TECHNOLOGY EDUCATION: A CASE STUDY

by

Janet Dickey

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BY

JANET DICKEY

has been approved

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APPROVED:

Mark H Rossman __________ Chairperson

Jeff Feinstein __________

Supervisory Committee

ACCEPTED:

Mark H Rossman __________

Director of Graduate Studies

ABSTRACT

Dramatic shifts are occurring in employment patterns in the United States. This shift from an industrial-based economy to one of an "Information Age" demands a need for education to make drastic changes in its approach to educating the nations future labor force.

To help meet these demands to educate students in scientific and technical skills, a grant was awarded by Arizona State Department of Education to Shadow Mountain High School and Shea Middle School in the Paradise Valley School District of Phoenix, Arizona, to develop a pilot technology program. Two vocational education teachers at the middle school level were selected to work with two technololgy teachers at the high school to develop a curriculum. The middle school teachers were Home Economics teachers, chosen on a voluntary basis.

The program included an introductory class for middle school students, designed to explore the various areas of technology, and to Pprepare them to learn to live and cope with the changing world. The class was offered for one period a day for a semester. The revised program will be offered in the fall of 1989 to all students as an elective option.

The State Department of Education will evaluate the program on the following basis: 1) the quality of a video presentation, 2) the effectiveness of a model program handbook, and 3) the written evaluation by the participating teachers and administration.

The results will determine if a technology course should be offered.

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CHAPTER ONE

INTRODUCTION TO THE PROBLEM

Introduction

Since ancient times, people have been looking for ways to improve the quality of life, making it more comfortable, healthy, and productive. Technology has had a great influence on our society; without it our lives would be entirely different. Technological knowledge has made us able to shape our environment and create a world different from the world we inherited from nature.

New advances in technology translate into unlimited opportunities in education to challenge students, to interest them, and to tap their potential. One of the primary functions of education is to prepare young people for the world of work. As the nature of work has changed and is changing, different knowledge, skills, and abilities are required for the available jobs. Responsibility for imparting this new learning lies with the schools--schools that in most cases are still operating under the false belief that the skills previously taught will adequately serve today's children in their future careers.

made an assessment of the traditional Vocational Industrial Arts Program at the high and middle school levels. It was the opinion of the department that the traditional vocational programs do not meet the needs of students in our rapidly changing world. Past programs in Industrial Arts have been based on basic approaches, using hand tools such as hammers, saws, and power tools. Emphasis has been placed on wood working, automotives and small engines; while these programs have been of value, the job market has been rapidly moving into more computer- based skills. Dramatic shifts have occurred in employment patterns; schools can not continue to train students for jobs that won't exist in ten years.

The State Department of Education encouraged schools to apply for grants enabling them to develop programs to meet the technological needs of the future. Vocational teachers must similiary formulate plans for new programs. Rather than having change dictated to them by the state, teachers must look at the technology programs from many angles and make needed changes on their own. There is a definite need for technology programs in the curriculum; teachers must develop these programs now to meet the challenges of tomorrow's work force.

Statement of the Problem:

The problem that this thesis addresses is the level of awareness of middle school students regarding the interaction of technology and the environment, particularly as it relates to communications, transportation, energy and manufacturing.

Significance of the Study:

This study is significant in that it provides a model that allows individuals in a middle school environment to be exposed to and experience new technologies. The environment is one that is safe, controlled, and provides a "hands-on" setting, combining theory with practice.

Definition of Terms

The following terms are used throughout the Case Study:

1) Technology: the application of knowledge.

2) High Tech: term used to identify the most modern, up-to-date systems.

3) Module: a laboratory station, containing self-directed, step-by-step instructions.

4) Transformable Environment: ability to change/adapt the environment without loss of momentum.

5) Technology Lab 2000: a laboratory design which simulates a technologically-impacted workplace.

6) Technology Clusters: units used in course work, identified by the Federal Department of Education. The units are: transportation, power, biotechnology, and construction.

7) Middle Schools: schools which include students in the seventh and eighth grades, generally twelve to fourteen years of age.

8) Elective Course: a course of study which is chosen by the student.

9) Vocational Education: courses concerned with training for a skill or trade to be persued as a career or job.

10) Cross-curricular: activities which cross the traditional curricular boundaries and involve other disciplines.

11) Student Friendly Environment: discipline where all students can become successful.

12) Non-comparative Grading: evaluations based on the degree students reach their full potential.

Chapter Two

REVIEW OF LITERATURE

Technology

Because technology affects so many areas of our lives, it is hard to define it in a simple way. One definition would be that technology is the practical application of a theoretical subject. It also has been defined as the application of knowledge and the knowledge of application. Therefore perhaps the most meaningful interpretation is: "Technology, that great growling engine of change" (Toffler,1988).

Technology has had an impact on all of our lives. The results of advances in technology, such as the telephone, television, automobiles, plastics, refrigeration, new machines, nylon, and so on, are all around us. Nevertheless, they are often taken for granted. We have come to depend upon technology to fulfill our basic needs. In order to use technology wisely, we must understand what it can do for us and what it is unable to accomplish. Technology provides many helpful products and services. It can, however, create some negative effects, such as pollution and crowded highways. Whether technology benefits us or not will be determined by the way we use it (Waetjen, 1987).

Technology has extended our natural capabilities. We can increase the power of our hands with tools such as pliers and hammers. We can increase our height with ladders, and learn to fly through the air. We can conquer disease and make replacements for the human body (Hacker, 1988).

Technology in the schools changed dramatically in the early 1960's, beginning with computer-based instruction, using sophisticated terminology and elaborate procedures. The seed of computer-based instruction laid dormant for many years. It sprouted and grew in the late l970's with the explosive entrance of micro-computers. These powerful and relatively inexpensive machines increased computer access for students, teachers and the administration. Schools sponsored staff development training programs in computer literacy for teachers and the administrators. Many corporations and organizations, whose primary purpose is the developing, marketing, and dissemination of educational software, surfaced (Roth, 1986).

Today, only 13 percent of the work force is employed in industrial jobs. Less than 25 years ago, 55 percent of the nation's workers made have replaced the mills, factories, and plants as the country's primary employer.

This dramatic change from industrial jobs to information-related employment occurred in less than thirty years. This increased pace of change alone has played havoc with social institutions such as education and employment events (McCure, 1984).

World of Work

One of the primary functions of education is to prepare young people for the world of work. As the nature of work has changed and is changing, different knowledge, skills and abilities are required for the available jobs. Responsibility for imparting this new learning lies with the schools--schools that in most cases are still operating under the false belief that the skills taught previously will adequately serve today's children in their future careers.

While the training for particular manual trades or specialized professions may have suited the needs of industrial America, the "Information Age" demands a broader base of knowledge from it's workers. The schools persist in teaching students outdated skills. There is a need for education to catch up to the realities of the work place.

Students of the "Information Age" not only need an increased ability to function in the a technological world, but also must be prepared to work more independently, solve more complicated problems, and continue to expend their intellectual capabilities and skills throughout their lifetimes.

Both businesses and schools are affected by the profound changes in our society today, and both are responsible for the education of our youth. The most far-reaching initiative in education to emerge in recent years is the growing corporate interest in the public schools. There is a rapid trend away from simple career days, club sponsorships, tours of facilities and contests, to management training for administration and teachers, computer technical assistance, release time for employees for tutoring in schools, and in some cases, involvement in state education reform (Doyle, 1986).

What do businesses get out of a connection with the schools? Corporations are concerned about future employees: their skill, their productivity, and the capacity of the talent they possess.

What do schools get from partnership with businesses? Aside from the increase in materials and services, businesses give schools a window on the real world. A few of these "windows":

1) loaned executive programs in which senior corporate executives work in a specialized area, such as administration, staff development, or resource management.

2) the mentor programs in which teams of professionals conduct seminars for small groups of students interested in their particular field. Businesses also helping in developing magnet schools to attract students in fields such as health care, science, or communications.

3) curriculum-renewal programs in which corporate specialists work with educators to develop courses that reflect the private sector technology, standards, and practices that students will encounter when they leave school (Woodside, 1986)

The proposition that people form partnerships to reduce costs and reap mutual gains has become a national focus. In the last three years in the Washington D.C. area alone, over sixty national corporations and local industries have involved themselves in a major effort to improve students career education (McKenizie, 1985).

Because of the expense of implementing technology in the classroom, the federal government has been called upon for financial support. President George Bush has stated his support of a Presidential Merit Schools award to schools that show improvement in their school by meeting state determined criteria. He also supported rewarding schoolsserving disadvantaged students, with the Federal government providing an average award of $100,000. Congress has been asked to approve funding of about $12 million for fiscal year 1989 for the Fund for Renovation and Reform of Schools and Teaching (FIRST). This fund will be expanded to finance experiments in education (Brady, 1988).

Model Technology Programs

A model technology program has been implemented in Pittsburg, Kansas, in 1986. It is based on the philosophy that the body of knowledge for which we are responsible, is doubling every five years. Conventional teaching methods and facilities have left schools ill-prepared to deal with such rapidly changing phenomenon. This model program offered an innovative aproach to teaching styles, facility design and student management.

The Kansas exploratory program has been team taught in a six-hour school day, during which thirty-six seventh and eighth grade students, per hour, explore eighteen different technology modules. Students could enroll in the class for three semesters, which would allow them to explore six different modules each semester. Because of the programs success, six new modules have been added. The modules include the following areas:

1) Electricity/Electronics
2) Drawing, Drafting and Design
3) Applied Physics
4) Automobile Engine Systems
5) Small Gas Engines
6) Performance Vehicles
7) Research and Design
8) Computer Application
9) Think Tank
10) Rocketry and Spaceflight
11) Production Technology
12) Computer Numerical Control
13) Transportation
14) Robotics
15) Flight Technology
16) Future Technology
17) Desktop Publishing
18) Radio/Communications
19) Television/Video Lab--Production
20) Television/Video Lab--Camera
21) Television/Video Lab--Programming
22) Problem-Solving Techniques
23) Structures Technology
24) Computer Systems Module

The entire class also participates in a Line Production module that includes labor/management negotiations, job selection procedures and a moving conveyor system that is used to produce rocket kits for a local company.

The subject content, teaching methods and facility design has been consistently reviewed and revised. The program is now used as a model program for the State of Kansas (Neden, 1986).

Interest in developing effective technology programs has resulted in the need for a laboratory which is both economical and flexible. One new concept, called "Technology Lab 2000" offers an organized system of furnishings, apparatus, computers, and software. It provides step-by-step guidance for quick command of the system, thus reducing the need for extensive teacher training. Island arrangements of versatile laboratory furnishings form a series of activity zones, within which students work, interact and learn, offering a transformable environment: an environment that supports reconfiguration (Trans Tech Systems).

The Lab 2000 has been used in Arizona, at two sites: A pilot program has been developed in Queen's Creek, in 1988, and also at Ingleside School in Scottsdale, 1989. Evaluation of the programs will be available in June, 1989. Informal observations of the Lab 2000, presented at the Mid-Winter Conference of the Arizona Industrial Education Association, stated the following comments:

Advantages: 1) lower cost than purchasing individual system units.
2) requires little technological expertise from teacher.
3) pre-planned lessons.

Disadvantages: 1) utilizes many "loose" parts, making inventory a nightmare.
2) many units are too simplictic.

CHAPTER THREE

THE DEVELOPMENT OF A PILOT TECHNOLOGY PROGRAM: A CASE STUDY

Background

In 1988, fifteen grants were received in the Paradise Valley School District in Vocational Education. A Technology Education grant, written by two technology educators at Shadow Mountain High School, for approximately $125,000 was awarded to develop an exploratory program. Dr. Kent Frison, Director of Vocational Education for Paradise Valley, stated : "The program, shared between Shea Middle School and Shadow Mountain High School, is one of three demonstration sites in the State of Arizona. The purpose of the program is to provide a model which will provide for an overview, with hands-on experiences, in current and future technologies and applications of basic math, reading, language, and science skills. The goal is to provide students with the flexibility required for success in tomorrow's occupations" (Frison, 1988).

The original grant was written to involve only ninth grade students at the high school level. However, the State Department strongly felt the program should be expanded to include the middle school, which feeds into the high school. The middle school would be exploratory in nature, and the high school would offer a more in depth study. Since the two schools are located side-by-side, this was a convenient arrangement to share facilities and equipment. With the flow of the middle school into the high school, interest and awareness in the technology field would encourage the students to continue to explore the programs throughout their four years of high school. The outgrowth of this decision was to involve 150 student and all the vocational teachers at Shea Middle School: Industrial Arts, Home Economics, Business, and Computers. A later meeting ,which included two Arizona State Department representatives, the two high school technology teachers, Shadow Mountain High School and Shea Middle School Principals, and the six vocational teachers from Shea, it was felt a more manageable arrangement for the initial program would be to select two teachers and thirty students. The two teachers chosen were from the Home Economics Department, based on their interest in the Technology program and a willingness to develop the curriculum. They joined the two grant recipient teachers from Shadow Mountain High School in October, 1988, to develop a curriculum for the new Technology Education program, scheduled for the new semester, January 27, 1989.

The project description, as submitted to the State Department in the Grant Proposal, was as follows:

The Paradise Valley School District has recognized the value of Technology education and has determined technological literacy as a desired student outcome. Since America is increasingly characterized as a technological society, schools should promote to all students insights and understanding of technology. This proposal has been developed to reflect nationally-endorsed direction and standards.

The course objectives were as follows:

1) Curriculum Implementation Plan: Curriculum will be developed using Arizona validated competency lists for exploratory and core-level students. Information based on the Board of Regents recommendations for New York State will be used as a base for the seventh and eighth grade curriculum. Nationally recognized Technology curriculums will be utilized for the core level classes. Curriculum development will begin with this proposal submission with a working copy and completed during the school year by participating instructors, staff for the Division of Vocational Education, consultants, and a teacher cadre. The TECHNOLOGY EDUCATION SOURCE DOCUMENT, and the approved PRINCIPLES OF TECHNOLOGY curriculum will be used. Begin date 5\20\88; ending date 6\1\89.

2) Evaluation: Student and Program evaluation will consist of A) Teacher survey B) student achievement test over the objectives, and C) and end of the year program evaluation review document. This report will be submitted to the Department of Education for dissemination. Starting date 1/30/89, ending date 6/30/89.

3) Special Need Students: Provisions will be made to insure equal access regardless of race, color, natural origin, age, sex, or handicap. This will include identifying special need/at risk students, providing curriculum, equipment and in service of instructors, as evidenced by programstandards, counselor

disseminated materials, and program materials. Starting date: 7/1/88; ending date 6/1/89.

4) Delivery of Curriculum Content: Participating instructors will be in serviced on how to deliver Technology concepts in a "hands-on" curriculum with a minimum of 70 % lab time to 25% classroom time. Results of the in services will be included in the end of the year program evaluation review, starting 9/1/88; ending 6/30/89.

5) Marketing of the Program and Student Recruitment: Marketing and student recruitment will be provided developing a presentation video, student developed handouts, counselor disseminated materials, inter- and intra- school presentation. Starting date 8/1/88; ending date 6/30/89.

6) Student Population: The model program will immediately impact over seven hundred students who will actively participate as Technology students, as well as students from other academic disciplines who will be invited to participate in some technology labs. Starting date 9/5/88; ending 6/30/89.

7) Coordination With Other Pilot Sites: Coordination will be conducted through visitation conducted by participating instructors, through end of the year program review, and dissemination of curriculum materials. Starting date 8/30/88; ending 6/30/89.

8) Model Site: The Paradise Valley School District understands the roll of a model site and will provide access, share methodology, and deliver promotion. Workshops will be held prior to school to in service the teachers, counselors, and administrators in content and goals of the programs. Intermediate and post year workshops and evaluation will also be provided.

9) Model Program Handbook: A model program handbook to include information of steps for replicating at other sites, source bibliography, and corresponding student generated video,

will be provided for submission along with a final report to the Division of Vocational Education. Starting date 8/1/88; ending 6/1/89.

10) Evaluation: An end of the year program evaluation review document will be developed by participating instructors, administration, and professionals in the field. This plan will be submitted for approval to the Division of Vocational Education Program Improvement Unit for co-approval within thirty days of award of the project.

11) Matching Funds: The Paradise Valley School District will match funds in accordance with Federal, State, and local guidelines. These funds will be used to specifically address the needs of this pilot Technology site beginning and ending date fiscal year 88'-89'.

12) Purchase of Equipment: Equipment will be purchased to provide innovative equipment, update current equipment and facilities, provide equipment for the at risk/special needs students, and equipment to be designed for universal use at other technology sites. Starting date 7/1/88; ending date 6/1/89

Program Development

In designing a technology program, a distinction must be make between technology education and technical education and vocational education. Technical or vocational education are intended to provide students with specific job skills. Technology Education is designed to provide technology literacy as a part of a fundamental, liberal education for students.

School is the ideal place to design and foster an understanding of technology, and the role it plays in shaping our culture. While learning about technological systems and the resources they use, students also can learn about human responsibilities in the control and application of technology.

Every technological activity involves the use of the seven types of resources. These resources are: people, information, materials, tools and machines, energy, capital, and time. By developing an understanding how technological resources are used and to develop the ability to use them wisely, students will be better able to function as creators and consumers of technology. In developing the program, the following questions were asked: What resources are available?

1) People: how many students work on the activity, and in what what order?
2) Information: how do the students access the information?
3) Materials: what materials can/can not they use?
4) Tools: what tools are required/available?
5) Machines: which machines would be appropriate to use?
6) Energy: what are the limitations on types/amounts of energy?
7) Capital: how much money is available, and how spent?
8) Time: how much time is available to cover units?

The format of the pilot program involved thirty-one seventh and eighth grade students, ranging from eleven to fourteen years of age. The students met for one hour each day for an eighteen- week semester. The students were a randomly -selected group: 10 eighth graders and 21 seventh graders, 13 boys and18 girls. They were chosen by availability at the scheduled time and not on academic ability. This later proved to be a liability; several students were discipline problems and not able to functioning on a self-paced program.

One of the greatest problems in the teaching of the class was the availability of equipment. The equipment, such as computers, lockers to secure projects and materials, hydroponics, etc. were not all in place at the beginning of the semester. The high school teachers were not given any time off from regular teaching duties to order materials and assembly the equipment. Equipment was not alwaus ready, which meant the written programs were not able to be started. The sharing of equipment and supplies caused many problems: stolen and vandalized equipment by high school students made some of the stations inoperable; i.e., the microphone for the laser beam, mouses for the computers.

The two Shea teachers were responsible for developing the curriculum and conducting the class activities. They were initially in-serviced by the two Technology Education teachers at the high school, writers of the grant. Resources available to them were exsisting technology programs currently being used at Shadow Mountain High School, selected textbook "Living with Technology", Utah Curriculum Guide, and computer programs from Pittsburg, Kansas.

Technology is divided into four main areas or headings: construction, transportation, communications, and manufacturing. These areas were identified by the Federal Department of Education as catagories found in all areas of technological systems. Each of these areas have activities which provide insight to the main topic. These activities will be continually revised and improved as the program develops.

Two factors dictated the activities chosen: 1) Cost: programs using computers had to be geared to available existing computers. Presently, there are two Macintosh and five Apple 11's. Other high cost items include laser optics, robotics and video equipment. 2) Teacher choice: activities already written and successfully used at the high school level. Some of these programs were re-written for the middle school level. For example, the unit on solar energy used two solar cookers and a passive collector which were already available, along with a written procedure of an activity the students would do for the energy unit.

In developing a class outline, it was decided to present a video on one of the technology areas each Monday, discussing current advancements and the week's activities. The students then selected areas of interest, using individual notebooks which contained information of all the activities and the procedure necessary to get started. The students then worked on an activity during the week, and Friday was a day of wrap-up, discussing and evaluating the progress of the week.

The first week of the class, time was spent on assembling a hard cover notebook for each student. The notebooks contained:

1) Course Outline
2) Student Activity Log
3) Activities and Procedures
4) Student Contract: understanding of course discipline
5) Grading Log Sheet: tabulation of earned grades
6) Requirements for Success: guidelines for success
7) Homework/Class work Format: grading and accountability log (Appendix 1-9).

The first week also included an exercise on problem solving, using two games as the activity. The games presented the same types ofproblem analysis as problems faced in the "real" world. The games,called "The Paper Tower" and "The Bridge" are designed for groups of four or five students.

The following is a description for the game:

<u>"The Paper Tower"</u>

Task: to construct the tallest tower you can

Time: 20 minutes

Materials: 4 sheets of paper, glue or masking tape

<u>"The Bridge"</u>

Task: to construct a bridge on which can be sat and crawled under

Time: 30 minutes

Materials: unlimited supply of newspaper, masking paper

Although the program has been designed as a self-paced individual program, several activities have been planned for the class to do as a group. During the second week of the class, the topic of recycling and waste management was presented. Guest speakers from "Phoenix Clean and Beautiful" showed a video and discussed Phoenix waste disposal problems and the areas of recycling. One of the activities in the communications area, in Desktop Publishing, the students wrote articles for a newspaper, and the area of waste management was a topic that could have been developed by the students as a cross-curricular activity.

The third week the students began working in the modules; teacher discretion grouped students for the activities. Sixteen activities were available to the students at that time. As each module was completed, the students placed their name on a poster placed above the station, identifying them as "experts" in that area, and would be available to answers from students encountering problems with that unit. The first group to finish an activity was encouraged to produce a video (using the activity found in the Student Activity Log) on procedures and helpful tips concerning the activity, which will assist the next group just beginning. Plans included a field trip to Scottsdale Air Park in Scottsdale to visit some high-tech businesses. Guest speakers also were scheduled during the 18 weeks.

Students continued moving through the activities, with Mondays designated as days for presenting general information and identifying the week's activities. Lab activities followed during the week; Fridays were wrap-up days, evaluating student progress and making revisions of the program.

In developing the curriculum, the four areas (communications, transportation, construction, and manufacturing) were identified, and appropriate activities were chosen which would offer basic information about these areas (Appendix 10-29). The curriculum was developed in several different ways: 1) use of exsisting programs presently used in the high school technology program, rewritten for the middle school student. 2) use of computer programs which would direct the student to follow specific directions. 3) teacher developed programs, written exclusively for the middle school student, which generally require reading from the textbook "Living with Technology", taking a pre-test and post-test.

The curriculum was developed using 15 days paid for by the grant. Each teacher also received $800 from the grant to pay for personal time. Seven activities were ready at the start of the semester. The balance of activities were to be added as equipment was available. Problems developed however, causing some units to never materialize. The hydorponic garden was set in place during the last two weeks of class, which was not long enought to germinate any seeds. The time factor was also a problem; the unit on computer-aided heat transfer was allowed one week, but students were not able to finish their projects in the alloted time. Breakdown of equipment, such as in the robotics unit, allowed only half the students to complete the module.

The selection of the middle school teachers was based on their interest and willingness to develop a technology program. The two teachers were Home Economics with three years and ninr years experience respectfully. Neither teacher was experienced with technology application and were not computer-literate. The grant provided them with a Macintosh SE Computer, and in-service training by the high school technology teachers.

In February, the Mid-Winter Conference of AIEA (Arizona Industrial Education Association) was held in Phoenix. The theme was "Questions About Technology Education, Tying It All Together". The keynote speakers were Dr. Donald Lauda, Dean of the School of Applied Arts and Sciences, Long Beach, California, and Mr. Robert Daiber, Technology Teacher, Triad High School, St. Jacob, Illinois. New technology programs in the state were presented and ideas shared. The main emphasis of the conference was to demonstrate to traditional Industrial Arts teachers how a technology education program can be implemented in exsisting programs.

In March 1989, a meeting was held with representatives of the business community who expressed an interest in assisting the technology program. They offered their time and expertise in their individual areas as guest speakers.

The Facility

The tech lab was located at the north end of Shadow Mountain High School, measuring 100 x 140 feet, and was divided into modules (Appendix 30). The modules were along the walls and were open so one can see through or across into other areas. Each module was self-contained, complete with the necessary instructional materials, references, supplies, tools and equipment. The facility was also designed to be flexible enough to allow for the addition, modification or deletion of module areas in the future. A classroom located at the end of the lab is a designated area for class and small group activities. The teacher's desk is located in the classroom. In the remaining lab area the individual modules or stations are located, with ample teacher and student storage areas.

The areas were divided into the seven technological groupings, with each activity being conducted within that boundry. A technological resource center was planned to house an up-to-date library of magazines and high-tech information.

Technology Modules

The modules represent the technology clusters. These clusters are addressed in smaller, specific units, briefly described as follows:

<u>Communications:</u>
Fiber Optics
Laser Beam
Video Production

Design Sketching
Computer Assisted Design (CAD)
Pinhole Camera
Contact Print
Heat Transfer (Computer Generated)
Desk Top Publishing

<u>Biotechnology:</u>
Hydroponics
Recycling
Ecology Report

<u>Transportation:</u>
Car Builder
Glider

Buoyancy Test
Rocket Design

<u>Energy:</u>
Solar Cooker
Solar Collector
Windmill Design

<u>Power:</u>
Electric Motor
Internal Combustion Engine (Computer)

<u>Production Systems:</u>
Robotics
Geodesic Dome
Processing System

<u>Future Technologies:</u>
Think Tank

Teaching Procedures

Prior to working in any module, all students will go through an orientation which will cover:

1) Organization and management of the course (see Appendix J and K
2) An introduction and overview of technology, discussing what technology is, its history and how it affects the whole world
3) Measurements
4) Safety
5) Media and computer operation.

CHAPTER FOUR

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The Technology Education program at the middle school is exploratory in nature. At this level, students investigate and examine the four broad content areas: communications, transportation, manufacturing, and construction. In general, the curriculum plans have placed emphasis on three key objectives:

1. To provide students with a general understanding of technology. This objective implies that the teacher will help students define what is technology, understand what technology is appropriate for human usage, and determine the cause and effect of technological change.

2. To develop students' technical skills. The teacher will provide instruction that will enhance students' abilities to correctly use modern tools, machines, materials, techniques, and technical information.

3. To develop students' social-cultural skills. The teacher will provide instruction to increase students' capabilities to make decisions, solve problems, communicate, and cope as consumers, citizens, or employees in a technological world.

The State Department of Education will evaluate the program on the following basis: 1) the quality of a video presentation, 2) the effectiveness of a model program handbook, and 3) the written evaluation by the participating teachers and administration.

The results will determine if a technology course should be offered.

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Appendix 1-9

TECHNOLOGY EDUCATION

SHADOW MOUNTAIN HIGH SCHOOL
SHEA MIDDLE SCHOOL

COURSE OUTLINE

WEEK ONE .... INTRODUCTION TO TECHNOLOGY
TOWER COMPETITION
LAB TOUR
TECHNOLOGY SURVEY
LIVING WITH TECHNOLOGY VIDEO
PAPER BRIDGE COMPETITION
PAPER GAME

WEEK TWO .... DECISIONS, DECISIONS, DECISIONS, VIDEO
LAB PROCEDURES
LAB SET-UPS
LABS
LAB WRAP-UP

WEEK THREE .... THE TECHNOLOGY SPIRAL, VIDEO
LABS
LAB WRAP-UP
TECH QUIZ

WEEK FOUR .... ENERGY FOR SOCIETIES, VIDEO
LABS
GUEST SPEAKER
LAB WRAP-UP

WEEK FIVE .... HEALTH AND TECHNOLOGIES, VIDEO
LABS
TECHNOLOGY FIELD TRIP
LAB WRAP-UP
TECH QUIZ

WEEK SIX .... FEEDING THE WORLD, VIDEO
LABS
LAB WRAP-UP

WEEK SEVEN .... COMMUNICATIONS, VIDEO
LABS
LAB WRAP-UP

WEEK EIGHT .... THE CHANGING ROMANCE, VIDEO
LABS
LAB WRAP-UP
GUEST SPEAKER
TECH QUIZ

WEEK NINE .... CHINA, JAPAN, AND THE WEST, VIDEO
LABS
LAB WRAP-UP
TECH EXAM

WEEK TEN .... POPULATION PATTERNS , VIDEO
LABS
LAB WRAP-UP

WEEK ELEVEN .... EXPLORING SPACE, VIDEO
LABS
LAB WRAP-UP
TECH QUIZ

WEEK TWELVE .... RISK, SAFETY, AND TECHNOLOGY, VIDEO
TECHNOLOGY FIELD TRIP
LABS
LAB WRAP-UP

WEEK THIRTEEN .... TEACHING WITH YOU, ME AND TECHNOLOGY
GUEST SPEAKER
LABS
LAB WRAP-UP
TECH QUIZ

WEEK FOURTEEN .... YOU, ME, AND TECHNOLOGY, VIDEO
LABS
LAB WRAP-UP

WEEK FIFTEEN .... PRESENTATION VIDEOS
ECOLOGY REPORTS
ROCKET LAUNCH
LABS
LAB WRAP-UP
TECH QUIZ

WEEK SIXTEEN .... PRESENTATION VIDEOS
ECOLOGY REPORTS
ROCKET LAUNCH
GUEST SPEAKER
LABS
LAB WRAP-UP

WEEK SEVENTEEN .... PRESENTATION VIDEOS
ECOLOGY REPORTS
ROCKET LAUNCH
LABS
LAB WRAP-UP
TECH QUIZ

WEEK EIGHTEEN .... PRESENTATION VIDEOS
ECOLOGY REPORTS
ROCKET LAUNCH
LABS
FINAL TESTING
FINAL REPORTS
LAB WRAP-UP

TECHNOLOGY EDUCATION
SHEA MIDDLE SCHOOL

NAME ______________________

STUDENT ACTIVITY LOG

COMMUNICATIONS

	STUDENT	TEACHER
- Fiber Optics		
- Laser Beam		
- Video Production		
- Design Sketching		
- Computer Assisted Design (CAD)		
- Pinhole Camera		
- Contact Print		
- Heat Transfer (Computer Generated)		
- Desk Top Publishing		

BIOTECHNOLOGY

- Hydroponics		
- Recycling		
- Ecology Report		

TRANSPORTATION

- Car Builder		
- Glider		
- Buoyancy Test		
- Rocket Design		

..... activity log continued

ENERGY

- Solar Cooker ....
- Solar Collector ....
- Windmill Design ....

POWER

- Electric Motor ....
- Internal Combustion Engine (Computer) ....

PRODUCTION SYSTEMS

- Robotics ....
- Geodesic Dome ....
- Processing System ....

FUTURE TECHNOLOGIES

- Think Tank ....

Appendix 10-29

TECHNOLOGY EDUCATION
SHADOW MOUNTAIN HIGH SCHOOL

CLASS ____________
HOUR ______ ROOM ______
DATE ____________
TEACHER ____________

STUDENT CONTRACT

I ______________________ and ______________________
student signature parent/gaurdian signature
have read and understand the course requirements listed below.

1) Our goal in Technology Education is for your learning success. This requires an investment by you, your teacher, your parents or guardians, the school, and society. After understanding the grading requirements, indicate the grade you are willing to make a commitment to achieving. ** If at any time during this course your total grade average falls below this mark you will notified along with your parents/gaurdian and extra work provided.

GRADE COMMITMENT: ____________

2) Disruptive behaviour cannot be allowed in a lab class. Behaviour that disrupts the lab, endangers other students, or vandalism will result in being removed from the remaining labs.

3) A daily notebook is required and is given a point value as listed on the grade sheet.

4) It is the responsibility of the student to make up missed work, assignments, and labs (where possible).

5) Lab fees are required for this course. This fee covers expendables used in the labs. Any extra lab materials requested by the student will be charged a per cost fee.

6) Safety is a priority! Safety glasses will be provided at a $2.00 rental fee per class. If requested the student will be allowed to provide their own glasses and waive the rental fee.

TECHNOLOGY EDUCATION
SHADOW MOUNTAIN HIGH SCHOOL

ENGINEERING

HOUR ______ DATE ______

NAME ______

GRADING LOG SHEET

LABS

1) STABILITY (10 PTS) ______
2) CENTER OF GRAVITY (10PTS) ______
3) EGG CARTON (20 PTS) ______
4) MOMENT OF INTERTIA(10PTS) ______
5) CYCLOID CURVE (15 PTS) ______
6) BRIDGE (25 PTS) ______
7) PRODUCT RESEARCH (15PTS) ______
8) CAM (15 PTS) ______
9) PAPER ATTACHMENT (10PTS) ______
10) ROBOTIC PROGRAM (10 PTS) ______
11) ELECTRICAL CIRCUIT(10PTS) ______
12) EXTRA CREDIT (?) ______

TOTAL ______

QUIZZES

1) WEEK TWO (10PTS) ______
2) WEEK FOUR(10PTS) ______
3) WEEK SIX (10PTS) ______
4) WEEK SEVEN(10PTS) ______
5) WEEK EIGHT (10PTS) ______

TOTAL ______

EXAMS

1) WEEK FIVE (25 PTS) ______
2) WEEK NINE(75 PTS) ______

TOTAL ______

HOMEWORK

1) ARTICLE REVIEW (10 PTS) ______
2) ARTICLE REVIEW (10 PTS) ______
3) TECH ARTICLE (10 PTS) ______
4) TECH ARTICLE (10 PTS) ______
5) SOURCE DOCUMENT(10 PTS) ______

TOTAL ______

NOTEBOOK

1) WEEK FOUR (10PTS) ______
2) WEEK EIGHT (40PTS) ______

TOTAL ______

TECHNOLOGY EDUCATION
SHADOW MOUNTAIN HIGH SCHOOL

REQUIREMENTS FOR SUCCESS

By working together, we can all insure a successful year in this class. There are some guidelines I would like to share with you so we all know what is expected in order to maintain an enjoyable and productive learning atmosphere for everyone.

OFFICE HOURS

Anytime you need assistance or just to talk please feel welcome to do so. My office hours will be announced to the class, please record them here for your convenience.

Mr. Pasley	6:45 a.m. - 7:15 a.m.
	After school by Appt.

CLASSROOM PROCEDURES

1) Comply with all Shadow Mountain school rules.
2) Be in your seat when the bell rings. The Tardy Policy will be enforced
3) Have all necessary materials in class with you each day: blue or black pen, pencil, notebook, workbook, extra paper, and any work materials required. It is inappropriate to borrow materials during class time. You will not be permitted to leave class to gather materials.
4) No food or drink in the room at any time.
5) No passes will be issued except emergency passes to the nurse.
6) Remain at your work station unless obtaining supplies or turning in work.
7) Make up work: make an appointment with me to make up work/test you fail to show up at the arranged time, you will forfeit the opportunity to earn your grade for that work. Shadow Mountain policy will be followed in allowing the appropriate number of days to complete missed work due to an excused absence. ** SOME LABS MAY NOT BE MADE UP!

continued .....

TECHNOLOGY EDUCATION

SHADOW MOUNTAIN HIGH SCHOOL

CLASS ____________

HOUR ____________

NAME ____________

STUDENT GRADE SHEET

This sheet should help you determine your grades throughout the semester. The total point value of each grading area is given as well as the corresponding grading scale. To keep track of individual grades use the GRADING LOG SHEET.

QUARTER		QUARTER		SEMESTER TOTALS	
labs ________	(150pts)	labs ________	(150pts)	labs ________	(300pts)
quiz ________	(50pts)	quiz ________	(50pts)	quiz ________	(100pts)
exams ________	(100pts)	exams ________	(100pts)	exams ________	(200pts)
notebook ________	(50pts)	notebook ________	(50pts)	notebook ________	(100pts)
hmwk ________	(50pts)	hmwk ________	(50pts)	hmwk ________	(50pts)
ex/credit ________		ex/credit ________		ex/credit ________	
				semester exam ________	(200pts)
total ________		total ________		total ________	

GRADING SCALES

QUARTER GRADING SCALE

350 PTS -- 400 PTS	=	A
300 PTS -- 349 PTS	=	B
250 PTS -- 299 PTS	=	C
200 PTS -- 249 PTS	=	D
0 PTS -- 199 PTS	=	F

SEMESTER GRADING SCALE

900 PTS - 1000 PTS	=	A
800 PTS -- 899 PTS	=	B
700 PTS -- 799 PTS	=	C
600 PTS -- 699 PTS	=	D
0 PTS -- 599 PTS	=	F

TECHNOLOGY EDUCATION

SHEA MIDDLE SCHOOL

NAME ____________________

LAB TITLE:

LASER BEAM

LAB DESCRIPTION;

This lab contains 8 lab activities to help you understand laser optics. The main difference between laser optics and fiber optics is: laser optics is the transmission of a light beam in a straight line. Fiber optics is the transmission of a light beam through a " fiber " or "strand". The light beam will follow the fiber in any direction. The eight activities are as follows:

1) Laser Beam Divergence
2) Monochromaticity
3) AM Communication
4) Polarization Modulation
5) Splitting - Parallel Glass
6) Splitting the Beam - Prism
7) Condensing Lens
8) Diverging Lens

MATERIALS:

See the Lab activity for each lab for materials needed.

PROCEDURE:

1) Choose a partner with whom you would like to work.
2) Follow the directions for each of the eight lab activities.
3) Answer the **REVIEW QUESTIONS** for each of the lab activities.
4) When you have completed the eight activities, place the **REVIEW QUESTIONS** in the notebook under **Completed Lab** section.
5) Show your completed work to your instructor, and have them sign the **STUDENT ACTIVITY LOG**.

NEW TERMS:

negligible divergence
monochromaticity
bandwidth
photocell
AM
polarization modulation
parallel
condense
holograms

TECHNOLOGY EDUCATION
SHEA MIDDLE SCHOOL

NAME ____________________

LAB TITLE:
HEAT TRANSFER - COMPUTER GENERATED

LAB DESCRIPTION:

In this lab, you will be required to design a "logo" for the front or back of a T-shirt, using the MAC SE computer . You may either use the MACDRAW program where you actually draw your own design, or use the MACPAINT program, where you select from a notebook of graphics (WETPAINT SELECTIONS). If you decide to draw your own, you will need to take the "Macdraw Tour" first. If you would like to select a picture or pictures from the book of graphics, then you will follow the directions below. Most people enjoy using the graphics selections from WETPAINT, and adding their own personal touches along with the graphic selected.

MATERIALS:

1) Mac SE computer
2) Disk
3) Notebook with graphic selections
4) WETPAINT DISKS

PROCEDURE:
(The following procedure is for a graphic design selected from the WETPAINT GRAPHICS NOTEBOOK)

1) Select from the notebook which design you would like to use. Keep in mind that you may add words, or more than one picture, or you may use fillin patterns, etc.

2) Turn on the computer, and open the hard drive with a double click.
3) Open "SUPERPAINT" folder, using a double click. (Double click right on the "ICON" of SUPERPAINT.
4) Insert the appropriate disk for the picture you have selected. (EXAMPLE: BIG BIRDS 6C, OR ARROWS 2A)
5) Go to the FILE, and click on OPEN.
6) Click on Macpaint once.
7) Select the right category.
8)

TECHNOLOGY EDUCATION
SHEA MIDDLE SCHOOL

NAME ____________________

LAB TITLE:

GLIDER

LAB DESCRIPTION

In ancient Greek legend, Icarus was able to fly by flapping wings made for him by his father. He flew so high that the heat from the sun melted the wax that held his wings together, and he fell into the sea. People have always dreamed of flying, but some of the earliest fliers were not willing participants. Marco Polo, an Italian who traveled in and wrote about China in the 1200s, reported that Chinese sailors would tie an unwilling person to a large kite and launch it into the wind.

Using human muscle power, animal power, and the wind, people have been building transportation systems since ancient times. In this lab, you will be designing a guilder, using a computer.

TECHNOLOGY EDUCATION

SHEA MIDDLE SCHOOL

NAME ________________

LAB TITLE:

BUOYANCY TEST

LAB DISCRIPTION:

"BOUYANCY" is a scientific principle that must be considered for all modes of water transportation. Buoyancy is caused by the upward force that water (or any fluid) exerts on any object in the fluid. During this lab experience, you will be using clay and aluminum foil to experiment with buoyancy principles.

MATERIALS:

2 oz. (approximately) modeling clay
Wide mouth glass or plastic containers (4" diameter or larger)
Aluminum pie pan
Transparent plastic syringe
Masking tape
Aluminum foil

PROCEDURE:

1) Choose a partner with whom you would like to work.
2) Read in the text "Living with Technology", section " **WATER TRANSPORTATION**", page 450 - 455.
3) Locate the "**DISPLACEMENT OF AN OBJECT IN WATER**" lab activity found in your notebook.
4) Read the introduction page of the lab activity.
5) Proceed to the next page and follow the procedure for the

activity.

6) Complete the **DISPLACEMENT OBSERVATION SHEET**, which is located on the last page of the lab activity.

7) Place the observation sheet in your notebook under **Completed Lab** section.

8) Show your completed work to your instructor, and have them sign the **STUDENT ACTIVITY LOG.**

NEW TERMS:

buoyancy
displacement

TECHNOLOGY EDUCATION

SHEA MIDDLE SCHOOL

NAME ____________________

LAB TITLE

GEODESIC DOMES

LAB DESCRIPTION

What geometric shape is used for most of our sheltering structures? Rectangles, right? Are these the most efficient shapes to use? Suppose you wanted to build a structure to enclose a given space, what geometric shape would be the most efficient in terms of materials used to create the structures's surface area? The answer is a sphere. A sphere uses the smallest surface area to enclose a given space. Geodesic dome construction follows this basic principle. During this lab you will build a geodesic dome, using straws as your supports.

MATERIALS

1) 10 4-point connectors
2) 6 5-point connectors
3) 10 6-point connectors
4) 35 long struts (4" straws)
5) 30 short struts (3 1/2" straws)

PROCEDURE

1) Select a partner with whom you wish to work.
2) Read "**New Terms**" which follow.
3) Follow **PROCEDURE SHEET: BUILDING MODEL GEODESIC DOMES**
   Refer to model located in the station.
   Observe model of dome over Hydroponic Garden.
4) Show instructor completed model.
5) Have instructor sign **STUDENT ACTIVITY LOG**

OBJECTIVES

After completing the activity, students will be able to:
1) Describe the basic polyhedra used in geodesic domes.
2) Explain several advantages and disadvantages of building shelters using geodesic dome construction.
3) Identify several structures that utilize geodesic domes.
4) Construct model geodesic domes.

TECHNOLOGY EDUCATION

SHEA MIDDLE SCHOOL

LAB TITLE:

PINHOLE CAMERA

INTRODUCTION:

THE PINHOLE CAMERA IS TO INTRODUCE YOU TO THE WORKS OF A CAMERA. YOU WILL EXPOSE A PRINT AND MAKE A NEGATIVE BY YOUR PINHOLE CAMERA.

OBJECTIVES:

AT THE END OF THIS ACTIVITY EACH STUDENT WILL BE ABLE TO:

1. UNDERSTAND HOW A CAMERA WORKS.
2. TO DEVOLOP A PRINT.
3. TO CONTACT A PRINT.

MATERIALS:

1. LIGHT TIGHT BOX (QUAKERS OATS BOX) WITH A TIGHT LID
2. PRINT PAPER
3. FILM
4. DARKROOM
5. CHEMICALS TO DEVELOP FILM AND PRINT PAPER.
6. VIDEO - "PINHOLE CAMERAS"

REFERENCES:

1. THE PROCEDURE SHEET THAT ACCOMPAINIES THIS LAB.
2. CONTACTING PROCEDURE SHEET.

PROCEDURES:

1. GET ALL MATERAILS NEEDED AND VIEW THE VIDEO "PINHOLE CAMERAS".
2. TAKE YOUR PINHOLE CAMERA AND SEE IF IT IS LIGHT-TIGHT. (LOOK INSIDE OF BOX AND SEE IF ANY LIGHT COMES IN THE CAMERA.)
3. MAKE SURE YOUR PINHOLEIS COVERED GOOD WITH ELECTRICAL TAPE.
4. TAKE THE CAMERA INTO THE DARKROOM, WITH TAPE AND PRINT PAPER OR FILM (YOU CAN HAVE THE RED LIGHT ON IF YOU ARE USING PRINT PAPER OR LITH FILM.)
5. TAKE OFF THE LID OF THE CAMERA.
6. A. IF YOU ARE USING PRINT PAPER. TAPE THE PRINT PAPER TO THE LID. MAKE SURE THE SHINY SIDES UP.
   B. IF YOU ARE USING FILM, TAPE THE FILM WITH THE LIGHT SIDE UP (EMULSION SIDE).
7. GO OUTSIDE OR INSIDE
8. TO TAKE A PICTURE YOU NEED TO FIND A PLACE WHERE NO PEOPLE ARE AND NOTHING WILL MOVE IN THE PICTURE. (IF SOMEONE MOVES IN THE PICTURE, IT WILL BE A BLUR)
   A. PULL UP THE TAPE THATS OVER THE HOLE AND TIME IT FOR ABOUT 6 SEC.
   B. DONT MOVE THE CAMERA OR IT WILL BE A BLUR.
9. IF YOU TAKE THE PICTURE INSIDE USE A LIGHT METER OR CHECK WITH THE INSTRUCTOR FOR RECOMMEDED TIME.
   A. PUT THE LIGHT METER AT WHERE YOU TAKE THE PICTURE. READ HOW MANY SEC. TO EXPOSE FOR.
   B. DO A. AND B. STEPS FROM PROCEDURE 8
10. TAKE CAMERA IN TO THE DARK ROOM.
11. PUT CHEMICALS IN ORDER : DEVELOPER, STOP, WATER, FIXER, WATER.
12. PUT IN TEKTAL (PRINT DEVELOPER) FOR 1 MIN.
13. PUT IN STOP FOR 30 SEC.
14. RINSE IN WATER.
15. PUT IN FIXER FOR 4 MIN.
16. THEN RINSE IN WATER.
17. ALLOW TO DRY. (YOU ARE DONE IF YOU USED PRINT PAPER)
18. IF YOU HAVE FILM, FOLLOW THE PROCEDURES FOR CONTACTING.
19. PLACE ALL WORK IN NOTE BOOK AND TURN IN FOR GRADE.

TECHNOLOGY EDUCATION
SHEA MIDDLE SCHOOL

LAB TITLE:

VIDEO PRODUCTION

LAB DESCRIPTION

Video production is a growing industry in our society. Many businesses are using videos as a tool for training, communications, educating and public relations. We also find it being used for news broadcasts, television shows, commercials, and educational programing. When producing a video, the concepts of lighting, sound, props, and set design must be considered. This lab is an exercise in the production of a video. The topic of the video will be a demonstration of one of the lab activities of the class. For example, the taping ofa rocket launch, or a demonstration of fiber optics.

MATERIALS:

1) video camera
2) video tripod
3) wireless microphone
4) props
5) script/storyboard
6) video tape

SPECIAL NOTES:

1) **Storyboard Worksheet**: an outline of presentation; a series of rough sketches with audio and video directions underneath each sketch.
2) **Script Worksheet**: Lines to be spoken.

3) **Prop List Worksheet**: List of props needed.
4) Set design: Consider the background and camera angle in relation to the subject.

PROCEDURES:

1) Select a partner with whom you would like to produce a video.
2) Choose a lab experience you wish to tape, and obtain instructor signature on storyboard sheet.
3) Plan your video production, using the **video storyboard** and **script** worksheets.
4) Complete the **prop list** worksheet.
5) Practice your video production, using video camera and tripod.
6) After sufficient practice, begin the final taping of your production.
7) Turn in tape to the instructor; final evaluation at the end of the semester.

NEW TERMS:

Audio
Video
Tripod
Storyboard

TECHNOLOGY EDUCATION
SHEA MIDDLE SCHOOL

NAME ____________________

LAB TITLE:

ROCKET DESIGN

LAB DESCRIPTION:

This lab will help you understand why things are able to fly. You will learn the fundamentals of model rockets and how they are built. You will find out what goes on during each stage of a model rocket flight, how to select the correct engine for each mission, and what happens as each portion of the engine operates to produce a safe, successful flight. In this lab you will build and launch a model rocket.

MATERIALS:

1) Apple IIe computer
2) Computer program "In Seach of Space".
3) Rocket Kit

PROCEDURE:

1) Select a partner with whom you would like to work.
2) Read in text "Living with Technology", section **"Space Transportation"**, pp. 462-463. Define new terms on sheet provided.
3) Follow the computer program "In Search of Space", and answer questions on sheet provided.
4) Obtain rocket kit from instructor, follow directions for assembly.
5) Return completed rocket to instructor.

6) Launch at end of semester.

NEW TERMS:

Escape velocity*
Sputnik*
Shuttle*
Thrusting
Ejection
Ignition
Coasting

*define from text

TECHNOLOGY EDUCATION

SHEA MIDDLE SCHOOL

NAME ________________

LAB TITLE

ELECTRIC MOTOR (KIT)

LAB DESCRIPTION

Electric motors are electromagnetic devices that change electrical energy into rotary motion. They operate in the opposite way of a generator. Small motors are found in appliances, toys, and small machines. These are often called **fractional horsepower** motors because they deliver less than one horsepower. Much larger motors are used to move subways and trains, and elevators in buildings. Electrical motors are easy to control, provide instant response to a request for mechanical power, and do not use energy when they are not doing useful work. However, they must either carry their power source with them (e.g., a battery), or they must be connected by wires to a power source.
In this lab experience, you will be assembling an electric motor from a kit.

MATERIALS

1) Electric Motor Kit
2) One D Cell battery
3) Scissors
4) Ruler
5) Screwdriver

PROCEDURE

1) Locate all necessary materials before you start.
2) Before you begin to assemble the kit, check the total package to become familiar with the parts and their names. A complete list of parts is at the bottom of the instruction sheet in the kit.
3) Follow the directions in the kit CAREFULLY !!!!!
4) When you have completed assembling the kit, show your instructor your work.
5) Have instructor sign off **Student Activity Log**.

TECHNOLOGY EDUCATION

SHEA MIDDLE SCHOOL

NAME ____________________

LAB TITLE:

BUOYANCY TEST

LAB DISCRIPTION:

"BOUYANCY" is a scientific principle that must be considered for all modes of water transportation. Buoyancy is caused by the upward force that water (or any fluid) exerts on any object in the fluid. During this lab experience, you will be using clay and aluminum foil to experiment with buoyancy principles.

MATERIALS:

2 oz. (approximately) modeling clay
Wide mouth glass or plastic containers (4" diameter or larger)
Aluminum pie pan
Transparent plastic syringe
Masking tape
Aluminum foil

PROCEDURE:

1) Choose a partner with whom you would like to work.
2) Read in the text "Living with Technology", section " **WATER TRANSPORTATION**", page 450 - 455.
3) Locate the "**DISPLACEMENT OF AN OBJECT IN WATER**" lab activity found in your notebook.
4) Read the introduction page of the lab activity.
5) Proceed to the next page and follow the procedure for the

activity.

6) Complete the **DISPLACEMENT OBSERVATION SHEET**, which is located on the last page of the lab activity.

7) Place the observation sheet in your notebook under **Completed Lab** section.

8) Show your completed work to your instructor, and have them sign the **STUDENT ACTIVITY LOG**.

NEW TERMS:

buoyancy

displacement

TECHNOLOGY EDUCATION
SHEA MIDDLE SCHOOL

NAME ____________________

LAB:
INTERNAL COMBUSTION ENGINE

WORKSHEET FOR 2-CYCLE ENGINE

Label the parts of the 2 cycle engine in the spaces provided.

INSTRUCTOR SIGNATURE: ____

Appendix 30

TECHNOLOGY EDUCATION – TECH LAB–