

What effect does teaching technology have on our workforce and society?

A major consequence of accelerating technological change is a difference in levels of technological ability and understanding. The workforce of the future must have the ability to use, manage, and understand technology. Technological literacy is vital to individual, community, and national economic prosperity. Beyond economic vitality is the realization that how people develop and apply technology has become critical to future generations, society, and even the Earth's continued ability to sustain life.

What is the real challenge pertaining to technology teaching?

The challenge is not whether technology should be offered or how it should be taught. The real challenge is how it will be possible for a country to maintain a competitive technological advantage if it continues to ignore teaching about technology and innovation. To maintain its superiority as a technological leader, a country must teach and emphasize the study of technology beyond its use as a delivery system for other subjects. As technology plays an increasingly important role in our society and affects our everyday existence, our ability to understand, use, and manage it in our daily lives requires that it become a significantly supported educational initiative rather than one ignored by legislation. Fortunately, the groundwork has been completed with help from our nation's most prestigious science and technology agencies. The important step in progress is the realization that our technological superiority and affluence as a nation will not continue unless our populace is educated to take advantage of the opportunities that now exist.

Information in this brochure provided in part by the following organizations:



Massachusetts Department of Education

***“Engineering is the profession in which a knowledge of the mathematical and natural sciences, gained by study, experience, and practice, is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind.”***

by The Accreditation Board for Engineering and Technology (ABET)

**Extra course offerings”**

Technology Elective or “TechElect” is an elective specifically designed to strengthen the knowledge and skills of Technology/Engineering for middle school students. (An integral part of the Science & Technology/Engineering Curriculum Frameworks and MCAS assessment) Students will use the design process to research problems, design solutions, build prototypes, test solutions, and present their projects. Learning will vary from working individually to small groups of 2, 3 or 4. This class is held period 4 and is open to all 8th graders. Student wishing to participate should sign up for the elective on their “Elective Course Offerings” in the spring. Some example curriculum includes:

- Design a robotic arm to lift an object and place it in a container
- Design and build a structure out of spaghetti that will support the most weight
- Design a motorized Mag Lev vehicle that will go the fastest
- Design the most efficient house, from selecting a lot to the color of the paint
- Design a company logo for your engineering firm
- Solve the most efficient way to make a sandwich (you get to eat this one!)
- Solve puzzles, play games, go on field trips

“Computer Aided Design (CAD)” Club is designed for those Students who want to explore the area of computer aided design (CAD) and computer aided manufacturing (CAM). Activities could include, but are not limited to word processing, drawing, designing, painting, digital photography, desktop publishing, web page design, T-shirt design, and computer aided manufacturing. Space is limited to 14 students and you must sign up the day of the club.

“Woodworking Club” is designed for beginners as well as the more experienced wood workers. Basic woodworking techniques, tool selection, tool utilization, fastening procedures, and finishing processes will be taught, with a strong emphasis on safety. Students are encouraged to design and build their own projects, however pre-drawn plans are available for simple projects. Students can use this time to do personnel projects or to work on school related projects. There is no fee for this club unless a project requires hardware, or similar items, that are not normally stocked. Space is limited to 12 students, therefore a sign-up sheet will be placed on the door of room 113 every Wednesday morning. Students wishing to participate, should sign up that day and be present after school. (Students do not have to be present for all sessions.)

***If you ever have any questions or concerns, please do not hesitate to contact me.***

Sincerely, Michael Whitman

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# ENGINEERING TECHNOLOGY

**“Your mind is like a parachute, it only functions when open”**

*In a word, it is about INNOVATION! It is about how people think and apply technology to solve the problems facing society. The thinking process is closely related to that of an engineer, hi-tech worker, designer, or architect. Students use their ingenuity with tools, materials, processes, and resources to create solutions and opportunities for themselves and others. It is a new and dynamic subject in our schools that is as fast moving and as up-to-date as the thinking of technology in our society! It is future workforce thinking!!*



### Introduction to Technology - Grade 6

This course is intended to introduce kids to the world of technology. Students will participate in Technology Learning Activities (TLA's) that explore the areas of transportation, construction, manufacturing, design, communication, energy and more. All units and activities will work to reinforce foundation skills such as teamwork, responsibility, problem solving, critical thinking, creativity, and evaluation skills while striving to make the connection between math, science, physics, social studies and technology. Curriculum units could include but are not limited to Tools and Materials of Technology, Principles of flight, Magnetic Levitation, Extreme Machines, Mass Production, and Design and Fabrication.

Engineering Technology - Grade 7 Each student will have the opportunity to experience first hand how something is designed and then fabricated. The challenge will be to design and build a small CO<sub>2</sub> powered vehicle. In order to do this correctly and efficiently, we will utilize the steps outlined for us in the Design Process. The design process is a series of 9 steps, that when followed correctly, will lead us to a successful outcome. Since the design process has many different steps, we will be covering each step individually and in detail. Students will also learn how cooperation, commitment, and safety contributes to a positive outcome. Students will also be required to research the history of transportation and to apply the knowledge learned to make decisions concerning their race vehicle. We will learn the physics behind powering these vehicles with a CO<sub>2</sub> cartridge and test each vehicle for aerodynamics.

Exploratory Technology - Grade 8 In order to assure that each child gets a similar experience, students will alternate through Computer Aided Design (CAD) assignments and Modular Unit activities. Students will be working in teams of two for most of the in-class assignments. (We do not have enough equipment for all students to be working on the same project all at once.) Each child will be required to complete the following: one research project, two homework assignments, five in-class activities, one mid term exam and one final exam. All students will start the term with the same individual grade, an A+ , and it's up to the students to keep as many points as they can by completing all activities and assignments accurately and on time. The modular units we will study are as follows: Fiber Optics Communication, Laser Technology, Alternative Energy, Pneumatics Technology, Aerodynamics, Robotics, Bioengineering, and Electronics. The computer aided design activities are as follows: digital photography and graphic arts, web page design and publication, and computer aided manufacturing.

### Why is teaching engineering / technology important for our students?

A central role of an educational institution is to offer a curriculum that gives its students a basic understanding of the society in which they live. While our society is certainly both democratic and technological, not enough emphasis is placed on the technology component through school curriculums. People are losing touch with a fundamental aspect of society due to the fact that educational institutions impart so little understanding of our technological base. We risk underestimating the importance of the assessment of technological change or assuming that the assessment of technological change is entirely a scientific process. With our current zeal to improve schools, now is the time to examine how technology should be taught.

### What should students know and be able to do to be technologically literate?

The state standards identify content related to the nature of technology, technology and society, design, abilities for a technological world, and the designed world. Knowledge has been identified for grade levels K-2, 3-5, 6-8, and 9-12. Content is integrated into thematic units at the elementary levels, while course titles at the middle and high school levels may include Introduction to Technology, Exploring Technology, Innovation and Engineering Design, Communications Technology, Technological Systems, Engineering Design Fundamentals, and more. The standards also address medical, agricultural and related bio-technologies, energy and power, information and communication, transportation, manufacturing, and construction topics.

### Is engineering / technology being taught in our schools?

ABSOLUTELY. Engineering / technology education is an elective in most locations, but here at Bigelow Middle School, it is a required course for all students. Throughout the three years at Bigelow, students will participate in the following courses; Introduction to Technology, Engineering Technology, and Exploratory Technology. Other courses will be offered as electives such as Girls in Engineering, Inventions/Innovations, Manufacturing, Communication Technology, Design and Fabrication, and more. Unfortunately engineering / technology teaching does not enjoy the same time in the school schedule as the other core subject areas. Students are only required to take 7 weeks of any given FAA (Fine & Applied Arts) subject each year. If a student wishes to participate in any additional time in Engineering Technology he/she can participate in after-school clubs.

### What are the origins of engineering / technology education?

Engineering / technology education has evolved as technology has advanced. During the industrial era of the 20th century, it was taught in the schools as industrial arts, reflecting the industrial society. As advancements have catapulted us into a faster moving, more highly sophisticated, technological society, engineering/technology education has made content adjustments that reflect these changes. Generally, the public is unaware of these changes in curriculum and content and, therefore, the field must contend with a lack of support despite major strides to advance the subject matter. Engineering / technology is now being assessed through the state mandated MCAS tests in grades 6 and 8 and has finally been recognized as an important piece to the education pie.

### What do students learn in engineering / technology class?

In a word, it is about INNOVATION! It is about how people think and apply technology to solve the problems facing society. The aim is to solve problems and create opportunities within a realistic context. That context can start with the student's everyday environment and progressively move into more global issues. Examples of technology problems and learning situations could be the cleaning of a stream that has become polluted, the creation and fabrication of an invention to solve a household problem, or designing and building of a habitat for a unique situation. The thinking process is closely related to that of an engineer, hi-tech worker, designer, or architect. Students use their ingenuity with tools, materials, processes, and resources to create solutions and opportunities for themselves and others. The nature of learning goes from the very early years of just "knowing" to more developed applications that relate to the medical, agricultural, energy and power, information and communication, transportation, manufacturing, and construction technologies. It is a new and dynamic subject in our schools that is as fast moving and as up-to-date as the thinking of technology in our society! It is future workforce thinking!!

### What does the engineering / technology facility look like?

The classroom-laboratory at Bigelow ("The Clean Room") has a research and design area used in the planning stages of invention, innovation, and construction. The clean room has computers for research, design, and layout work and also learning stations that allow individual studies on technical topics such as laser communication, alternative energy, fiber optics, computer aided manufacturing, and more. The facility also has a fabrication lab ("The Dirty Room"), where students can construct, build, test, and evaluate activities and projects that relate to their designs and ideas.