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IDENTIFIERS	Indiana (Hammond)

ABSTRACT

A project designed to develop a prevocational program for grade 9 students in a comprehensive area vocational school is described in this final report. The major goals of the project were to enable students to make wise career choices and to develop better work habits and attitudes. Other goals were to identify the possible need for 10th grade prevocational programs and to further involve the community in the process of vocational education. A total of 66 unit packets were written for the cluster areas of graphics, metals, construction, and electricity/electronics. Each of the packets included instruction sheets, audiovisual materials, suggested field trips, and appropriate evaluation instruments. Occupational analysis was used as the basis for package development. The packages are currently being field tested. Appended materials (25 pages) include sample instructional materials and work sheets, a complete unit on basic electricity, and a list of completed units. (VA)

FINAL REPORT

DEVELOP A PRE-VOCATIONAL PROGRAM FOR FRESHMEN STUDENTS IN A COMPREHENSIVE AREA VOCATIONAL SCHOOL

William E. Parson
Project No. 61-73-C

HAMMOND SCHOOL CITY
HAMMOND, INDIANA

(VT 102 009)

March 31, 1975

State Board of
Vocational and Technical Education
Department of Public Instruction
Division of Vocational Education
State of Indiana

INDEX

I. INFORMATION SHEET

A. Kind of Project: (check one)

1	Experimental	4	Demonstration
2	Developmental	5	Evaluative
3	Pilot	6 X	Exemplary

B. Population

TYPE			Numbers
A	Disadvantaged	A	
B	Handicapped	B	
C	Migrant	C	
D	Minority	D	
E	Comination of the above	E	250
F	Other _____	F	250

GROUP			
1	Pre-school	1	
2	Elementary	2	
3	Junior High School	3	
4	Middle School	4	
5	Senior High School	5	500
6	Post Secondary	6	
7	Adult	7	
8	University	8	
9	Employer	9	
10	Employee	10	
11	Citizens	11	
12	Parents	12	
13	Combination of the above	13	
	_____		

LOCALITY (check the one which encompasses the locality involved)

a	National	a	
b	State	b	
c	Region	c	
d	District	d	
e	County	e	
f	Area	f	X
g	Community	g	
h	School Corporation (LEA)	h	

II. ABSTRACT

It is recognized that preparation for life - including career choice and preparation - is an ongoing process involving a continuing learning situation. It is important that students completing their 9th grade have somewhat of an idea of their occupational goal, so that they can utilize the last 3 years in high school in preparation for immediate employment or for preparation for continued study.

This project was designed to "Develop a Prevocational Program for Freshman Students in a Comprehensive Area Vocational School." Such a program has been developed, covering the cluster areas of graphics, metals, construction, and electricity-electronics. A total of 66 unit packets were written. Each packet includes instruction sheets, audio visual materials and suggested field trips, and appropriate evaluation instruments.

Package development was based on an occupational analysis to determine the knowledge and skills required for the job, and additional appropriate information and exercises to achieve the following goals:

The student will:

1. Be better able to make a wise career choice because of more knowledge of career education.

2. Develop better work habits and attitudes.

School Administration will:

3. Establish if there is a need for a 10th grade prevocational program

The Community will:

4. Be more involved in the process of vocational education.

III. STATEMENT OF PROBLEM

Technical-Vocational High School has been serving the vocational needs of the Hammond area for over 50 years. Students have been prepared for immediate employment after graduation, or for continued education in programs where a vocational background is an asset.

During this period many innovative programs have been initiated. Among these is a system of exploratory shops in which the freshmen may enroll in pre-vocational programs in electricity, wood, metal, and graphics for 9 weeks each.

A conviction has developed among responsible personnel that the ninth grade student could benefit more from career information and value development than from the present industrial arts concept.

The problem therefore was to develop and implement a program dealing primarily with career information and career choice, and secondarily with development of student work habits and life style within accepted individual and group values.

IV. PRIORITY AREA

This project falls into the category of a career education-community based model for vocational education, using business and industry, civic and social organizations, parents and schools.

It is recognized that preparation for life - including career choice and preparation - is an ongoing process involving a continuing learning situation. This project focused on using all possible resources which could provide information and guidance to help the student make a career choice in keeping with his aptitude, interest, and goals.

V. STRATEGIES

The basic object of this project as outlined in the statement of the problem was to design and implement a better program of pre-vocational instruction for ninth grade students.

Measurable goals to be realized as a result of implementing this program are:

1. Students will be more knowledgeable in the area of career education and thus be better able to make wise career choices because:

    a) They will develop awareness of types of occupational information.

    b) They will recognize specific occupational information which is related to their capabilities and interests.

    c) They will be able to apply, in terms of involvement, a broad course of action or occupational direction.

    d) They will be able to analyze skill development as part of an information base to determine awareness of skills and attitudes needed for the cluster.

    e) They will recognize the occupational skills that are compatible with their capabilities and interests.

    f) They will evolve a commitment to the skill levels within their chosen occupation.

2. Students will develop better work habits and attitudes.

3. Administration will be able to identify individual students who are not yet ready to enter vocational programs in the 10th grade. Such accumulated information will establish if there is a need for an additional pre-vocational program in the 10th grade.

4. There will be further involvement of the community in vocational education.

Based on the above objective and goals, the following preliminary strategies were developed:

1. A tentative operating program was designed for the project.
2. Staffing requirements were established.
3. A budget was prepared.
4. A tentative time schedule was established.
5. A proposal was submitted and funded by the State Board of Vocational and Technical Education through the Indiana Department of Public Instruction, Division of Vocational Education.

VI. THE PROCEDURES

1. Professor Andrew Parker of Purdue University was employed during the initial stages of the program to select the necessary developmental system and theory to be employed by the Project; and to train the staff in areas of task analysis of occupations; generation and writing of measureable goals and objectives; preparation of teacher-centered curriculum packages including instruction sheets, audio-visual materials development and utilization, and test construction.

2. The writing staff was selected from available teachers, each of whom had a combination of classroom experience and occupational experience in their respective fields.

(Appendix A)

3. Possible cluster areas for development under the Project were reviewed. Selected were graphics, metals, construction, and electricity-eletronics. These were chosen on the basis of the following criteria:

   a) Practicality of class scheduling and pupil programming. Four areas for 9 weeks each were most logical.

   b) Employment opportunities. Yearly surveys of student-graduate employment and area employment opportunities are used to establish the vocational programs to be offered.

   c) High coverage of vocational programs being offered. The 4 areas selected cover 90% of the vocational offerings, excluding business.

   d) Student interest. Results of OVIS Interest Survey and Student Program Selection substantiates areas chosen.

(Appendix B)

4. A list of occupations available in the area was prepared for each of the 4 clusters. From this tentative list of occupations, a selection was made of the occupations to be taught.

(Appendix C)

5. Each such occupation was then analyzed to determine the knowledges and skills required to successfully perform the job.

(Appendix D)

6. Instructional objectives were then developed for each cluster.

(Appendix E)

7. Appropriate teaching units were written which would enable the students to achieve the established goals.

(Appendix F)

8. Teaching units are now being employed and field tested. Due to the fact that the new curriculum required some change in facilities, purchase of additional equipment, and teacher acceptance, field testing and revision have not been completed. Completion dates of field testing will vary, depending on successful resolution of above delay factors.

(Appendix G)

VII. RESULTS

The objective of the Project has been accomplished; namely a better pre-vocational program for 9th grade students has been designed and implemented.

Complete 9-week pre-vocational programs have been written for cluster areas in graphics, metals, construction, and electricity-electronics. A total of 66 lesson units were developed.

The construction program was started from scratch in an available facility. Equipment was transferred from other shops. Necessary books and supplies were purchased. The teacher participated in writing the program.

The metals program used the same facilities and equipment. The teacher participated in writing the program.

The graphics program was relocated in a renovated facility. $15,000 of new equipment was needed for the new program. Financial restrictions has limited purchase to date of about half the requirements, resulting in delay in application of some teaching units. The teacher was involved in writing the program.

The electric-electronic program was relocated in an available facility. Purchase of supplies and equipment was implemented. The teacher was not available at the time the program was written.

Progress is being made toward attaining Measurable Goals as a result of implementing the new program in the classroom.

However, due to the normal time requirements to set up and equip the shops, there has been insufficient class time to date to permit collection of test data needed for evaluation of the student-centered goals, #1-2-3.

Goal 1 - Being better able to make wise career choices because of more knowledge of career education.

Goal 2 - Develop better work habits and attitudes.

Goal 3 - Establish possible need for 10th grade pre-vocational program - must await data collection for another semester.

Goal 4 - Further involvement of the community in vocational education - has been attained through stipulation in the units of field trips and class presentations by representatives of labor and management.

VIII. RECOMMENDATIONS

As indicated in previous sections of this report a curriculum has been developed and implemented in the classroom; but final field testing, revision of materials, and systematic evaluation remain to be completed.

It is therefore recommended that:

1. A continuation of the Project be instituted to provide the manpower needed to pursue the work to its ultimate conclusion.
2. The developed curriculum packets be made available at this time only to other groups working on similar projects.
3. On final completion of the Project the curriculum packets then be made available for general distribution.

Persons desiring unit packets should contact Research Coordinator, Vocational Department, 120 West Market Street, Indianapolis, Indiana 46204, for authorization.

Items	Project Budget FY 1973		Total Expenditures on Project	
	Agency	State/Federal	Agency	State/Federal
Direct Expenditures				
1. Personnel				
Principal Investigator	0	2000	0	2000
Director - Guidance	4000	0	4000	0
Instructors	0	13635	0	13635
2. Contractual Services-Clerical	0	1677	0	1677
3. Employee Benefits	208	725	208	725
4. Travel	0	37	0	37
5. Supplies	0	329	0	329
6. Communications	0	100	0	100
7. Properties	0	0	0	0
8. Facilities	370	0	370	0
9. Product Production and Dissemination	0	0	0	0
10. Project Evaluation	0	714	0	714
Indirect Expenditures				
TOTAL EXPENDITURES	4578	19217	4578	19217

PROJECT MONITOR _____

DIRECTOR Parson

LEA Hammond, Indian

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	Project Budget FY 1973		Total Expenditures on Project		End of Project Balance	
	Agency	State/Federal	Agency	State/Federal	Agency	State/Federal
tor	0	2000	0	2000	0	0
	4000	0	4000	0	0	0
	0	13635	0	13635	0	0
Clerical	0	1677	0	1677	0	0
	208	725	208	725	0	0
	0	37	0	37	0	0
	0	329	0	329	0	0
	0	100	0	100	0	0
	0	0	0	0	0	0
	370	0	370	0	0	0
	0	0	0	0	0	0
	0	714	0	714	0	0
	4578	19217	4578	19217	0	0

DIRECTOR Pearson

LEA Hammond, Indiana

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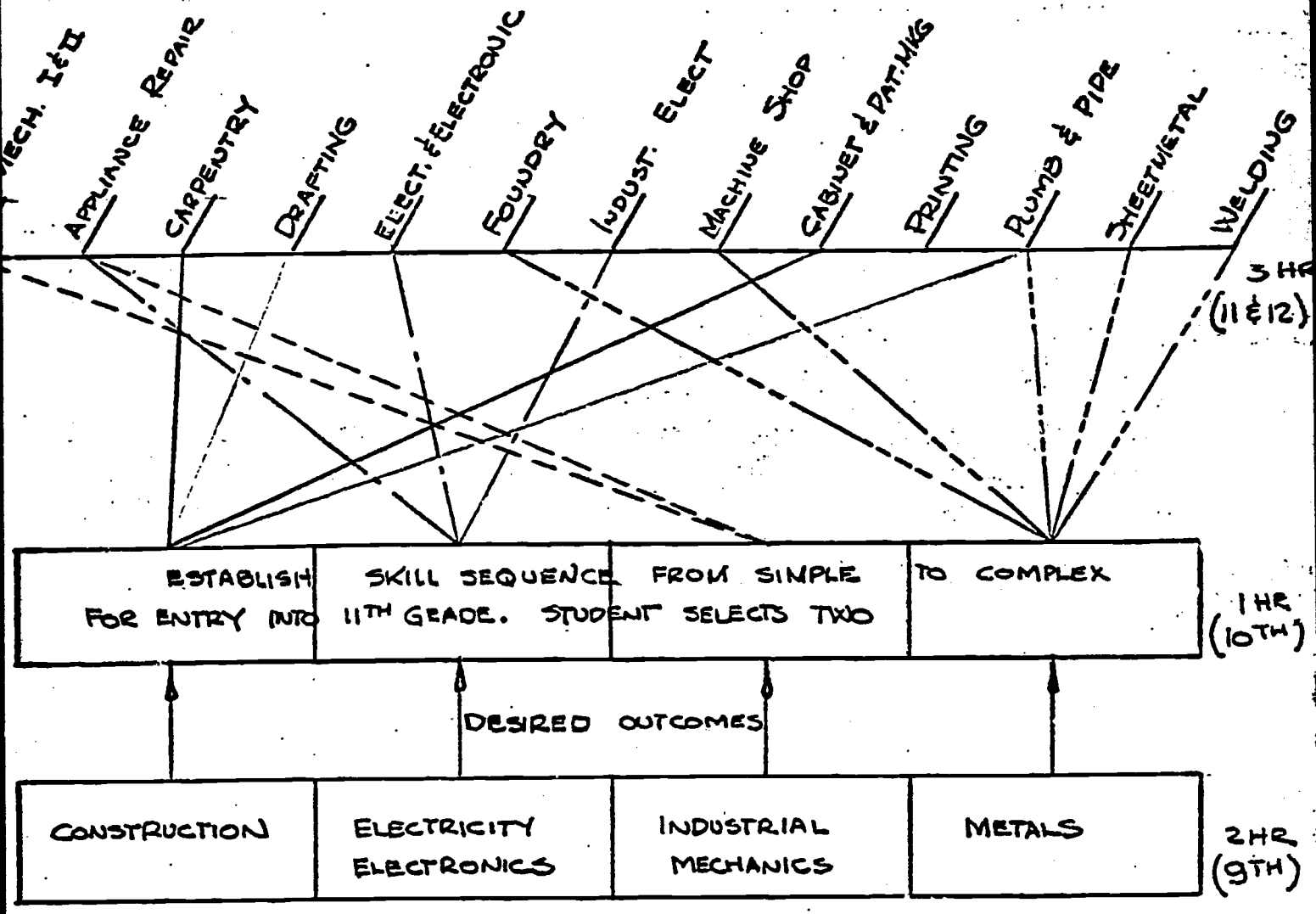
APPENDIX

Project No. 61 - 73 - C

A - STAFF

Director	William Parson	Director Vocational Ed.
Principle Investigator	Andrew Parker	Purdue University
Coordinator	Andrew Adaska	Coordinator, Tech-Voc. H.S.
Writers	Andrew Adaska	Graphics
	Adolph Egyed	Metals
	Jack Hayden	Power Mechanics
	John Molnar	Electric
	Jim Rizzuth	Construction
	Elbert Smith	Construction
	Richard Stemper	Construction
	Tom Strbjak	Graphics
Consultants	Gerald Kackley	Director Guidance
	All Instructors in T - 1 Department	

B - CLUSTER DEVELOPMENT - WORK SHEET



COMMON SKILL DEVELOPMENT
USE OF MANAGEMENT TEAM
PERFORMANCE OBJECTIVES

CARPENTER	ELECTRICIAN	AUTOMOTIVE MECH	WELDER COMBINATION
PAINTER	ELECT. APP. REPAIR	DIESEL MECHANIC	MACHINIST
IRONWORKER	IND. ELECTRICIAN	AUTOMOTIVE REPAIR S.	SHEETMETAL WORKER
PLASTERERS	EQUIPMENT INST.	CONST. EQUIP. MECH.	PIPEFITTER
PLUMBER		TRACTOR MECHANIC	AUTOMOTIVE BODY REPAIR
		REFRIGERATION MECH.	

C - OCCUPATIONS TO BE TAUGHT - SAMPLE

SCHOOL CITY OF HAMMOND
Hammond, Indiana
HAMMOND TECHNICAL VOCATIONAL HIGH SCHOOL

Electricity-Electronics Cluster

D.O.T.	OCCUPATION
003.181	Electronic Technician
824.281	Electrician Construction
829.281	Electrical Repairman
827.281	Electical Appliance Repairman
726.781	Electronics Assembler
729.884	Electrical Control Assembler
829.131	Electrician Foreman
827.381	Refrigeration Mechanic
822.131	Line Foreman
825.381	Electrician Ship & Boat Building
825.281	Ignition Repairman, Automotive
379.368	Dispatcher Radio
822.281	Equipment and Installer Private Bracn Exchange Repairman
637.281	Refrigeration Mechanic
822.381	Lineman
822.381	Transmission Man
829.381	Cable Splicer
829.381	Equipment Installer
952.782	Tranmission and Power Plant Operator

D - OCCUPATIONAL ANALYSIS - SAMPLE

ELECTRICAL OCCUPATION ANALYSIS

SKILLS: A WIRE CONNECTIONS; B READING SCHEMATICS; C BASIC MATH; D USE OF HAND TOOLS; E CIRCUIT TRACING; F BASIC ELECTRICITY; G TEST EQUIPMENT HOOK-UP; H TEST EQUIPMENT READING; I SAFETY PRECAUTIONS; J BASIC AUTO ELECT. SYSTEMS; K ELECTRICAL CODES; L RECORD KEEPING; M LAYOUT TOOLS; N LAYOUT PROCEDURES; O WIRE GAUGING; P INSULATION METHODS; Q SWITCHING METHODS; R UTILITY OPERATIONS; S BASIC MEASUREMENT; T SIMPLE MEASUREMENT; U BASIC ELECTRONICS; V TESTING METHODS; W RADIO OPERATION; X PROBLEM SOLUTION

OCCUPATIONS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
RADIO DISPATCHER			C/3			F/6			F/9			L/12											X/23	X/24
EQUIPMENT INSTALLER	A/1	B/2	C/3	D/4	E/5	F/6	G/7	H/8	F/9	J/11		L/12	M/13	N/14								V/22		
EQUIPMENT REPAIRMAN	A/1	B/2	C/3	D/4	E/5	F/6	G/7	H/8	F/9			L/12	M/13	N/14								V/22		
ELECTRICAL REPAIRMAN	A/1	B/2	C/3	D/4	E/5	F/6	G/7	H/8	I/9			L/12										V/22		
CONSTRUCTION ELECTRICIAN	A/1	B/2	C/3	D/4	E/5	F/6	G/7		I/9	K/11			H/13	N/14		P/16	Q/17							
ELECTRONIC TECHNICIAN	A/1	B/2	C/3	D/4	E/5	F/6	G/7	H/8	I/9			L/12	H/13	N/14		P/16	Q/17		S/19	T/20	U/21	V/22		X/24
ELECTRONICS ASSEMBLER		B/2	C/3	D/4		F/6		H/8	I/9										S/19	T/20				
APPLIANCE REPAIRMAN ELECT.	A/1	B/2	C/3	D/4	E/5	F/6	G/7	H/8	I/9			L/12				P/16						U/22		
TRANSMISSION MAN			C/3			F/6		H/8	I/9			L/12					O/17	R/18						
POWER PLANT OPERATOR			C/3			F/6		H/8	I/9								O/17	R/18						
REFRIGERATION MECHANIC	A/1	B/2		D/4		F/6	G/7	H/8	I/9				H/13	N/14					S/19			U/22		
CABLE SPLICER	A/1	B/2			E/5	F/6			I/9	K/11					O/15	P/16								
ELECTRICIAN SHIP + BOAT		B/2	C/3	D/4		F/6	G/7	H/8	I/9													V/22		
ELECTRICAL FOREMAN		B/2	C/3	D/4		F/6			F/9	K/11	L/12	H/13	N/14						S/19	T/20		V/22		X/24
LINEMAN	A/1	B/2		D/4		F/6	G/7	H/8	F/9							P/16								
AUTOMOTIVE ELECTRICIAN	A/1	B/2	C/3	D/4	E/5	F/6	G/7	H/8	I/9	J/10						P/16								
ELECTRICAL CONTROL ASSEM.		B/2	C/3	D/4		F/6		H/8	I/9										S/19	T/20				

KNOWLEDGE: 1 TYPES & METHODS; 2 SYMBOLS; 3 FRACTIONS & PERCENTS; 4 CARE & METHODS & TYPES; 5 METHODS & MATERIALS; 6 LAWS & THEORY; 7 METHODS & MATERIALS; 8 MEASUREMENT METHODS; 9 SAFETY PRACTICES; 10 THEORY OF OPERATION; 11 TYPES & BASIC FUNC.; 12 METHODS & TYPES; 13 OPERATIONS & TYPES; 14 METHODS & FUNCTIONS; 15 METHODS & PURPOSES; 16 METHODS & FUNCTIONS; 17 THEORY OF OPERATION; 18 TYPES & TYPES; 19 PROCEDURE & KINDS; 20 LAWS & THEORY; 21 PURPOSES & USAGE; 22 THEORY & METHODS; 23 METHODS; 24

T)	PEOPLE (5TH DIGIT)	THINGS (6TH DIGIT)
mining Time & place.	No Relationship	Precision Working - Selection of appropriate tools, objects, materials, etc
& evaluating data	No Relationship	- Adjustment of tools to the task requires considerable judgement
& evaluating data.	No Relationship	
	No Relationship	Precision Working "
hip	No Relationship	"
	Supervising - Assigning specific duties	"
, classifying Information	No SIGNIFICANT RELATIONSHIP	"
" "	"	"
& Evaluating Data	"	"
, classifying Information	SPEAKING - SIGNALING	No SIGNIFICANT relationship
& Evaluating Data.	No Significant relationship	Precision Working
classifying, Information	no Significant relationship	Precision Working
"	" "	" "
hnship	no Significant relationship	" "

WORKER TRAIT GROUPS

OCCUPATION	D.O.T.	DATA - (4 DIGIT)	PEOPLE
ELECTRONIC TECHNICIAN	003.181	Coordinating - Determining Time & place.	No Relation
ELECTRICIAN, CONSTRUCTION	824.281	Analyzing - Examining & evaluating data	No Relation
ELECTRICAL REPAIRMAN	829.281	Analyzing - Examining & evaluating data.	No Relations
ELECTRICAL APPLIANCE REPAIRMAN	829.281	Analyzing -	No Relations
ELECTRONICS ASSEMBLER	726.781	No significant relationship	No Relations
ELECTRICIAN FOREMAN	829.131	Coordinating -	Supervising -
REFRIGERATION MECHANIC	827.381	Compiling - Gathering, classifying Information	No Significa
ELECTRICIAN SHIP & BOAT BLDG.	825.381	Compiling - " " "	"
IGNITION REPAIRMAN AUTOMOTIVE	825.281	Analyzing - Examining & Evaluating Data	"
DISPATCHER RADIO	379.368	Compiling - Gathering, classifying Information	SPEAKING - Sign
EQUIPMENT INSTALLER & REPAIRMAN	822.281	Analyzing - Examining & Evaluating Data.	No Significan
LINEMAN	822.381	Compiling - Gathering, classifying, Information	No Significant
CABLE SPLICER	829.381	Compiling - "	"
TRANSMISSION & POWER PLANT OPERATOR	952.782	No Significant Relationship	No Significan

D - OCCUPATIONAL ANALYSIS - SAMPLE

SCHOOL CITY OF HAMMOND
Hammond, Indiana
HAMMOND TECHNICAL VOCATIONAL HIGH SCHOOL

Electronic Technician

I. DUTIES PERFORMED

A. Works with engineers and scientist
B. Engaged in research and development work
C. Help with design and construction of experimental models
D. Work with inspection, testing, and assembling

II. KNOWLEDGE AND SKILLS

A. Basic electronics theory
B. Mathematics
C. Reading schematic diagrams
D. Understand technical publications
E. Need color vision, manual dexterity, and good hand-eye coordination

III. TEACHABLE ELEMENTS

A. Basic electronic theory
B. Electronics math
C. Test procedures (equipment and procedure)
D. R ading schematics
E. Soldering and electrical connection
F. Use of simple hand tools
G. Nomenclature

E - INSTRUCTIONAL OBJECTIVES - SAMPLE

SCHOOL CITY OF HAMMOND
Hammond, Indiana
HAMMOND TECHNICAL VOCATIONAL HIGH SCHOOL

Electricity and Electronics Cluster

Instructional Objectives

Each student should be able to:

1. Read and interpret elementary schematic diagrams.

2. Recognize and relate, in general terms; the skills, traits, and work habits of the electrical and electronic component occupations.

3. Apply the following electrical concepts and laws:

   a. Kirchoff Laws
   b. Series Circuits
   c. Parallel Circuits
   d. Complex Circuits

4. Manipulate basic test equipment, such as:

   a. Multi-meter
   b. Continuity tester

5. Recognize and apply safe work habits and practices in the use of electricity.

6. Demonstrate satisfactory utilization of basic hand and layout tools of the electricity and electronics cluster.

7. Satisfactorily use basic mathematics in measurement and record keeping as determined by the instructor.

8. Identify, recognize and apply basic tracing methods in problem solving situations as determined by the instructor.

SCHOOL CITY OF HAMMOND
Hammond, Indiana
HAMMOND TECHNICAL VOCATIONAL HIGH SCHOOL

Goals

Objectives applicable to the freshman career development program at Hammond Technical Vocational High School are to help students:

1. Develop an awareness of occupational types of information
2. Recognize that occupational information which is related to his capabilities and interests.
3. Apply, in terms of envolvement, a broad course of action or occupational direction.
4. Analyze skill development as part of information base to determine awareness of skills and attitudes needed for the cluster
5. Recognize the occupational skills that are compatible with his capabilities and interests.
6. Envolve a commitment to the skill levels within the occupation of his choice.

C-S

P - SAMPLE WORK SHEET

I BASIC ELECTRICITY		(CLASS ROOM)
A. NATURE OF MATTER	30	ILLUSTRATION - USE CHALKBOARD
1. DEFINITION		AUDIO-VISUAL - TRANSPARENCY ON ELECTRON MOVEMENT - STATIC & DYNAMIC ELECTRICITY
2. STRUCTURE		
B. ELECTRON THEORY		
1. LAWS OF CHARGES		
2. FLOW OF ELECTRONS		(SHOP) ELECT. CHARGES
C. NATURE OF ELECTRICITY		DEMONSTRATION
1. TYPES	20	- USE BATTERIES OR D.C. SOURCE TO SHOW STATIC & DYNAMIC ELECTRICITY
a. STATIC		
b. DYNAMIC		
2. ELECTRICAL CHARGES		
a. POSITIVE	20	- USE AN OSCILLOSCOPE TO SHOW DIFFERENCE BETWEEN AC & DC
b. NEGATIVE		
3. KINDS OF ELECTRICITY		
a. ALTERNATING		
b. DIRECT	20	- QUIZ ON UNIT

STUDENT ACTIVITY

ASS ROOM)

LLUSTRATION – USE CHALK BOARD

UDIO-VISUAL – TRANSPARENCY ON ELECTRON MOVEMENT – STATIC + DYNAMIC ELECTRICITY ELECT. CHARGES

EMONSTRATION

Use BATTERIES OR D.C. SOURCE TO SHOW STATIC + DYNAMIC ELECTRICITY

Use AN OSCILLOSCOPE TO SHOW DIFFERENCE BETWEEN AC + DC

QUIZ ON UNIT

BEFORE

READS UNITS 6A IN TEXT.
READS HANDOUT OUTLINE

DURING

- TAKES NOTES ON LECTURE AND DEMONSTRATION
- OBSERVE DEMONSTRATION
- ASK QUESTIONS
- POSSIBLE DISCUSSION

AFTER

- TAKES QUIZ

CHALK BOARD

AUDIO VISUAL – TRANSPARENCIES

- ELECTRON MOVEMENT
- STATIC + DYNAMIC ELEC.
- ELECTRIC CHARGES

EQUIPMENT

- OSCILLOSCOPE
- AC + DC SOURCE

MATERIALS

- CAPACITOR
- LIGHT BULB
- WIRE
- DEMONSTRATION BOARD

HANDOUT OUTLINE OF:

- CONTENT TO BE DISCUSSED
- OBJECTIVE OF LECTURE & DE
- QUESTIONS THEY SHOULD BE ABLE TO ANSWER.

TEXT pp 32-34

QUIZ

F

SCHOOL CITY OF HAMMOND
Hammond, Indiana
HAMMOND TECHNICAL VOCATIONAL HIGH SCHOOL

ELECTRICITY-ELECTRONICS

LESSON PLAN-1
Suggested Time-2 Periods

BASIC ELECTRICITY

OBJECTIVES:

The student will, upon completion of this lesson be able to:

1. Describe the elements of basic electricity in a 20 minute quiz, passing with a score of 70 percent.

PREPARATION:

Teacher

Equipment:

Chalkboard, eraser, chalk
Overhead Projector and Screen
Oscilloscope
Capacitor
AC and DC Power Supply

Teaching Aids (in order of introduction in course):

1-1-T	Objectives for lesson
1-2	Outline
1-3-T	Complete Atom
1-4-T	What is electricity
1-5-T	Static and Dynamic electricity
1-6	Post test

References:

Exploring Electronics, Gerrish, Howard H., Goodheart Wilcox, 1971, Chapter 1.

Exploring Electricity and Electronics, Rollain, Phillip J. and Kraus, Thomas E., 1971, Chapter 2.

Basic Electricity and Electronics, Steinberg, William B., and Ford, Walter B., 1962, Unit 6A.

Learner

- Read in text Unit 6A, pages 32-34.
- Ask question, "Now that you are all enrolled in Electricity, who knows what electricity actually is?"

1-1-T - Cite objectives

COURSE OUTLINE
(Lecture - Demonstration)

PRESENTATION:

I. INTRODUCTION - Matter and Electron Theory

A. Explain to the student the importance of what electricity is: (EXAMPLE: As in any form of energy person who works with it can do a better and more economical job if he knows why and how it works.)

(EXAMPLE: automobile mechanic)

B. Acquaint the students with the format to be used in this presentation.

1-2 1. Hand out 1-2

II. BASIC ELECTRICITY

A. Nature of matter

1. Definition - anything that has weight and occupies space
2. Structure - (EXAMPLE: salt)
   a. Compound
   b. Element
   c. Atom

1-3-T

B. Electron Theory

1. Discuss electrical charges
   a. Negative
   b. Positive

1-4-T

2. Identify laws of electrical charges
   a. Refer to handout 1-2
3. Have members of class tell you:
   a. Flow of electrons
   b. Direction of electrons

C. Identify types of electricity

1-5-T

1. Static - Demonstrate with capacitor and paper showing how electricity is stored.
2. Dynamic - Demonstrate showing electricity in motion with light bulb.

D. Explain kinds of electricity

1. Refer to handout 1-2
   a. Alternating
   b. Direct current
2. Demonstrate showing what AC and DC look like on an oscilloscope.
3. Field questions

OBJECTIVES

THE STUDENT WILL, UPON COMPLETION OF THIS LESSON BE ABLE TO:

1. DESCRIBE THE ELEMENTS OF BASIC ELECTRICITY IN A 20 MINUTE QUIZ, PASSING WITH A SCORE OF 70%.

APPLICATION:

I. Organize students into small groups no larger than five (5).

A. Select leader and recorder

II. Give each group a question on which to report collectively.

(EXAMPLES: 1. Does the normal atom have an electrical charge?

2. Explain and give examples of static electricity.

1-2 3. Explain the laws of electric charges and cite examples of these.)

III. Group recorder restates question and then gives their summary. Then teacher clarifies or asks questions to bring out other pertinent information.

IV. Question class on questions at bottom of Hand out 1-2.

EVALUATION:

1-6 I. Assessing outcomes

A. Administer test

B. Collect and critique test having students participate in answering

1-1-T C. Refer to Handout 1-1-T and have student make his own assessment.

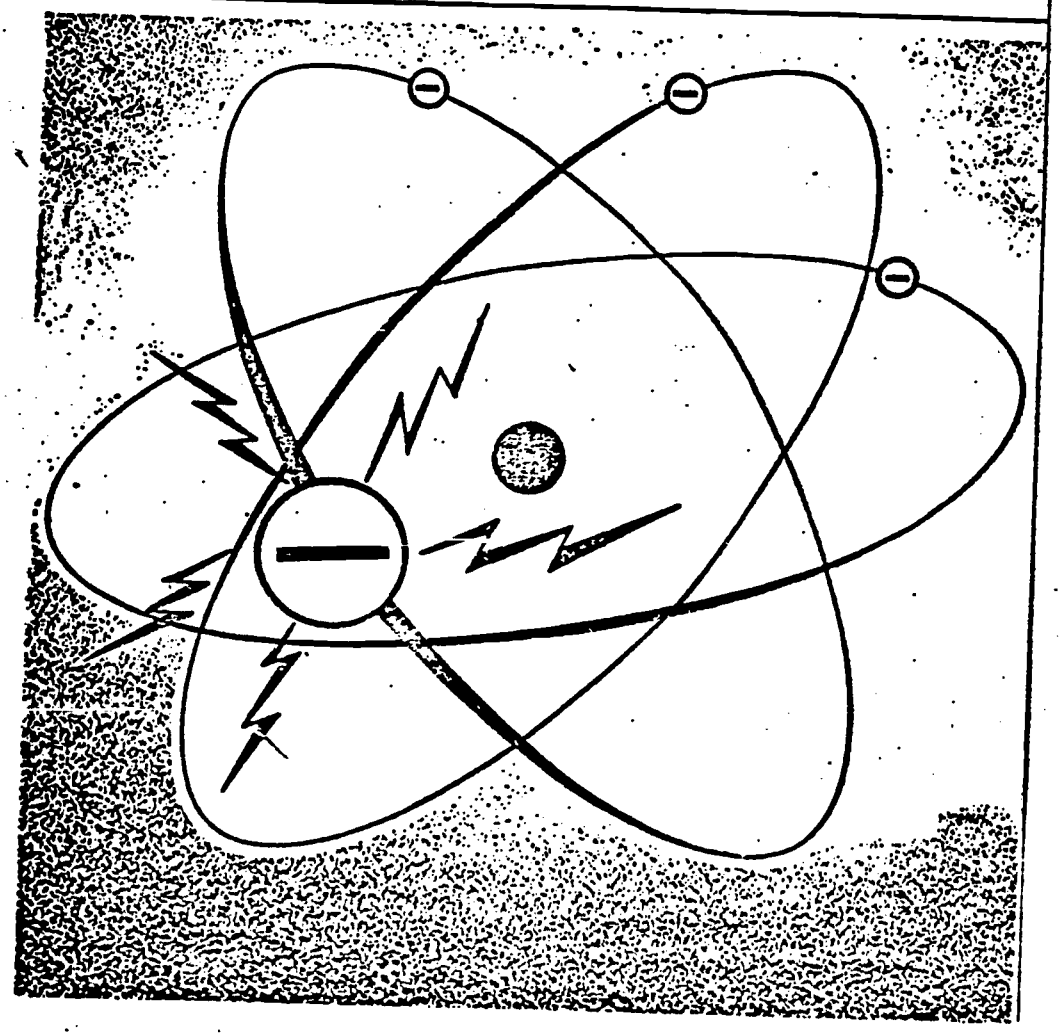
D. Summary

1. Review Handout 1-2

2. Solicit questions from members of class.

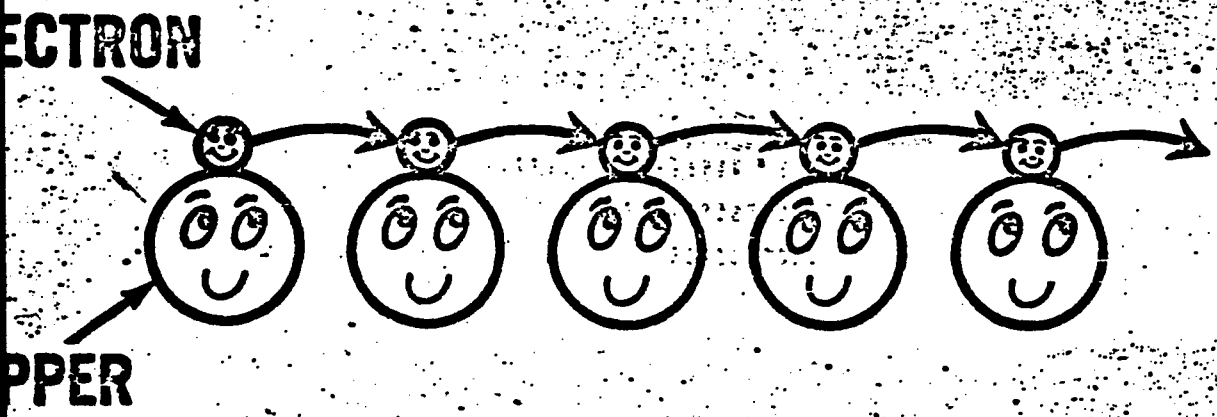
1-3-T

THE ELECTRON IS ELECTRICITY

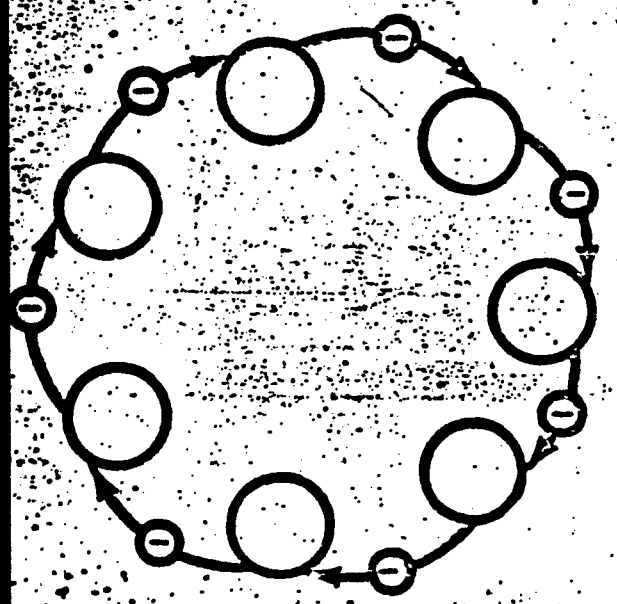


WHAT IS ELECTRICITY?

ELECTRICITY IS THE FLOW OF ELECTRONS!



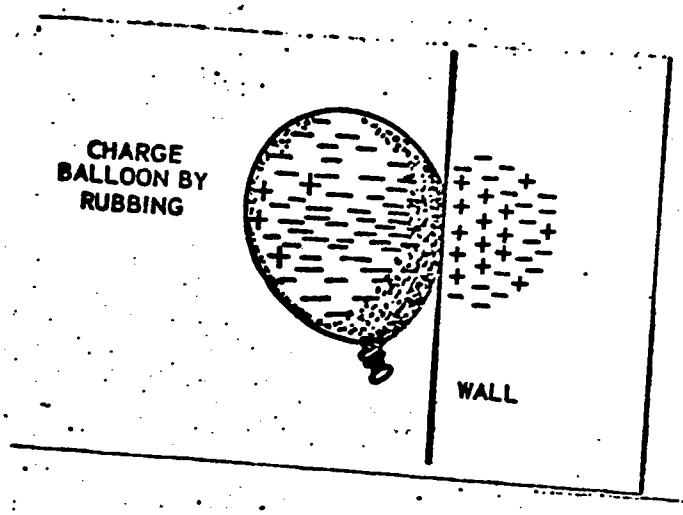
WHAT HAPPENS AT THE END?



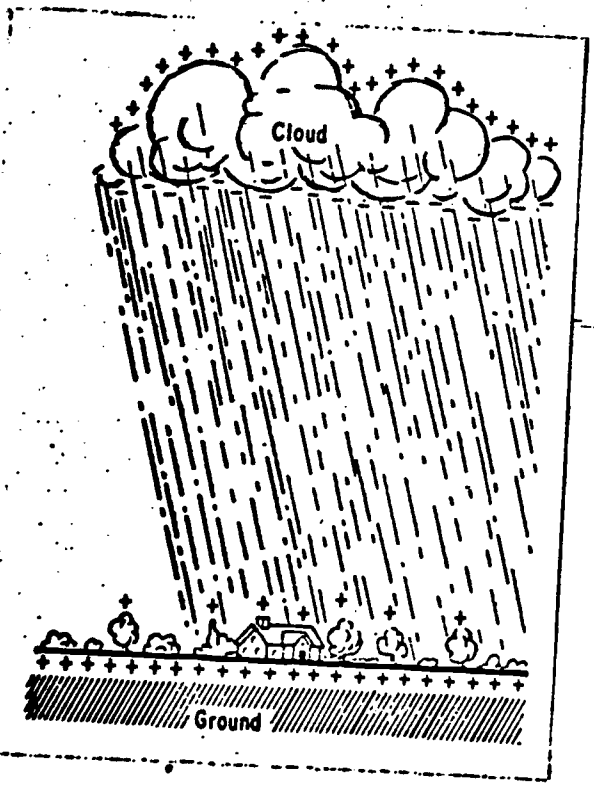
ELECTRICITY ALWAYS*
FLOWS IN A CIRCLE

(*ALMOST ALWAYS)

STATIC AND DYNAMIC ELECTRICITY



A balloon is attracted because unlike charges are produced by the charged balloon.



Distribution of electrical charges on a cloud and on the earth beneath it. Sometimes the charges are reversed so that the underside of the cloud is positive and the ground is negative. Yet the same whether the excess electrons start flowing from the cloud to the ground, or from the ground to the cloud.

SCHOOL CITY OF HAMMOND
Hammond, Indiana
HAMMOND TECHNICAL VOCATIONAL HIGH SCHOOL

Name _____ Date _____ Mark _____

BASIC ELECTRICITY

DIRECTIONS: In the following statements or questions select the correct answer and circle the letter in front of the correct response.
(EXAMPLE: An example of dynamic electricity is:
A. Lightning
(B). A motor operating
C. A dead light bulb
D. An unused battery)

1. An electron has:
   A. a negative charge
   B. no charge
   C. a positive charge
   D. either positive or negative charge
2. Electrons drifting from atom to atom in a material:
   A. are free electrons
   B. are bound electrons
   C. go in opposite directions
   D. have a positive charge
3. Electric current is considered to be the movement of electrons
   A. from a positive point to a negative point
   B. in orbit around a nucleus
   C. from a negative point to a positive point
   D. in a random fashion
4. Direct current flows
   A. in alternate directions
   B. in one direction in a particular circuit
   C. from negative to positive
   D. from positive to negative
5. The following is a compound.
   A. iron
   B. copper
   C. water
   D. oxygen
6. The nucleus of an atom contains
   A. an electron
   B. an electron and proton
   C. a proton and neutron
   D. a proton

7. If a negatively charged material came near a positive material it would

   A. attract it C. have no effect

   B. repell it D. depend on their strength

8. When electrons have motion

   A. they move in a straight line

   B. you call this static electricity

   C. you call this current

   D. they form a compound

9. If you took the compound salt and divided it into its principal parts; you would have

   A. two atoms C. salt

   B. two elements D. a molecule

10. Alternating current differs from direct current because

   A. it changes direction

   B. it flows from negative to positive

   C. half way through it reaches zero

   D. it is not portable

11. Most all atoms in their normal state

   A. have a negative charge C. repell each other

   B. have a positive charge D. are neutral

DIRECTIONS: Answer the following questions with a short statement or word.

12. Of what is all matter made? _____

13. What do we call loosely held electrons? _____

14. How do electrons move through a material? _____

15. What are five (5) examples of matter?

   (a) _____ (b) _____

   (c) _____ (d) _____ (e) _____

16. Explain in your own words what is electricity?

APPENDIX G - LIST OF COMPLETED UNITS

METALS

1 - ORIENTATION TO METALS

2 - WORK DRAWINGS

3 - LAYOUT TOOLS

4 - FILES AND FILING

5 - DRILLS AND DRILLING

6 - HAND HACKSAW

7 - SHEET METALS

8 - ARC AND OXY-ACETYLENE WELDING

9 - FORGING

10 - LATHE WORK

11 - SHAPER

12 - MOLDS AND MOLDING

ELECTRIC

1 - BASIC ELECTRICITY

2 - CONDUCTORS AND INSULATORS

3 - WIRE CONNECTIONS

4 - WIRE CONNECTIONS

5 - SOURCES AND EFFECTS

6 - BASIC MEASURING INSTRUMENTS

7 - KIRCHOFF'S LAWS AND CELL CONNECTIONS

8 - ELECTRICAL RESISTANCE

9 - RESISTANCE MEASUREMENTS

10 - SYMBOLS AND SCHEMATIC DIAGRAMS

GRAPHICS

COMMUNICATIONS

1 - INTRODUCTION TO GRAPHICS

2 - PLANNING, AND ART AND COPY PREPARATION

3 - COMPOSITION

4 - PROOFING - LOCKUP -/IMPOSITION

5 - PLATEN PRESS

OFFSET

1 - OFFSET PRINTING

2 - OFFSET PRINTING INDUSTRY

3 - COLD TYPE COMPOSITION

4 - JOB PLANNING AND LAYOUT

5 - CAMERA COPY

6 - LINE PHOTOGRAPHY

7 - DARK ROOM PROCEDURE

8 - LAYOUT AND STRIPPING THE FLAT

9 - PLATE MAKING

10 - FUNDAMENTALS OF OFFSET PRESS

11 - OPERATION OF OFFSET PRESS

GRAPHICS CONTINUED

DRAFTING

1 - INTRODUCTION TO LETTERING

2 - SCALES AND MEASUREMENTS

3 - INSTRUMENTS

4 - FREEHAND SKETCHING

5 - ORTHOGRAPHIC PROJECTION

6 - SIZE DESCRIPTION

7 - PICTORIAL DRAWINGS

8 - SECTION USE

9 - AUXILIARY VIEWS

CONSTRUCTION

INTRODUCTION

1 - SAFETY AND YOU

2 - MEASURING AND YOU (TERMINOLOGY)

3 - UNDERSTANDING BLUEPRINTS

4 - MEASURING AND YOU (TOOL IDENTIFICATION)

5 - USE OF HAND TOOLS

6 - TOOL CARE AND STORAGE

CONCRETE AND MASONRY

1 - HISTORY - CHARACTERISTICS - MANUFACTURING

2 - MORTAT INGREDIENTS

3 - MATERIALS

4 - TOOLS AND EQUIPMENT

5 - APPLICATION

CARPENTRY

1 - MAKING A MITTER BOX

2 - BUILDING A MODER GARAGE

CONSTRUCTION CONTINUED

PIPEFITTING

1 - CUTTING PIPE

2 - REAMING PIPE

3 - THREADING PIPE

4 - MAKING UP PIPE WORK

HEATING AND VENTILATING

1 - SUBJECT EXPOSURE

2 - INSTALLATION