TECHNOLOGY EDUCATION

FIVE-YEAR EVALUATION

William Annin and Ridge High School
Grades 7-12

May, 2007

Supervisor of Fine & Practical Arts
Christine High

Committee

Nick Beykirch
Craig Burfeindt
Paula Costlow
Michael Levy
Germaine Ogitis
Rose Prusina
Steven Richards
William Roth

Table of Contents

Technology Education Background

In 1992, the Secretary's Commission of Achieving Necessary Skills (SCANS Report) identified technology, any modification of the natural world designed by human beings to solve human problems, enhance human life, or extend human capability, as an essential workplace competency. This report suggested that students should be able to select equipment and tools, apply technology to specific tasks, maintain and troubleshoot equipment. At this time, the New Jersey Department of Education recognized the importance of this discipline and included technology in the Cross Content Workplace Readiness Standards. In January of 2004, a new standard, Standard Eight: Technological Literacy was adopted in two parts, 8.1 computer and information literacy, and 8.2, Technology Education. This standard states: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual, society, and the environment. Therefore integration of the study of technology should begin throughout the elementary and middle school levels and continue throughout the high school program in order to prepare students to be more competitive and better contributing members of modern society.

Technology Education Philosophy

Humans have been called the animals that make things, and at no time in history has that been as apparent as the present. Every human activity is dependent upon various tools, machines, and systems. It is for this reason that the study of technology be included as an essential component to a modern comprehensive course of study throughout the K-12 curriculum. Experiences in technology education allow students to make connections between bodies of knowledge throughout various content areas and thereby develop a better understanding of the systems and environments of the designed world around them. Students at a very young age need to be challenged to actively solve problems, participate in design activities, test, critique, and evaluate solutions, assess how their decisions may later impact society in general, and furthermore examine the history and scope that technological development has on the modern world.

It is important to note that although technology education incorporates the use of computers, it is <u>not</u> computer education, but rather a program of study about technology in a broader context. Technology education is a field of study involving the application of learned principals to specific, tangible situations, with the ultimate goal of producing a technologically literate student. A comprehensive Technology Education program, based on the Standards for Technological Literacy is typically broken down into four areas. These include the design process, which is the main approach that engineers, designers, and others use to create solutions to problems. The second area is in development and production. This is where the design is actualized into a finished product. A third area considers the use and maintenance of the product, which will determine the success or failure of the artifact or device. Finally, students need to be challenged to evaluate the effects the technology has on people, places, and environments. There are often many obvious benefits to technological products, but there can be many hidden dangers as well.

The technology education curriculum adds a hands-on component, using tools, machines, and materials, not common to any other aspect of their educational program. Technology education lends itself to a variety of teaching techniques and action based activities for the individual, small group, and at times a large group situation with the intended outcome of the learner being able to work cooperatively, applying technical and scientific knowledge to a variety of situations and settings.

Throughout the student's educational experience, technology education provides the opportunity for students to develop basic technical skills and create a foundation of knowledge, through problem solving and critical thinking activities that will allow for success as they progress into their adult lives. Through the participation in technology education, it is our hope that students will expand their knowledge base and therefore become well rounded, technologically literate young adults.

Program Goals

The goals of Industrial Arts/Technology Education are as follows:

To help all students make informed decisions as consumers of technology in all aspects of their lives

To provide opportunities for students to become more technologically literate individuals

To develop an understanding in students of the impact and consequences of technology on their lives

To have students apply creative problem solving techniques to finding the solution of technical problems

To have the students apply the concepts of mathematics, science, social studies, language arts, humanities and the arts in the context of technology

To engage students from all sectors of the student population in meaningful first hand experiences in technology

To use technology education as a catalyst for an interdisciplinary approach to general education

To aid all students to begin making informed career choices

To develop an attitude within students that encourages them to keep pace with a rapidly changing society and realize education is a life long process

Description of Current Program

Since 1997, when the last report was provided, the school population has grown. There are now three full-time teachers in the middle school and five teachers at the high school. Beginning at the middle school level, all students participate in multiple technology education courses, which serve to introduce the concepts of technology, design, and problem solving. Students at this level develop a basic understanding of the components or systems of technology education, and begin to develop confidence in their ability to work safely with tools, equipment, and materials. These courses give the students the opportunity to recognize individual skills and interests. By the eighth grade, students begin to participate in their own choice of classes from a wide variety of available elective courses and programs. These electives allow students to build on what was previously learned as well as study technology in greater depth in their own areas of interest. The availability of elective courses continues at the high school level with an even wider range of content areas for the learner to explore on an introductory level or progressively more advanced levels. The curriculum is designed for all students, whether college bound, vocational studies or technical school, or as an avocation.

Course Offerings

William Annin Middle School

7th Grade (cycle)	Technology Education I
	Technical Fabrication
8th Grade (elective)	Introduction to Technical Theater
	Robotics
	Technology Education II
	Woodworking
	Advanced Woodworking

All of the courses offered utilize design, problem solving, engineering, mathematics and science to bring real world applications to the curriculum. The students are challenged to think creatively while working toward well defined project goals and procedures. Each instructor maintains a web-site for students to access class notes and assignments as well as to guide class work in certain courses. All student work is evaluated against pre-defined criteria through the use of rubrics where appropriate.

The program has achieved great accomplishments in recent years. During the 2006-2007 academic year, William Annin became a *Five Star Technology Education Demonstration School*. This is an award given by the New Jersey Technology Education Association for exemplary programs. This honor is held by only one other middle school in New Jersey currently. The program was also selected as Middle School Program of the Year during the same year.

The Technology Education program at Annin was also selected to participate in a filming of NJN's series Classroom Close-Up. The episode aired last winter on public television.

The Technology teachers were honored last year by the New Jersey Technology Education Association with the *Image Award*. It was the first year the organization gave the award to its membership for promoting positive leadership and current trends in the field. One of the faculty was also selected for the *Martinson Innovative Technology Teacher Award*. This is the highest honor given by the state organization to practicing Technology teachers.

Ridge High School

Mechanical Drawing/CAD
Machine Drawing/CAD
Industrial Design
Architecture
Advanced CAD I & II Architecture
Advanced CAD I & II Machine
Industrial Robotics I & II
Technology: Design, Engineering and Innovation
Introduction to Woodworking
Woodworking Processes
Contemporary Woodworking
Cabinetmaking
TV I: Introduction to Television Production
TV II: Advanced Techniques
TV III: Programming for Cable

Students in woodworking classes begin with an introduction to safety, materials, design, and processes. As they progress through the elective offerings, more advanced topics such as joinery and composite materials are discussed, as well as a more in depth look at materials, design, and techniques. Each student in the woodworking electives works to design and complete a unique project, and learns about how to safely perform all of the tasks required to complete that project. Emphasis is placed on design and problem solving, and student work is showcased in the annual art show.

Students in Technology: Design, Engineering, and Innovation are assigned a series of hands-on problem solving activities. Individually, or as part of a group, they must design and execute a working solution to the problem. The design and problem solving model is followed, and each student researches ideas before fabricating a solution. Groups typically compete to some extent for the best design, and all results are presented in project portfolios. This course focuses on design and problem solving, while discussing new and emerging technologies.

The drafting/CAD and Industrial Robotics technology courses are designed to give students a hands-on experience in mechanical, machine and architectural engineering

disciplines. These technology courses are taught through the use of manual drawing techniques as well as computer aided drafting and design software. Other than the mechanical drawing course, all advanced courses are project based. The Industrial Robotics courses a1so offer hands-on learning experiences. These courses use robot model building and computer based simulation programming projects to expose and teach students how robotic technology is being used and implemented in the "real world."

Instructional Strategies

Teachers utilize strategies that involve **Active Student Leaning**. This is a natural part of the practical arts. Instruction involves some lecture and demonstration, teacher question/student answer, but ultimately lessons center primarily on student activity. Technology is utilized for the purpose of expanding access to information, and sharing information. Sample activities involve:

- Skills practice
- Simulations or structured exercises
- Small group discussions
- In-class writing
- Peer teaching
- Peer editing

In this project/ process oriented environment, **Differentiated Instruction** is standard. This is based on the premise that the students are at the center of the process. A general description of lesson presentation is that information is presented to the students, followed by a problem to resolve that allows students to relate the information to what is meaningful to them.

- Learning takes place in environments with peer interaction
- Continual feedback is provided
- Students are given options that revolve around central concepts, and problem solutions are open-ended.
- Degrees of difficulty are varied to assure appropriate challenges
- Choices are provided for topics and learning modes of expression and working conditions
- Information is provided in a variety of ways: orally, visually, demonstrations, part to whole/whole to parts
- Teachers serve as coaches for individuals as well as the whole class
- Homework can be assigned to extend understanding and skill level
- Student groupings may vary according to similar readiness, mixed readiness, similar interests, mixed interests, similar learning profile, mixed profile

Lessons address concern for **Rigor and Relevance**. Rigor is achieved by challenging students to use higher level thinking skills. This is a natural consequence of project driven lessons. When students are creative, reflective and productive they have many opportunities to analyze, synthesize, and evaluate. While some activity is focused on practice and skill development, relevance is achieved with projects that culminate in real-world problems, situations, and/or simulations. Rigor and relevance is achieved through addressing both Bloom's taxonomy as well the application taxonomy.

Assessment and Evaluation

Several of the strategies for assessment are being used by all of the teachers in all of the classes in the /Technology Education Department. These are: verbal questioning and discussion, observation of guided practice, work-in-progress critiques and end-of-project critiques.

Every student has his/her work reviewed on a regular basis. The ability of the teacher to get around to every student during a class period is dependent on the course and the number of students in the classes, and the nature of the projects.

The following criteria are used to evaluate completed assignments:

- Effort is evident in the work as well as demonstrated in the process
- Adherence to process and procedures (precision).
- Craftsmanship
- Creativity
- Understanding and compliance with project objectives

In the majority of classes at Ridge, a final review is used to complete all lessons. There are final exams given in the Mechanical Drawing, Architectural Rendering and Machine Drawing classes. Other classes have portfolio reviews.

Tests may be given at the end of units and a final reflective activity is provided during the regular class period, or during the exam period at the end of the semester. Rubrics are often used to establish standards of performance. These documents, which allow students to participate in their own project evaluation, are tailored to meet the needs of specific courses, and require students to take an objective look at their work, and reflect on the process that led to the products. Grades are given, depending on the class, daily, weekly or biweekly.

Cultural Diversity/Multiculturalism

Of primary concern in this area is gender inclusion. All members of this department agree that making all Technology Education courses open to both genders is essential in

this modern society. They all promote and foster equity by communicating opportunities on a regular basis to administration, counselors, parents and students in whatever forum and/or media at our disposal. The department also has shops and labs that are gender friendly. The technology knowledge and skills offered in all classes do and will equip our students to be successful citizens and professionals, whatever gender, now and in the future.

Different cultures are studied at least in a general way through the study of furniture styles from various countries. Spanish, French and American architecture are reviewed. In Technical Theatre students study the origins of how things are done from a variety of countries and historical periods.

Types and sources of wood are covered, mentioning for example that mahogany comes from the rainforest. But only 10% of the wood that is cut down is for use of the wood as a product. The rest of the cutting and clearing is for land use and the wood cut down is wasted. Environmental impacts are studied and sustainable forestry.

Textbooks are reviewed and selected in part for their gender and cultural equity.

Interdisciplinary Opportunities

The items we offer at Ridge and William Annin as interdisciplinary components are as follows:

Writing across the curriculum- Students in technology related courses are required to submit a technical report or portfolio on material of their choosing. These reports follow a specific format, which requires good written expression, grammar, spelling, and technical report writing skills. These papers include a summary of material used as a resource, an objective reaction to the material and the ability to relate it to concepts, skills and projects worked on in class.

Television – Television Production courses require students to express their ideas in writing through journals, critiques, short essays, scripts and storyboards. Students will communicate in writing and then develop their thoughts into electronic media projects.

Related math and science instruction- All Technology Education courses require the use of mathematics. Students are required to use both standard and metric measurements. In Technology Education courses on more advanced projects students at times will be required to use geometric, algebraic and trigonometric solutions to design problems.

Historical background instruction-Students in Technology Education courses are afforded ample historical instruction designed to impart an understanding and importance of the subject matter and skills they will be learning about. Students learn sequence and evolution of these skills from the beginnings of human development through the great civilizations, industrial revolution and right up to modern times. Historical background is

an excellent way to develop and motivate interest in the material to be presented in Technology Education courses.

Science as it relates to design-Science is an integral part to the solution of most design problems in the Technology Education courses. Students must be able to relate science material and facts in completion of many of their design problems. Students are taught to utilize the engineering/design process; to utilize proven principles of science coupled with empirical data in the solution to their design problems.

Enrichment/Remediation/Acceleration

The Technology Education Computer Lab at Ridge is open all during the day on a regular schedule. At William Annin the labs are scheduled to be open before and after school according to a weekly schedule. They are also open during lunch periods when feasible. Students are encouraged to come in to make up work, to help them keep up with their work, or for extra practice for work in their courses.

Due to the project based nature of Technology Education classes, students are always able to work at their own pace, whether that be more slowly than the average student, or more rapidly. With the student/teacher ratio as it is the teachers are able to move around and work individually with the students, providing remediation or acceleration, as they are appropriate.

At the middle school, time is available after school, and for remediation students can arrange for additional time to complete projects. At the high school, teachers do not adhere strictly to the tutorial periods as that would unnecessarily limit the opportunities for students to seek extra help. Teachers are willing to have students come in during almost any period that is convenient both to the student and the teacher. Written instructions are provided on the board, worksheets or handouts. Verbal instructions and visual aides are provided as well as demonstration.

Acceleration is offered as extra-credit and additional projects, but mainly by pushing the higher performing student to increased levels of performance. Teachers challenge students by discussing more complex ideas and concepts, requiring more skilled use of materials, selecting more sophisticated subject matter, and requiring more sophisticated critiquing. They are challenged to see more complex relationships between ideas, to communicate them in their work, and to identify them in the work of others.

Differentiated Instruction Strategies are identified under Instructional Strategies later in this document.

Curricular and Co-Curricular Offerings

At William Annin Co-Curricular Activities revolve around the spring musical. They include the Technical Crews: lighting, sound, set design and construction, painting, costume/makeup. The Business crews produce the playbill, posters and provide ushers.

At Ridge, the TV/Video Club welcomes a wide-variety of members. Students, who are currently enrolled in TV Production classes, have taken a TV class in the past, and those who have a genuine interest in how film and video productions are created (for safety reasons, only those students who are enrolled in TV classes or have completed a class will be able to utilize the equipment). Some of the activities include videotaping and editing shows, concerts, presentations, and other special events offered through the district. Original work is welcome, and can also be produced with prior approval from the advisor. Ideas for an annual video festival are a possibility, as well as segments for a Ridge High School news magazine show. Finally, the club offers the participants an opportunity to sit back, relax, and discuss their favorite films and TV shows. The club meets once a week, after school in room 703.

Staff Development Activities

The Ridge High School Technology Education teachers have participated in both mandatory and extracurricular activities that support their professional development.

Those activities include:

- Staff College
- Professional Days- observing other schools
- Workshops- relating to Technology Education
- Evaluation and improvement of curriculum and facilities
- Commercial work using their skills outside of school
- Read periodicals/magazines

The Technology Education teachers in Bernards Township are constantly reflecting on the curriculum, the program offered and the needs of the students. They look for ways to enhance the department.

Technology Education teachers are somewhat limited in the training they can take for reimbursement by the Board of Education. It is not uncommon for a teacher to want to take basic level courses in disciplines such as CAD for new applications that become available or new skills for their areas. These courses are only provided in colleges on the undergraduate level. As a matter of fact, there are no colleges in this area that provide

graduate level programs in Technology Education. Since the teachers' contract says it only will reimburse teachers for graduate level courses, these teachers are discouraged from taking courses that would expand their subject disciplines to present the curriculum or develop and expand the program.

In addition, professional days are not supported financially, requiring teachers to carry the financial burden themselves. During the school year, it is at the discretion of the building principal to provide a substitute, thereby permitting the teacher to be absent from classes, but the teacher must pay all expenses, including registration, travel and materials.

Technology/Facilities/Program

William Annin

Technology Education currently is being taught in four locations at William Annin. They include:

Room 104: General Technology Education Lab

Room 104 includes eight worktables as well as computers around the perimeter of the room. Courses taught in this room include Robotics, Technology Education One, Technology Education Two, and Programming. Each computer contains CAD and robotics software. The room also houses LEGO Dacta kits for both simple machine and robotics applications.

Room 108: Woodshop

The woodshop contains various hand tools, stationary and portable power equipment as well as a large bench area for project construction. A dust collection system is in place to remove large amounts of chips from the machinery as well as fine particles from the air. Maintenance is completed on the equipment by the teacher. Dust collection is maintained by Aramark.

The bench tops in 108 need to be replaced. Many of them are in rough shape and are beyond a state of re-finishing. A plan should be implemented to replace at least one bench per year.

The floor needs to be painted annually with durable floor paint. Painted floors are easier to keep clean than raw concrete ones. Because of the nature of the activities in the room it needs to withstand constant abuse. The paint currently on the floor was completed haphazardly last summer with some parts still remaining unfinished. It is not holding up and will need to be re-done before the start of the next school year. The safety zones

around the machinery need to be redone in spots or added in others. All machinery in a school shop must have a clearly defined safety zone in place.

Room 211: Art Room

Technical Theater as well as Technology Education II is taught in this location. Having both courses meeting in the same room allows for economy in supplies by not having them in multiple classrooms. It is a traditional art room with large tables for student work. There is not significant storage for student project work or supplies in this location. Some class experiences also occur on the stage in the auditorium.

Room 211 is not adequate for the teaching of technology education subjects. There is currently no safety glasses cabinet in the room, which should be installed immediately due to liability and student safety issues. Any time students are working with materials like wood or plastic, are crushing bridges, or are cutting with Xacto knives, safety glasses should be worn. There are also many modeling activities that should be included in the Technical Theater classes that require basic power equipment like a band saw and jig saw. These types of equipment cannot be utilized because there is no emergency power lockout in the room to prevent power activation when the teacher is not present. Student project storage as well as supply storage is not adequate in this room. Supplies are stored in 104 and 108 for the classes that run in this room.

Furthermore, much of the content for the Technical Theater course needs to be taught in the auditorium. The auditorium is often not available during class meeting times due to scheduling conflicts. This therefore causes content not to be covered due to a lack of instructional space.

Room 106 A: Small Computer Lab

This room is located between the woodshop and the photography room. It houses three computers used for CAD in woodworking and Technical Fabrication. It also houses the wind tunnel used for testing the CO2 cars for drag. The computers in this lab are a result of a donation acquired this year.

Ridge

At the high school, there are 3 rooms where Technology Education courses are currently being taught.

Room 623, CAD/Robotics Lab

There are 20 CAD work stations with both manual and computer capabilities for drafting. Industrial quality software for both computer engineering and architecture are available. Printing equipment includes a large scale plotter and a blueprint machine. There are seven permanent robotics stations with robotic simulation software and industrial quality

robotic arm trainers with appropriate programming software. Peripheral devices available are slides carousels, gravity feeders, circuit input control devices, and conveyors.

Room 618, Wood shop

The woodshop is a large, well equipped room, complete with machinery, hand, and power tools. The facility also contains a finishing room, and an office for the teachers. This office is lacking outside ventilation, but has an air-conditioning unit that circulates the air in the room. The woodshop is accessed through the hallway door, as well as an overhead bay door to the outside, however, access is limited to this door due to the new addition to the school. Recently, storage cabinets, computer tables, and 4 computers were added to the rear storage room in the woodshop to allow students to access the internet, as well as to complete project planning in Woodworking and Tech. Design classes. Doors are kept open between these two areas for the purpose of student supervision. If windows were installed in the doors, they could be closed, reducing the sawdust in the computer area.

The woodworking machinery in the room is relatively complete, but some of the machines are reaching the end of their service life, and are in need of repair and/or replacement. Most maintenance on the equipment is currently performed by the teachers, with assistance from Aramark. The room has 3 relatively new air filters, and a large, older dust collection system which is currently not functioning efficiently. Students in Woodworking and Tech. Ed. classes typically complete most of their work on the 5 student workbenches in the room, which have been replaced in recent years, but require ongoing maintenance. Tools and other materials are stored in cabinets around the room, and student work is stored in lockers beneath the workbenches, on shelving at the sides of the room, and scattered throughout the rear of the room. Student project storage continues to be an ongoing challenge. Lumber (which comes in through the bay doors), and some other materials are kept in a second floor loft area, complete with metal racks, while sheet goods, lumber shorts, and other materials are held in teacher constructed storage at the rear of the room. The lighting in this room needs some attention. The lathe work area is very dark, and the ceiling light fixtures are a mixture of white and pink lights. Neutral would be a great improvement.

Room 703 Television Studio

The facility itself consists of 4 rooms. The large classroom at one time was the chorus room, and has a 3-level riser auditorium style seating. A small backroom was at one time used as a control room, but currently doubles as the control room, and an office for the two TV teachers. A long, narrow room in the back corner houses excess equipment and serves as an equipment checkout area for each class. The fourth room has been assigned as an office space for a speech teacher due to the physical space restraints during this year of construction.

The students currently have access to seven Canon GL-2 camcorders. These are "prosumer" grade digital camcorders and record with the mini-dv tape format. The students edit with the Avid Express Pro program that operates on the five Dell CPUs. There is one editing station that utilizes a Mac G5 computer system. Three of the systems have external DVD burners that are used to burn copies of class projects. The editing systems are equipped with 500 GB external hard drives and 7-port desktop USB hubs. Mini-DV/S-VHS VCR decks are used to capture footage and to dub from one format to another. A Lacie 5-disc DVD duplicator is utilized for school events, functions, and student-athlete highlight reels, when multiple copies are needed to distributed for fundraising or sending to colleges. Finally, the TV studio is equipped with a Mackie 1202-VLZ Pro 12-channel mic/line audio mixer.

Other equipment available for the students is Manfrotto fluid head tripods, and dollies for capturing audio. Students utilize shotgun, handheld and lavaliere microphones from Cannon and Shure. Portable Lowel Lighting Kits and lighting accessories are also available. A portable green screen for chroma-key effects is also available.

The program is currently capable of producing single-camera video projects. Ninety-percent of the work is produced in the field or on location. The technology is currently available to create a news magazine-style program, using constructed or virtual sets.

The district's Channel 15 is no longer actively broadcasting from the Media Center, but the Townships Bulletin Board is still managed from a computer and Scala software system purchased in June of 2006. There is currently no interest on the part of the school district to reactivate the broadcast programming.

Core Curriculum Content Standards

In the area of Technology, standards address basic computer tools and skills, but also productivity tools, such as social aspects, information assess, research, and problem solving. Students are expected to gain an understanding of the nature and impact of technology, the design process and impact assessment, and systems in the designed world.

Through the use of CAD software and systems the students explore the designed world; by creating and designing themselves they learn to also read plans, to evaluate and to assess them. Through lecture, reading articles, researching and discussing, students are made aware of contemporary and emerging computer applications. They are required to use appropriate language when communicating about their subject. Students create and manipulate information independently and/or collaboratively to solve problems and design and develop products. They identify, diagnose, and suggest solutions for non-functioning technology systems. By identifying problems first, students formulate strategies to solve problems using brainstorming and appropriate resources.

In the area of Career Education and Consumer, Family and Life Skills, students are taught career awareness and planning as well as employability skills. Critical thinking, self management, and interpersonal communication are stressed.

Comparison of J Factor Districts

Course titles are general, and content sometimes varies in the curriculum and implementation.

In the middle school, in comparison with the benchmark schools, the offerings provided in Bernards Township either meet or exceed the other schools. William Annin is the only middle school program offering woodworking as an elective program. No other school offers Robotics to their middle school students. The school district with the most extensive offerings is Montgomery, but their offerings are predominately technology, with no traditional woodworking.

Among the high school offerings, the quantity of offerings varies for 4 courses (Millburn) to 21 (Livingston). Bernards Township offers 15 courses.

- Livingston and Montgomery have the most comprehensive offerings in Technology Design/Engineering (varying titles). Livingston has a full-blown Vocational program and the school has a large enrollment, which enables them to offer more courses.

- Montgomery offers Technology courses in lieu of Woods/Traditional programs.

- Hillsborough has the most traditional with one semester of Technology Design.

- Chatham and Holmdel have single semesters of Technology and/or Robotics.

- Millburn and Princeton are light in their Technology in general, and have predominately CAD.

Bernards Township is the furthest ahead in terms of offerings in CAD (offering full year courses in Architecture CAD II, Machine CAD II, Industrial Design II), but has fewer offerings in Technology Education. It is comparable or better in the quantity of Robotics courses to the two other districts that offer it. Bernards Township provides the most complete offerings in Woodworking. It is second only to Montgomery in its TV Production offerings.

None of the Benchmark districts offer courses in every subject area, but the areas where Bernards Township is not providing offerings are Computers (Cisco Networking, Computer Graphics, which are offered in the art department), Automotive, Photography (also offered in the art department) and electronics.

On an advanced level Bernards Township offers Independent Study in any of these course areas.

Recommendations

It would be advantageous to implement a program that would rotate older woodworking equipment out of service on an annual basis. While all the equipment is currently operating safely, the equipment is very old and could break down at any given time. To avoid critical pieces being out of service for a long period of time, they should be replaced in a more proactive manner.

William Annin

Room 211 (art room) is not ideal for teaching of technology education subjects. This room does not have adequate storage nor does it lend itself to materials processing activities. Much of the content for the Technical Theater course needs to be taught in the auditorium. The auditorium often is not available during class meeting times due to building usage of the auditorium. Improved planning to work around classroom needs would help in this area. Some content cannot to be covered due to a lack of available instructional space.

In Room 104 the drill press and wood lathes specifically should be replaced in the near future. Parts for repair are often difficult to acquire due to the age of these pieces of equipment.

There has been some time spent in considering adding a new exhaust hood for spraying finishes at the front of the room. While the current set-up does not harm the students or teachers in any way, better fume exhaust would be an asset. Ventilation fans through two windows would also help to move air throughout the room.

Ridge

In general, the Technology Education rooms at Ridge are appropriately utilized with the exception of the TV studio, which is used every period of the day. One period is for a Health class. Having one period free would allow the teachers to organize and prepare for classes without students present, and for students (for tutorials for example) to have access to equipment without competing with the full classes.

A Technology Education course was added, but Technical Theater has not yet been added. With the addition of the new 1,000 seat auditorium, there could be a much expanded opportunity for Technical Theatre. The addition of storage space, more projects could be undertaken, and space to work would be available.

There are two primary areas in need of attention in the woodshop.

1. Maintenance:

The facility and the equipment contained within requires ongoing maintenance, such as changing filters, emptying dust collection bins, cleaning, etc. Rather than being done as a result of teacher requests, these services should be performed by Aramark on a regularly scheduled basis. A schedule would avoid equipment becoming clogged or broken, which creates issues for maintenance personnel, teachers, and students.

2. Repair and Replacement of Equipment:

Some of the equipment in the woodshop is upwards of 25 years old and in need of repair. Some of this equipment is expensive to repair, so replacement is recommended. This may be done over time, but a budget is necessary. In addition, portable power tools require ongoing repairs, which also requires a budget and/or service agreement.

It is necessary to implement a program that would rotate older woodworking equipment out of service on an annual basis. While all the equipment is currently operating safely, it is still necessary to have a plan in place to avoid critical pieces being out of service for a long period of time.

Recommendations

Wm. Annin	Recommendation	Implementation	Timeline	Constraints	Current Status
Room 104 Wood Shop	Replace drill press and wood lathes	Purchase	ASAP	Cost Labor	Difficult to repair due to age and availability of parts
	Improve circulation of air around the room when using spray paints and finishes	Install two window fans	ASAP	Cost Labor	Poor ventilation
Room 108 Technology Education	Provide additional storage space	Install doorway between storage room into 108 to provide accessible project storage	Summer 2008	Building storage needs Cost of labor and materials	Storage space is improvised in wood shop
Room 211 Art Room	Create Storage for supplies	Install additional cabinets instead of display board on one wall.	2008-09	Cost Materials	Insufficient storage
Auditorium	Upgrade electrical system	Add circuit breakers	2008-09	Cost/Labor	Ongoing work
Ridge					
Room 703 TV Production	Add 5 additional editing stations	Purchase and install	Summer 2008	Cost	Insufficient number of work stations for all students
New Auditorium	Introduce a Technical Theatre Course	Utilize the new auditorium to expand student opportunity, and better serve the auditorium needs.	Proposal 9/2008	Cost of Staff	
618 Wood Shop	Routine for cleaning filters and removing sawdust	Aramark Maintenance	Immediate	Personnel Cost	Uncertain
	Increase lighting in lathe area	Aramark Maintenance	ASAP	Cost	Insufficient
	Additional project storage area	Aramark Maintenance	ASAP	Cost Space	Insufficient
	Replace lights with neutral light spectrum	Aramark	ASAP	Cost of lights and Labor	Pink & White mixed
	Install windows in the doors separating the computer area and shop area	Aramark	2008-09	Cost Materials Labor	No separation

Wm. Annin	Recommendation	Implementation	Timeline	Constraints	Current Status
Tech Ed. Office Ventilation	Replace/Install air conditioning unit	Aramark	ASAP	Cost of Unit	No current air circulation at all.
Room 623 CAD/Robotics	Expand facilities to include and additional multipurpose room for Robotics, Mechanical Drawing and Technology	Renovate 614 to accommodate Computer Graphics, and renovate room 622 to accommodate computers and work tables	2009-10	Cost of Materials and Labor	Currently overcrowded with work stations and equipment.
District	Budget plan for repair and replacement of old equipment	Central Office	2008-09	Cost of equipment	Currently would come from Supply Budget

Appendix

Data Collection

Comparison of Benchmark Schools

Middle School

6th Grade

	Chatham	Holmdel	Hillsborough	Livingston	Millburn	Montgomery	Princeton	Bernards
Integrated Instructional Technology	C							
Tech/Industrial Arts	C							
Transportation Technology						C or S		

7th Grade

	Chatham	Holmdel	Hillsborough	Livingston	Millburn	Montgomery	Princeton	Bernards
Industrial Arts/Shop			C					
Set Design						FY		
Technical Fabrication								C
Technology Education I	C	C						C

8th Grade

	Chatham	Holmdel	Hillsborough	Livingston	Millburn	Montgomery	Princeton	Bernards
Intro to Media and Graphics Communication						S		
Intro to Robotics						S		
Intro to Technical Theater								S
Introduction to Television Production						S		
Industrial Arts/Shop			C					
Introduction to Woodworking								S
Woodworking								FY
Robotics								S
Structures & Mechanisms						C		
Technology & Industrial Arts	C							
Technology Education II		C						S

High School

	Chatham	Holmdel	Hillsborough	Livingston	Millburn	Montgomery	Princeton	Bernards
CAD / Drafting								
Mech. Drawing / CAD I / Drafting	FY	S	S	FY	S	S	FY	FY
CAD II / Architecture or Mechanical	FY	S	FY	FY		FY	FY	FY
CAD III / Architecture or Mechanical	FY	S	FY	FY		FY	FY	FY
CAD IV / Portfolio /						FY		FY
Industrial Design								FY
Woodworking / Stagecraft								
Woodworking I / Introduction			S	FY	S			S
Woodworking II / Wood Processes			FY	FY	S			S
Woodworking III / Contemp. Woods			FY					FY
Woodworking IV / Cabinetmaking								FY
Stagecraft I				FY				
Stagecraft II				FY				
Robotics / General Tech. Ed.								
Robotics I	S					FY		S
Robotics II								S
Tech. Design/Engineering/Systems	S	S	S	FY		S		S
Tech. Design II				FY		S		
Tech. Design III				FY		FY		
Tech. Design IV				FY		FY		
Computers								
Computer Technician / PC Repair			S					
Computer Programming I						S		
Computer Programming II								
Cisco Networking I							FY	
Cisco Networking II							FY	
Cisco Networking III							S	
Computer Graphics I		S	FY		S	S	FY	
Computer Graphics II			FY			S		

	Chatham	Holmdel	Hillsborough	Livingston	Millburn	Montgomery	Princeton	Bernards
Computer Graphics III			FY			FY		
TV Production								
TV I	S	S				FY		S
TV II		S				FY		S
TV III						FY		S
Automotive								
Auto I / Transportation Tech.			S	FY				
Auto II				FY				
Small Engines			FY					
Visual/Graphic Communications								
Photography I		S		FY		S		
Photography II		S				S		
Photography III		S				S		
Visual/ Multimedia /Graphics I			FY	FY			S	
Graphics II			FY					
Graphics III			FY					
Electronics Technology								
Electronics Fabrication				FY				
Electronics I				FY				
Electronics II				FY				
Electronics III				FY				
Cooperative Education								
Co-op I	S		FY	FY				
Co-op II				FY				
CAD / Drafting								
Mech. Drawing / CAD I / Drafting	FY	S	S	FY	S	S	FY	FY
CAD II / Architecture or Mechanical	FY	S	FY	FY		FY	FY	FY
CAD III / Architecture or Mechanical	FY	S	FY	FY		FY	FY	FY
CAD IV / Portfolio /						FY		FY
Industrial Design								FY
Woodworking / Stagecraft								

	Chatham	Holmdel	Hillsborough	Livingston	Millburn	Montgomery	Princeton	Bernards
Woodworking I / Introduction			S	FY	S			S
Woodworking II / Wood Processes			FY	FY	S			S
Woodworking III / Contemp. Woods			FY					FY
Woodworking IV / Cabinetmaking								FY
Stagecraft I				FY				
Stagecraft II				FY				
Robotics / General Tech. Ed.								
Robotics I	S					FY		S
Robotics II								S
Tech. Design/Engineering/Systems	S	S	S	FY		S		S
Tech. Design II				FY		S		
Tech. Design III				FY		FY		
Tech. Design IV				FY		FY		
Computers								
Computer Technician / PC Repair			S					
Computer Programming I						S		
Computer Programming II								
Cisco Networking I							FY	
Cisco Networking II							FY	
Cisco Networking III							S	
Computer Graphics I		S	FY		S	S	FY	
Computer Graphics II			FY			S		
Computer Graphics III			FY			FY		
TV Production								
TV I	S	S				FY		S
TV II		S				FY		S

Resources

New Jersey Core-Content Standards

New Jersey Technology Goals

New Jersey Technology Education Association