of this commitment is two years. Each party agrees to the following:

School Application

The school system submits this application to ITEA-CATTS that indicates its intention to implement the following EbD™ course(s). *Please confirm by checking the box to the left of the course(s) that will be piloted and implemented*.

- ☐ **Exploring Technology (Grade 6)**
- ☐ **Invention and Innovation (Grade 7)**
- ☐ **Technological Systems (Grade 8)**

- ☐ **Foundations of Technology (Grade 9)**
- ☐ **Advanced Design Applications (Grades 10-12)**
- ☐ **Engineering Design (Grade 12 – capstone)**
- ☐ **Technological Design (Grades 10-12) – FY09**
- ☐ **Advanced Technological Applications (Grades 10-12) – FY09**
- ☐ **Technological Issues & Impacts (Grades 10-12) – FY10**

- ☐ **Foundations of Technology (Online version) - TBD**
- ☐ **Engineering Design (Online version) – TBD**

The School agrees to the following stipulations as part of the Agreement:

1. *Curriculum*: As part of the Agreement, each School will be provided unlimited access and duplication rights (for the teachers within the school) to EbD™ course guides. EbD™ Schools and Teachers agree to follow the scope and sequence for the course and to deliver the content using the Units and Lessons contained within the model Course Guides without modifications. During the term of the Agreement, any updates to the course guides will be provided at no charge.
2. *Instruction*: As part of this agreement, teachers from the School will be provided professional development opportunities to ensure that the content within the Units and Lessons are delivered consistently. This will include a range of opportunities that are synchronous (face to face) and asynchronous (electronic through *e*TIDE*online*). *EbD*™ Network Teachers agree to become actively engaged in these opportunities.
   a. Cost of the opportunities is free to the school(s) (schools in EbD™/CATTS Consortium States) provided terms of the Agreement are upheld.
   b. Cost of travel, substitute teachers, and internet connectivity are the responsibility of the school system.

3. *Assessment*: As part of this agreement, schools and teachers agree to:
    a. Have students participate in the *EbD*™ Network and the ITEA online end-of-course assessment. Schools are not required to share student names. Data will be collected in isolation of names in compliance with privacy requirements and consistent with proper professional practices and student confidentiality. Teachers will have access to scores and be able to identify students through their own coding system. ITEA-CATTS agrees that test scores shall be kept confidential and shall only be used for purposes of monitoring and reporting in aggregate the effectiveness of the course(s).
    b. The school will provide matching scores for the same student set (student codes to be used to align scores) for state standards tests in mathematics and science (course titles/levels not needed; all mathematics and science scores should be clustered; i.e., earth science, biology, chemistry, physics clustered as science, and algebra and geometry as mathematics).
    c. An equal *random* number of non-EbD™ student's scores are also needed for standards-based (standardized) mathematics and science state test scores. These will be used to determine if EbD™ made significant improvements in students' academic studies. ITEA-CATTS will provide a spreadsheet to schools to enter these data. Scores will be sent electronically to ITEA-CATTS no later than <August 31, 2009 for FY 2009>; <August 31, 2010 for FY2010>; and <August 31, 2011 for FY2011>.
    d. The school system will create and sustain an EbD™ Collaboration Team. The team consists of (but is not limited to) representatives from the technology, mathematics, science, English, and counseling departments in the school, as well as 1 or 2 representatives from the community (PTA/engineering communities). If more than one school in a school district is participating in the EbD™ Network, one Collaboration Team may be created with representatives from each school.
    e. The EbD™ teacher(s) will attend the ITEA Conference and participate in sessions designated for the EbD™ Network. These sessions are essential to the value-added components of the Network and for classroom instruction.

Equipment/Hardware/Software Requirements

The school agrees to provide a laboratory space that is conducive to the delivery of a Technology Education program. The only requirement is to have sufficient quantities of resources that will ensure students participating in the course have access to equipment and processes necessary to design, construct, and present solutions to the technological problems they are presented. Students must have access to the following software applications (NOTE: Using eTIDEonline, users can find Open Source Software that meets these needs at no cost to the school/district):

1. CAD – Computer–aided-design software (e.g., AutoCAD, GoogleSketch or equivalent with drawing capabilities)
2. Word processing software (e.g., Microsoft Word, WordPerfect)
3. Spreadsheet software (e.g., Microsoft Excel)
4. Presentation software (e.g., Microsoft PowerPoint)

Model Program

The School agrees that the course as implemented will serve as an ITEA-EbD™/CATTS program model for other school districts. The School will make its program available for observation and inspection by other schools and districts. The school agrees to exchange information concerning the program with other schools, whether or not these schools are enrolled in the EbD™ Network (curricular materials may not be shared unless approved by the ITEA's Center to Advance the Teaching of Technology & Science).

Termination

The license granted hereunder shall cease should either party provide thirty (30) days written notice of its election to terminate the license agreement. Upon termination of the agreement, all curriculum materials, including any reproduction thereof, shall be immediately returned to ITEA, but in no event later than fifteen (15) days after the effective date of termination.

Indemnification

To the extent permitted by law, the School District hereby agrees to indemnify, defend, and hold harmless ITEA from and against, and in respect to, any and all losses, expenses, costs, obligations, liabilities, and damages, including interest, penalties, and reasonable attorney's fees and expenses, that ITEA may incur as a result of any negligent or willful act of the School or any of its agents or employees or the failure by the School to perform any of its representations, warranties, commitments, or covenants under this Agreement.

Confidentiality

The parties to this Agreement understand and agree that the contents of this final Agreement, and the discussions and negotiations between the parties resulting in this final Agreement, shall be maintained as confidential and shall not be disclosed to any third party except to the extent required by applicable law.

Entire Agreement

The initial term of this Agreement shall begin as of the date of signing and end on June 30, 2010. The Agreement is automatically renewed for additional Contract Years (July 1 – June 30, 2011) unless a party terminates the Agreement by notice to the other party in writing no later than April 30 preceding the beginning of the next Contract Year.

This Agreement, including any instruments of agreements attached hereto as exhibits or incorporated herein by reference, contains the entire understanding of the parties. This Agreement supersedes all prior agreements and understandings between the parties. This Agreement shall be binding upon, and shall inure to the benefit of, the parties and their respective successors and permitted assigns.

Superintendent of Schools	Date	CTE Director / TE-STEM Supervisor	Date
Principal	Date	Teacher(s)	Date
Kendall N. Starkweather * Executive Director, ITEA	Date	State Director, EbD™/CATTS	Date

District & School Contact Information Sheet		
School District		
Superintendent's Name		**Phone:**
Email Address		
District Address		
District City/ST / ZIP		
District TE/STEM Supervisor	**Name:**	**Email:**
School Name		
Address		
School City/ST / ZIP		
Principal's Name		
Email Address		
Phone / Fax		
School Website		
Teacher's Name / Email		
Teacher's Name / Email		
Phone / Teacher's URL	**Phone:**	**URL:**
Pilot Course(s)	☐ Exploring Technology (Grade 6) ☐ Invention and Innovation (Grade 7) ☐ Technological Systems (Grade 8) ☐ Foundations of Technology (Grade 9) o Foundations of Technology – Student Online Version (TbD) ☐ Technological Design (Grades 10-12) FY09 ☐ Technological Issues & Impacts (Grades 10-12) FY10 ☐ Advanced Design Applications (Grades 10-12) ☐ Advanced Technological Applications (Grades 10-12) FY09 ☐ Engineering Design (Grade 12-capstone) o Engineering Design – Student Online Version (TbD)	

INSTRUCTIONS:

1. **OBTAIN SIGNATURES on PAGE 3**
   a. Please obtain the signatures of the Teacher(s), Principal, TE/STEM Supervisor/Director, and the Superintendent
   b. ITEA will obtain the signatures of the State Director of Engineering byDesign™ and the ITEA Executive Director
2. **COMPLETE THE CONTACT INFORMATION ABOVE**
3. **RETURN FORMS BY MAIL, FAX (301-482-1978) or EMAIL (pdf) bburke@iteaconnect.org WITH THE REQUIRED SIGNATURES ON PAGE 3 and return entire application to:**

Barry Burke, Director
Center to Advance the Teaching of Technology & Science
8133 Seneca View Drive
Gaithersburg, MD 20882-3622

Part 4. Application for NH Matching PreEngineering funds.

Application For
Pre-engineering Curriculum and Program Development under RSA 188-E-14
Pre-engineering Technology Curriculum

New Hampshire Department of Education
Bureau of Career Development
21 South Fruit Street, Suite 20
Concord, New Hampshire 03301

Statement of Nondiscrimination

The New Hampshire Department of Education does not discriminate on the basis of race, color, religion, marital status, national/ethnic origin, age, sex, sexual orientation, or disability in its programs, activities and employment practices.

The following person has been designated to handle inquiries regarding nondiscrimination policies:

Brenda Cochrane
ADA/Title IX Coordinator
NH Department of Education
101 Pleasant Street
Concord, NH 03301-3860
(603) 271- 3743
(603) 271- 3743 TTY/V

Cover Page

Pre-engineering Curriculum and Program Development Application

_____ **Middle School**

_____ **New Hampshire High School**

_____ **Regional Career & Technical Center**

1. School District Name SAU #

2. Signature of Authorizing Agent Date

3. Program Manager (Please Type or Print) Title

4. Program Manager's Address:

Telephone

E-Mail Address

Plan:

- Description of curriculum (courses) including any prerequisites or requirements for simultaneous registration
- List of instructional personnel and certification(s) held by each
- Description of student recruitment activity - if any
- Description of high school, postsecondary linkages - to community-technical institutions, university, CPPOS, etc.(include any documented memoranda of agreement)
- Other_____

Space Requirements:

- Please provide a time/room schedule for the designated spaces and their use.
- Describe the amount and type of space for all courses in this pre-engineering technology program.

Curriculum / Advisory Committee:

- Provide the names and addresses of the members of the local curriculum advisory committee for the Pre-engineering Technology Program.
- Indicate the relationship of this committee to the secondary Regional Program Advisory Committee for Career and Technical Education.

Courses and Scheduling:

- Identify all courses to be offered and indicate when they will be available for students (date of beginning as part of approved school course listings).
- If the first three courses (middle school), the next three courses (New Hampshire high schools) or all five courses (Career and Technical Center) are not available, describe how a student is able to articulate with other institutions to complete the sequence of courses.
- Are there written agreements, which provide for this: CPPOS, Articulation?

Matching Expenditures:

- Show how district expenditures complement the development of the pre-engineering technology program.
- Provide a list of expenditures by the district and include a rationale for using these as match funds for the pre-engineering technology program.
- Include equipment items purchased for use not earlier than one year prior to the project period start date (provide a copy of inventory record (card, etc.)).

Professional Development - Instructors:

- Provide verification of a bachelor's degree and teaching certificate(s).
- Provide a training plan for instructors. Show how each is certified to teach the areas of his/her specific course.
- Describe any planned activity for instructors not presently qualified, to achieve teaching expertise.
- Provide a plan for instructional staff to achieve/maintain technological expertise for the pre-engineering course(s).

Budget:

- Provide a Form 1 (Current Edition – Sept. 2005) with the appropriate certifications and assurances (p.1) and a listing of expenditures with correct function and object codes (p.2).
- Include the expenditures by the district and used as matching funds (with notation to that effect).
- Ensure that signatures are original, where required.
- Provide a Budget Summary, which includes a detailed description (specification) of the expenditures on the Form 1. (Include detail and logic used to determine these amounts.)

Please return completed applications to:

Dr. Ed W. Taylor
New Hampshire Department of Education
Bureau of Career Development
21 South Fruit Street, Suite 20
Concord, NH 03301

If there are any questions, please feel free to contact me at the above address, by phone at (603) 271-3886; or by e-mail: etaylor@ed.state.nh.us

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