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ABSTRACT

The major goal of a project was to articulate the progress of Kentucky Industrial Education Continuum level III competency-based curriculum with level II curriculum development. Its first objective was to identify and develop a model to articulate competencies that should be taught at level II with competencies currently being taught at level III. The second project objective was to identify and articulate competencies which should be taught at level II with competencies already identified and taught at level III. Listings of competencies were located, identified, and compiled for all 32 program areas of the eight occupational families identified in the State Continuum. Validation involved all interested level competency-based level II programs to insure continuity between achieved statistically significant validation. The third project objective was to develop an implementation model for competency based level II programs to insure continuity between levels II and III. A needs assessment model was developed which articulated level II programs with level III programs in the same service area and used to conduct a needs assessment of programs in State Vocational Region 9. (Appendixes, amounting to over one-half of the report, include the final competency lists, teacher-added competencies, and non-validated competency lists.) (YLB)

Needs Assessment of CBVE Application and Articulation with Industrial Education Levels II and III

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Morehead State University

Paul J. Courtney
Research Coordinator
Morehead State University

Kentucky Department of Education

FINAL REPORT

PROJECT NUMBER:	J08880013F
TITLE OF REPORT:	Needs Assessment of C.B.V.E. Applications and Articulation with Industrial Education Levels II and III
PROJECT DIRECTOR:	Dr. A.R. Putnam Morehead State University UPO 1206 Morehead, Kentucky 40351 Paul D. Courtney Research Coordinator Morehead State University Morehead, Kentucky 40351
AGENCY OR INSTITUTION:	Morehead State University Morehead, Kentucky 40351
REPORT FOR THE PERIOD OF:	July 1, 1979 to June 30, 1980
DATE SUBMITTED:	July 15, 1980

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A B S T R A C T

Project Title: Needs Assessment of C.B.V.E. Applications and Articulation with Industrial Education Levels II and III.

Principal Investigator: A.R. Putnam, Morehead State University, Morehead, KY

Telephone: 783-3230

OBJECTIVE: 1. Identify and develop a model to articulate competency that should be taught at Level II with competencies currently being taught at Level III, based upon the State's continuum of Industrial Education at the Exploration, Orientation and Preparation levels.

2. Identify and articulate competencies which should be taught at Level II with Level III of the State Industrial Education Continuum.

3. Develop an implementation model for competency based level II program to insure continuity between level II and III of the State Industrial Education Continuum.

PROCEDURE: Develop a needs assessment plan for region 9 to determine curricular needs for Level II programs in the region. Identify and articulate the competencies which should be taught and develop an implementation model. Develop an evaluation model to determine effectiveness of implementation of C.B.V.E. based programs at Level II to articulate with Level III in those areas of Industrial Education now utilizing C.B.V.E. Make recommendations for adoption on a state wide level. Region 9 is unique in that Practical Arts, Levels I, II and III Industrial Education, Post Secondary Vocational, and Graduate Vocational Programs all are available in a close proxemity.

EXPECTED CONTRIBUTION OR POTENTIAL IMPACT ON VOCATIONAL EDUCATION: Following the "Goals, Objectives, Activities, Annual Program Plan 1980 (P.L. 94-482", the above proposal is to conduct Applied and Developmental Research to help meet the "Major Goals for Vocational Education in Kentucky, 1979-80." Level II programs have lagged behind Level III programs and this must be corrected if the state plan is to be fully implemented.

EVALUATION: Evaluation is built into the proposal by objective.

PRODUCT(S) TO BE DELIVERED: 1. A needs assessment plan. 2. Identified competencies for Level II programs. 3. An implementation model and recommendation for implementation.

MAJOR ACTIVITIES, ACCOMPLISHMENTS, AND FINDINGS

Following the "Goals, Objectives, Activities, Annual Program Plan 1980, C.P.L. 94-482" this project seeks to conduct applied and developmental research to help meet the major goals for Vocational Education in Kentucky, 1979-80.

Since the reorganization of Industrial Education into a continuum of four parts in the Commonwealth of Kentucky, program development in level II has lagged far behind program development in level III. One of the major reasons is that little articulation has taken place between the two levels. While the preparation level has steadily progressed with competency based curriculums, the exploratory level has, in many cases, floundered along without adequate direction. Industrial education orientation and exploration programs, by definition in the Federal Regulations (October 3, 1977), serve two objectives; a) to assist individual in making informed and meaningful occupational choices, and, b) to prepare students for entry into advanced trade and industrial or technical education programs. When these programs do not function properly, the students progress into the world of work is impeded. The major goal of this project is to articulate the progress of level III competency based curriculum with level II curriculum development.

OBJECTIVE ONE

Our first objective, in sequential order, was to identify and develop a model to articulate competencies that should be taught at level II with competencies currently being taught at level III of the Kentucky Industrial Education continuum. A model was developed (see Figure 1) to facilitate such articulation.

COMPETENCY ARTICULATION MODEL

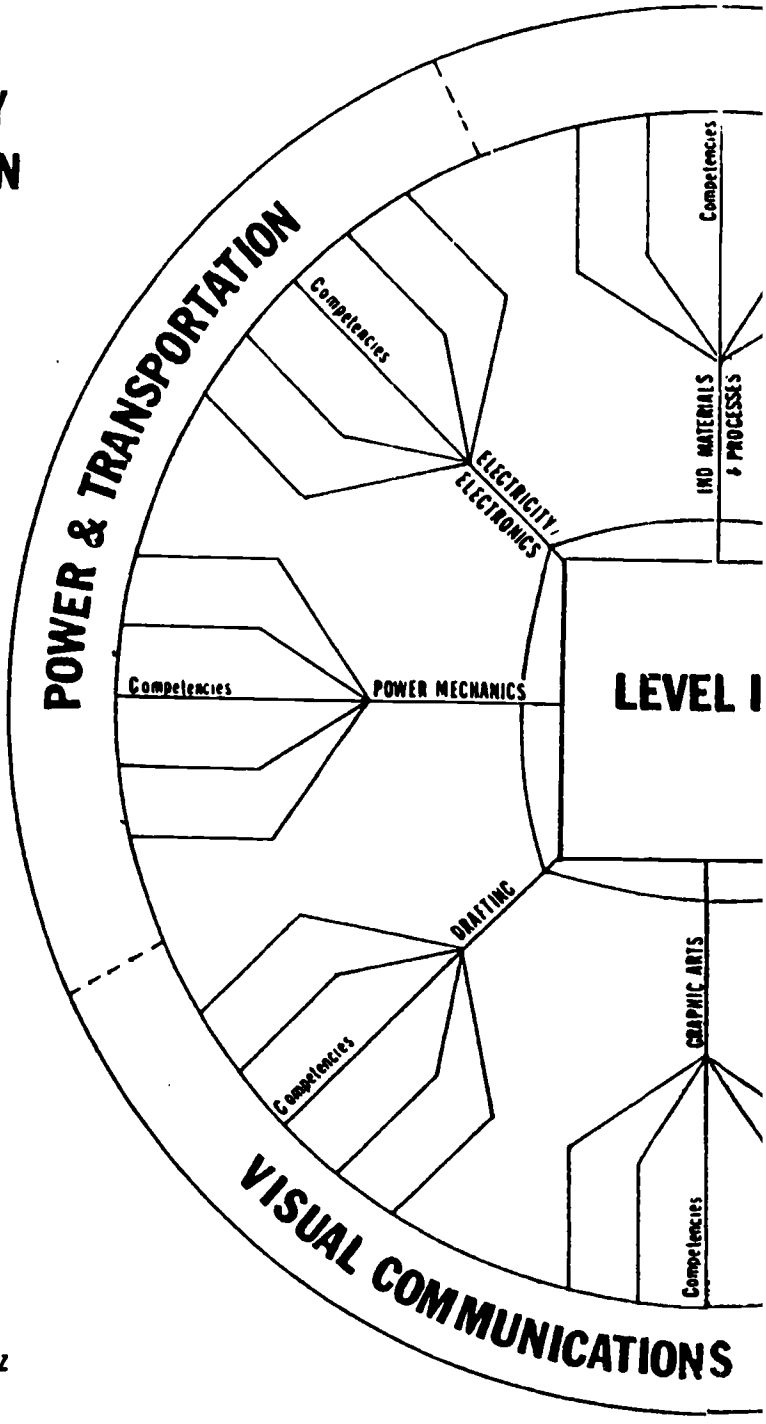


FIG. 1

The four level I industrial clusters, identified by the state continuum as Manufacturing, Construction, Visual Communications, and Power and Transportation, are shown in the outer circle and movement between and among the four is not restricted. Movement into level II programs proceeds through competencies which this study has identified. Unrestricted movement between the eight (8) identified occupational families is allowed. Movement into a level III program can be accomplished through any of the exploratory level programs.

OBJECTIVE TWO

Our second objective was to identify and articulate competencies which should be taught at level II with competencies already identified and taught at level III. Our methodology was to locate, identify, and compile listings of competencies in program areas which make up the occupational families identified in the State Continuum. To accomplish this we conducted searches through ERIC, through the Kentucky State Department of Vocational Education, and through other sources as we identified them. Competencies in all 32 program areas of the eight (8) occupational families were identified and compiled. We did not consider any competencies which had not been previously validated, and level III competencies which were obviously job entry level oriented were not considered for level II listing. We found the eight (8) occupational families to be accurate descriptors, but we definitely feel that the program areas, as identified, should be revised. Problems include redundancy, inadequate descriptors, and descriptors which are specifically preparation oriented. Additional evidence that this is a serious problem area of the continuum is that the entire program areas failed to even approach significance in the validation process. Figure 2 is a listing of the eight (8) State Continuum identified occupational families with identified program areas.

GENERAL WOODS
- Wood Technology
- Cabinetmaking
- Carpentry

GENERAL ELECTRICITY/ELECTRONICS
- Communications Electronics
- Electrical Power
- Industrial and Computer Electronics

GENERAL GRAPHIC ARTS
- Photo-Offset Lithography
- Letterpress Printing
- Screen Process Printing
- Graphic Layout and Design
- Photography

GENERAL POWER MECHANICS
- Auto Mechanics
- Fluid Power
- Transportation
- Power Generation
- Power Transmission

GENERAL DRAFTING
- Technical Illustration
- Architectural Drawing
- Machine Drawing

GENERAL METALS
- Sheetmetal
- Foundry
- Welding
- Machine Shop

GENERAL CRAFTS
- Leathercraft
- Jewelry and Lapidary
- Textiles
- Woodcrafts
- Artmetal
- Ceramics

INDUSTRIAL MATERIALS AND PROCESSES
- Plastics
- Masonry
- Structural Ceramics

FIGURE 2

DATA COLLECTION

After all proposed competency lists had been compiled, it was determined that all interested level II industrial educators in the State of Kentucky should be involved in the validation process.

An instrument of collect data for the validation process was developed and field tested. Field testing was accomplished by submitting the instrument to several teacher educators in Region 9 with experience in teaching industrial education at both levels II and III and experience in research. The instrument was also submitted to several supervisory personnel at the B.V.E. for evaluation. Minor changes were made as a result of input, and the instrument was determined to be both reliable and valid. A copy of the instrument can be found in Figure 3.

COMPETENCY
TASK LIST FOR: _____

Is this an appropriate Level II subject? ☐ Yes ☐ No

Industrial Education
Level II-CBVE
Articulation

Morehead State University
UPO Box 774
Morehead, KY 40351

DIRECTIONS:

1. Check competencies you are presently teaching.
2. In the Assessment Column, circle the number beside each competency that represents your evaluation of that competency.
   5-Essential--Very important component of Level II.
   4-Adequate--Appropriate but not essential.
   3-Modify--Appropriate but needs modification.
   2-No opinion.
   1-Inappropriate--Material not suited for Level II.
3. Add any competencies you teach, but are not listed.

	Check If Taught	Assessment Column					
		Essential	Adequate	Modify	No Opinion	Inappropriate	Office Use

Figure 3

Page ___ of ____ Pages

COMPETENCY TASK LIST FOR: _____	Check If Taught	Assessment Column					
		Essential	Adequate	Modify	No Opinion	Inappropriate	Office Use
Industrial Education Level II-CBVE Articulation Morehead State University UPO Box 774 Morehead, KY 40351							

A letter of inquire (Figure 4) soliciting cooperation with the project was sent to all teachers of level II programs in the State of Kentucky as reported by the B.V.E. One hundred sixty-six letters were mailed on January 30 1980, and 71 responses were received by February 19. A follow up letter (Figure 5) was mailed on February 20. Ninety-seven letters were sent in the second mailing.

A total of 121 responses were received for a response rate of 73% of all teachers of level II programs in the state as identified by the B.V.E. One hundred and three of the responding teachers, representing 63% of all level II teachers in the state, wished to participate in the project. Figure 6 is complete reporting of all level II teachers and programs who wished to be involved in the validation process.

Stratification was determined by program areas currently taught by the respondants. Each level II educator who wished to participate was sent a competency list for one or two occupational families which they were presently teaching. Every effort was made to generate as much data as possible for each program area, while avoiding duplication or overloading of an individual teacher. A complete list of competencies for all program areas was also submitted to two teacher educators representing level II and IV at each regional state university in Kentucky and Berea College and to two local school system Industrial Arts Supervisors.

On April 1, 1980, 180 competency lists were mailed to level II educators. On April 14, 1980, a follow up letter was sent to all nonrespondants. A total of 138 or 76% of all level II teachers who had been sent lists of competencies returned their completed questionnaire booklets. It is significant to note that of the 6 colleges and universities originally included in the study, only Morehead State University, Northern Kentucky University, and Berea College

MOREHEAD STATE UNIVERSITY

MOREHEAD, KENTUCKY 40351

Dear Educator:

We are conducting a study in conjunction with the Bureau of Vocational Education which we believe you will find interesting. We are trying to compile a complete list of competencies that should be taught in Industrial Arts classes. This information will be used to improve and update the quality of education a student receives in Industrial Arts.

We are asking you to help us determine if the competency lists are complete and accurate. If you wish to participate in this study please fill out the enclosed preliminary questionnaire in order that we may forward you the correct lists for the areas you are now teaching. For your convenience a self-addressed, stamped envelope is enclosed.

Your experience and knowledge are very important to this effort, and we are counting on your help. Thank you very much for your time and effort.

If you need additional information, feel free to contact me at 606/783-4651.

Sincerely,

Dr. A.R. Putnam, Ed.D.
Project Director

Paul D. Courtney
Research Coordinator

Enclosures

PDC:kcf

chose to have input into the validation process. Figure 7 reports the results of our data collection efforts for the competency validation process.

Figure 4

BACKGROUND INFORMATION

Name _____

School _____

Address _____

City _____ Zip Code _____

Please indicate your choice.

/__/ Yes, I do wish to participate.

/__/ No, I do not wish to participate.

Classes presently being taught in Industrial Arts:

_____

_____

_____

Years of Teaching Experience _____

Highest Degree Attained _____

Institution Granting Degree _____

Figure 5

MOREHEAD STATE UNIVERSITY

MOREHEAD, KENTUCKY 40351

School of Applied Sciences and Technology

Dear Educator:

Approximately three weeks ago we sent you a letter and a questionnaire requesting background information and soliciting your cooperation to parpticipate in our study. To this time, we have received no reply from you. It would be greatly appreciated if you could respond to this questionnaire and return it to us.

Our project deals with identifying competencies that should be taught in Industrial Education Level II programs. We need your experience and expertise in order to determine if these competencies are valid.

Please fill out the enclosed questionnaire so that we may be able to furnish you with the list of competencies for the subjects you are now teaching.

In the event you did not receive the first questionnaire, or that you misplaced it, we are enclosing a duplicate set of materials originally sent to you.

Again, we thank you very much for your help and cooperation.

Sincerely,

A. R. Putnam, Ed. D.
Project Director

Paul D. Courtney
Research Coordinator

Figure 6

LEVEL II SAMPLING AREAS

Level II

Programs & Schools

Types	Number Available
One Teacher Programs	36
Two Teacher Programs	23
Three Teacher Programs	11
Four Teacher Programs	8
Five Teacher Programs	1
Junior High Schools	3
Senior High Schools	78
Urban Schools	37
Rural Schools	42

Level II

Subjects

Subjects	Number Available
General Drafting	52
Gen. Graphic Arts	16
Gen. Power Mechanics	9
General Woods	55
General Crafts	27
Gen. Electricity/Electronics	22
General Metals	29
Ind. Materials & Processes	5

1st Mailing	January 30 February 20	166 letters 71 responses @58%
2nd Mailing	February 20 March 15	97 letters *121 responses 73%

*121 teachers responded to the survey, 18 teachers who responded did not wish to participate in the survey. This resulted in a total of 103 participating teachers for 63% of the sampling population.

FIGURE 7

SUBJECTS	NOS MAILED		NOS RETURNED		PERCENTAGES %	
	High School	Colleges* Universities	High School	Colleges* Universities	High School	Colleges* Universitie
General Crafts	27	16	23	5	85	31
General Electricity/Electronics	22	16	16	5	73	31
General Drafting	36	16	31	5	86	31
General Graphic Arts	16	16	13	5	81	31
General Metals	23	16	16	5	70	31
General Power Mechanics	11	16	9	5	82	31
General Woods	35	16	28	5	80	31
Industrial Materials & Processes	10	16	3	5	30	31

*Number includes two (2) county Industrial Arts Supervisors

DATA ANALYSIS

After collection of the data it was necessary to determine when the responses to any given item occured more frequently than could be expected due to chance alone. We shall refer to this as statistical significance.

The first data to be treated dealt with our respondants opinion as to whether the occupational families and program areas were appropriate descriptors for level II programs (see Figure 3).

To determine if one of the two possible responses occured more frequently than we should expect due to chance alone, we chose the Binomial Test. Mathmatically it is stated:

$$P(x) = \binom{n}{x} P_x Q^{n-x}$$

where: P = proportion of cases expected in one of the categories

Q = 1 - P = proportion of cases expected in the other category.

Basically, it tells us what the probabilities are of obtaining a given frequency of response to our item. If an item is statistically significant, using this test, we have received more responses in a given category (i.e., either yes or no) than we should expect due to chance. For a detailed discussion of the Binomial Test, see Nonparametric Statistics For the Behavioral Sciences (1956) by Siegel. Using a programmed calculator, we ran a Binomial Test for subject appropriateness on each occupations family and program area. The results are reported in Figure 8. We also ran a Binomial Test on each competency to determine if there was a significance of the frequency with which the respondants reported teaching the individual competencies. The results are reported in Appendix A.

The statistic which we determined most appropriate for the competency validation process was the Chi Square Test for one sample case. Mathmatically it is stated:

$$x^2 = E \frac{(F^o - F^e)^2}{FE}$$

where: F^o = observed frequencies, F^e = expected frequencies.

Basically, this statistic tells us if the frequency of one particular response on an item is greater than could be expected due to chance alone. We selected an alpha level of .05 which means that there are 5 chances in 100 that an observed significance is due to chance.

A Chi Square test was run on each proposed competency, and any competency which did not achieve statistical signigicance was purged from the list. Complete results are reported in Appendix A.

RESULTS

In all occupational families identified in the continuum of Industrial Education for Kentucky, except Industrial Materials and Processes, we were able to identify certain competencies which appeared generic in nature, and, we suspect, may connect levels I and III. We listed these competencies separately from the other program areas, and in most cases, they acheived statistical significance.

Four of the eight occupational families of the continuum achieved statistically significant validation for most of the proposed competencies in all program areas. The other four, General Crafts, General Power Mechanics, General Electricity/Electronics, and Industrial Materials and Processes, had significance problems in certain program areas. General Crafts competencies in the program areas of Auto Mechanics and Power Generation. General Electricity/Electronics faired well only in the generic competencies area, and most competencies in Industrial Materials and Processes failed statistical significance altogether.

It is significant that few competencies in the entire validation process

were border line cases. Most of the competencies that failed to achieve statistical significance did not even approach a reasonable alpha level. A review of the entire validation process suggests that respondants rejected program areas rather than individual competencies. It would appear that our suspision that some program areas are badly in need of review is well founded.

In each program area, respondants were encouraged to add competencies which they thought should be taught at level II (see Figure 3), and comments. These additional data may be found in Appendix B. While analysis of these data is beyond the scope of this project, it is recommended that they be treated in further research efforts in this area.

OBJECTIVE THREE

Our third objective was to develop an implementation model for competency based level II programs. To accomplish this, we first developed a needs assessment model which articulates level II programs with level III programs in the same service area. Using the model, we then did a needs assessment of programs in State Vocational Region 9. Region 9 was selected as a pilot because it is unique in that level I, II, III, and IV programs are all available in close proximity. The Needs Assessment data can be found in Figure 10.

Figure 8

SUBJECT APPROPRIATENESS

* Statistical Significance

	Yes	No
GENERAL CRAFTS	27*	1
Leather	25*	3
Textiles	11	15*
Wood Crafts	26*	1
Art Metal	26*	3
Ceramics	15*	8
Jewelry and Lapidary	9	7
GENERAL ELECTRICITY/ELECTRONICS	20*	0
Communicationa Electronics	17*	3
Electrical Power	13*	2
Computer Electronics	7	8
GENERAL DRAFTING	36*	0
Technical Illustration	34*	0
Architecture	31*	2
Machine Drawing	33*	0
GENERAL GRAPHIC ARTS	16*	1
Letterpress Printing	14*	3
Graphic Layout and Design	17*	0
Screen Process Printing	15*	1
Photo-Offset Lithography	14*	0
Photography	13*	1
GENERAL METALS	19*	1
Sheet Metal	19*	1
Foundry	19*	1
Welding	18*	1
Machine Shop	18*	1
GENERAL POWER MECHANICS	13*	1
Auto Mechanics	8*	4
Fluid Power	8*	5
Power Generation	11*	1
Transportation	10*	1
GENERAL WOODS	29*	1
Cabinetmaking	2*	3
Carpentry	19*	9
INDUSTRIAL MATERIALS AND PROCESSES	8*	0
Plastics	6*	2
Structural Ceramics	5	2
Masonry	5	2

CONCLUSIONS AND RECOMMENDATIONS

In all occupational families as listed in the continuum of Industrial Education for Kentucky, except Industrial Materials and Processes, we were able to identify competencies which appeared generic. In the validation process we listed these competencies separately and in most cases they acheived statistical significance. We suspect that these competencies may connect the various levels of the continuum together. It is possible that level one should be made up of such generic competencies. We recommend that investigations be made into this possibility.

Our work with the continuum leads us to believe that some program areas listed under the various occupational families are poor descriptors. The competency validation process added further evidence of this. We recommend that a thorough review of program area titles in all occupational families be concluded, particularly in Industrial Materials and Processes.

SUMMARY

In summary, our first objective, articulation between the first areas of the continuum was achieved by the development of the articulation model found in Figure 1.

We accomplished out second objective, identification of competencies which should be taught at level II by developing and validating competency lists in all program areas identified in level II of the continuum of Industrial Education in Kentucky. The validated competency lists may be found in Appendix A.

Development of an implementation model, objective three, was accomplished and applied to region 9 as a pilot region. Region 9 was selected because of its uniqueness of having level I, II, III, and IV programs areas in close proximity.

Figure 9

COMPARISON OF NUMBER OF COMPETENCIES

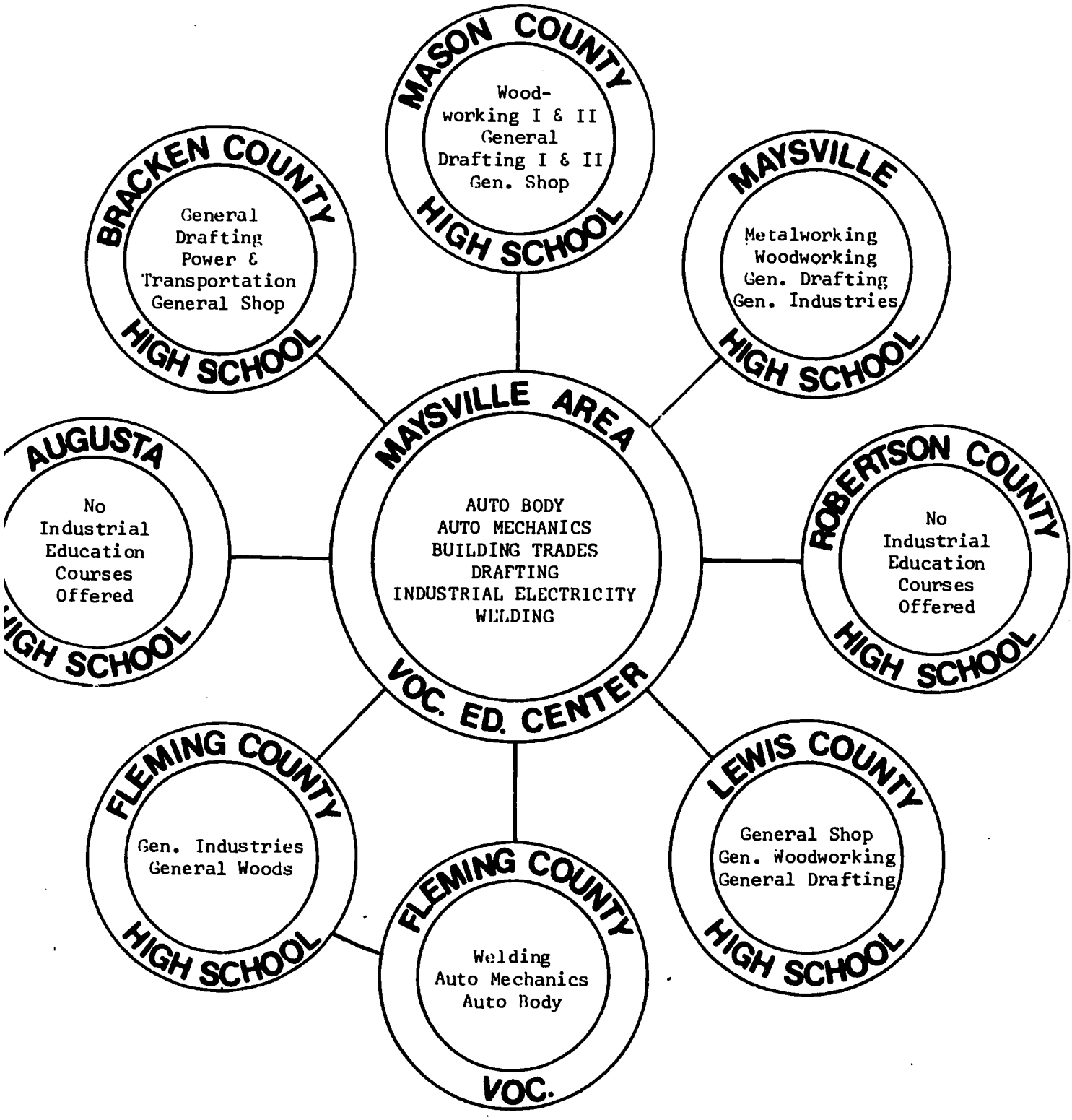
PROPOSED TO THE NUMBER OF COMPETENCIES VALIDATED

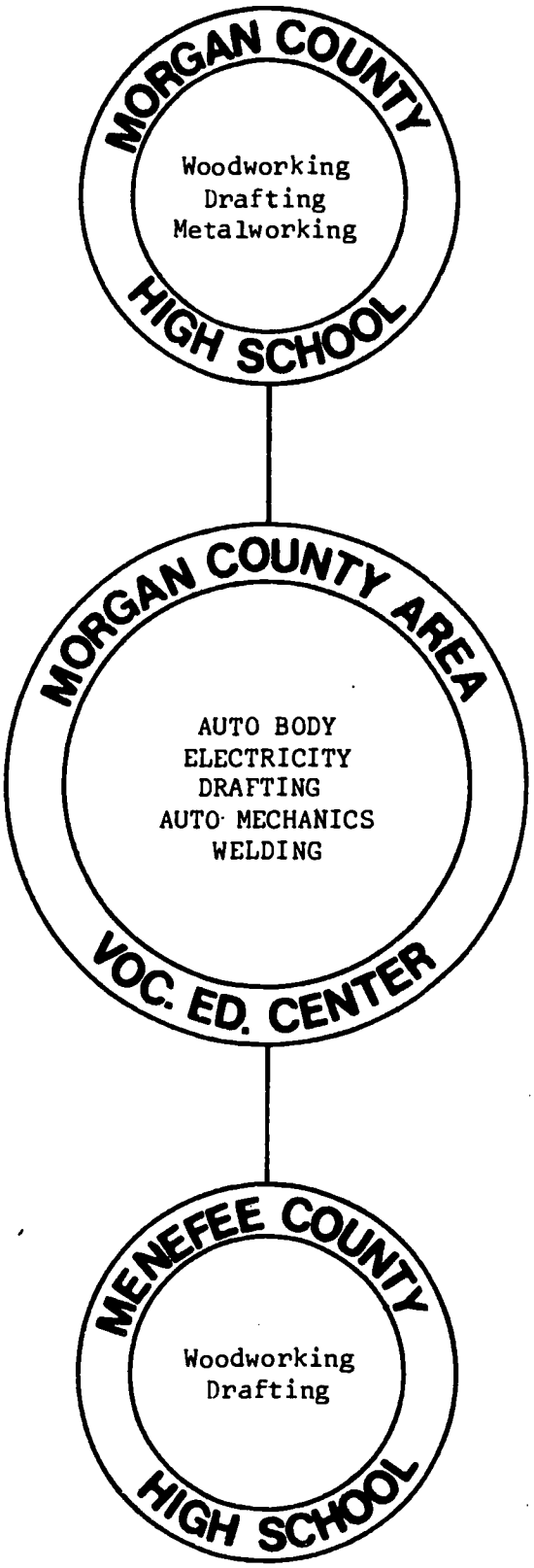
Subject	Number Proposed	Number Validated
GENERAL CRAFTS		
Generic Competencies	7	7
Leather	6	6
Textiles	4	0
Wood Crafts	6	4
Art Metal	16	13
Ceramics	5	2
Jewelry and Lapidary	18	1
GENERAL ELECTRICITY/ELECTRONICS		
Generic Competencies	39	37
Communication Electronics	49	14
Electrical Power	29	4
Industrial and Computer Electronics	29	2
GENERAL DRAFTING		
Generic Competencies	14	13
Technical Illustration	8	7
Architecture	12	11
Machine Drawing	16	15
GENERAL GRAPHIC ARTS		
Generic Competencies	21	15
Letterpress Printing	7	6
Graphic Layout and Design	6	5
Screen Process Printing	9	8
Photo Offset Lithography	14	11
Photography	32	24
GENERAL METALS		
Generic Competencies	24	20
Sheet Metal	32	23
Foundry	7	7
Welding	20	16
Machine Shop	23	17
GENERAL POWER MECHANICS		
Generic Competencies	16	12
Auto Mechanics	30	1
Fluid Power	31	0
Power Generation	41	10

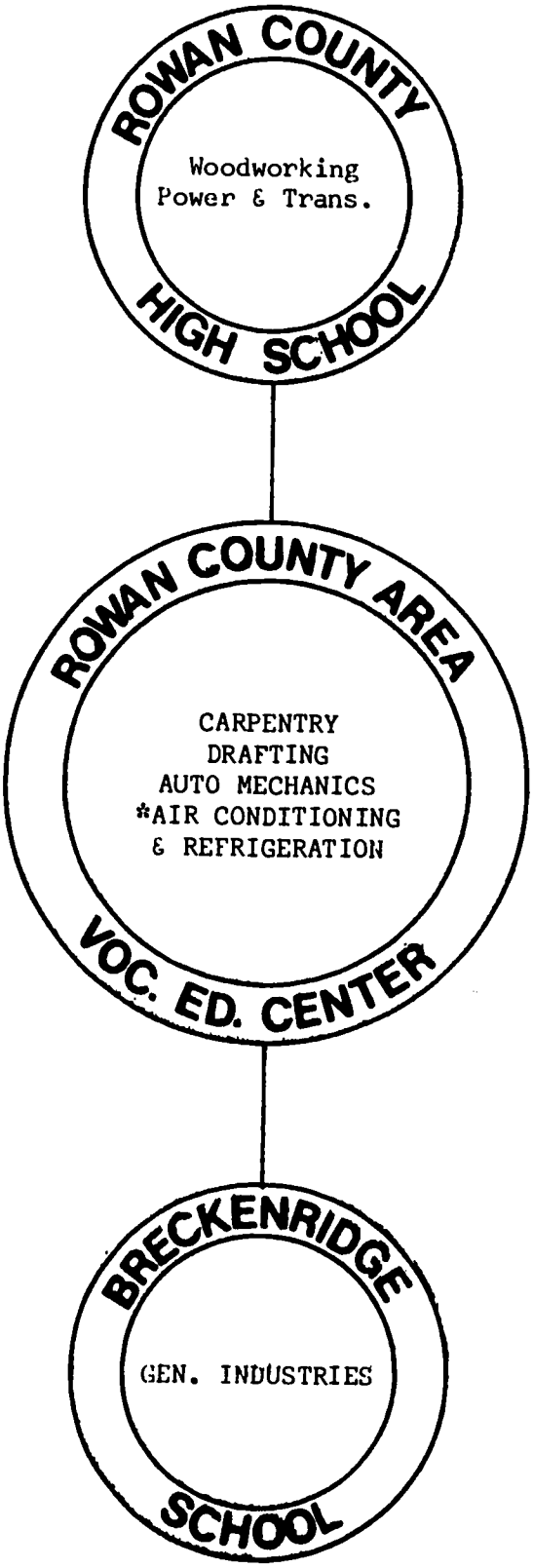
Subject	Number Proposed	Number Validated
GENERAL WOODS		
Generic Competencies/ Wood Technology	35	33
Cabinetmaking	67	52
Carpentry	18	6
INDUSTRIAL MATERIALS AND PROCESSES		
Plastics	12	3
Masonry	20	0
Structural Ceramics	10	0

Figure 10

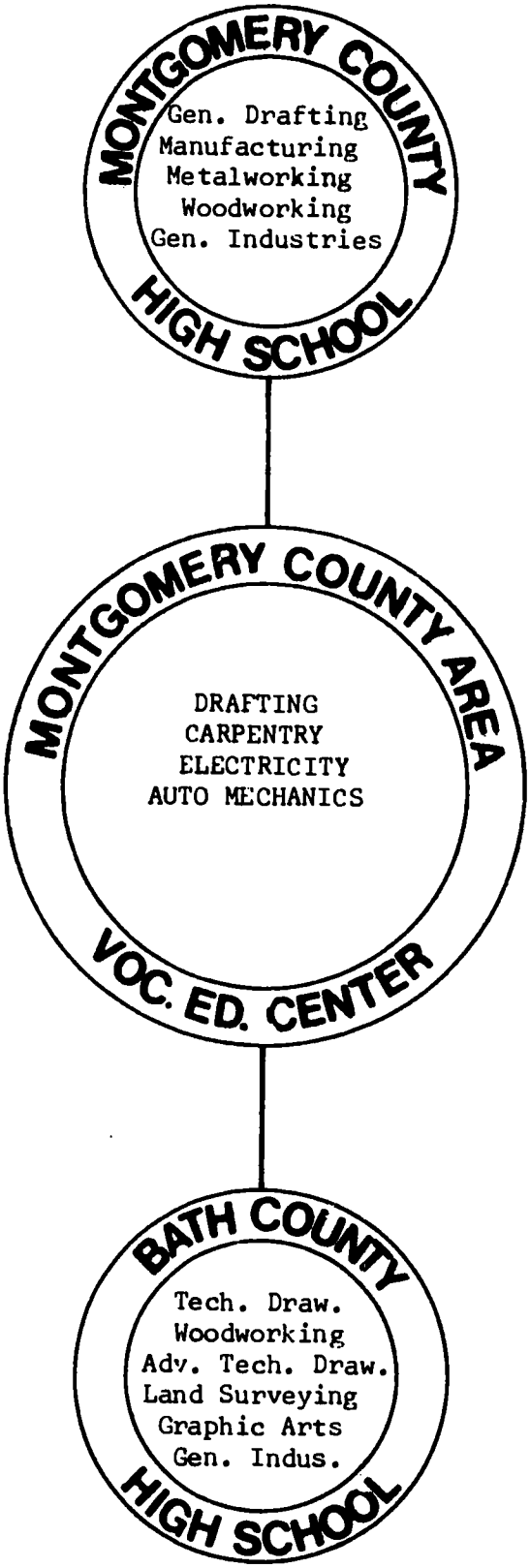
NEEDS ASSESSMENT MODELS


MASON COUNTY
Wood-
working I & II
General
Drafting I & II
Gen. Shop
HIGH SCHOOL
BRACKEN COUNTY
General
Drafting
Power &
Transportation
General Shop
HIGH SCHOOL
MAYSVILLE
Metalworking
Woodworking
Gen. Drafting
Gen. Industries
HIGH SCHOOL
AUGUSTA
No
Industrial
Education
Courses
Offered
IGH SCHOOL
MAYSVILLE AREA
AUTO BODY
AUTO MECHANICS
BUILDING TRADES
DRAFTING
INDUSTRIAL ELECTRICITY
WELDING
VOC. ED. CENTER
ROBERTSON COUNTY
No
Industrial
Education
Courses
Offered
HIGH SCHOOL
FLEMING COUNTY
Gen. Industries
General Woods
HIGH SCHOOL
FLEMING COUNTY
Welding
Auto Mechanics
Auto Body
VOC.
LEWIS COUNTY
General Shop
Gen. Woodworking
General Drafting
HIGH SCHOOL


MORGAN COUNTY
Woodworking
Drafting
Metalworking
HIGH SCHOOL
MORGAN COUNTY AREA
AUTO BODY
ELECTRICITY
DRAFTING
AUTO MECHANICS
WELDING
VOC. ED. CENTER
MENEFEE COUNTY
Woodworking
Drafting
HIGH SCHOOL


ROWAN COUNTY
Woodworking
Power & Trans.
HIGH SCHOOL
ROWAN COUNTY AREA
CARPENTRY
DRAFTING
AUTO MECHANICS
*AIR CONDITIONING
& REFRIGERATION
VOC. ED. CENTER
BRECKENRIDGE
GEN. INDUSTRIES
SCHOOL

ROPOSED


MONTGOMERY COUNTY
Gen. Drafting
Manufacturing
Metalworking
Woodworking
Gen. Industries
HIGH SCHOOL
MONTGOMERY COUNTY AREA
DRAFTING
CARPENTRY
ELECTRICITY
AUTO MECHANICS
VOC. ED. CENTER
BATH COUNTY
Tech. Draw.
Woodworking
Adv. Tech. Draw.
Land Surveying
Graphic Arts
Gen. Indus.
HIGH SCHOOL

MAYSVILLE AREA VOCATIONAL EDUCATION CENTER

Maysville Area Vocational Education Center offers the following programs:

Auto Body
Auto Mechanics
Building Trades
Drafting
Industrial Electricity

Maysville Area Vocational Education Center serves the following counties and high schools:

BRACKEN COUNTY HIGH SCHOOL

Bracken County High School offers the following classes in Industrial Arts:

General Drafting
Power and Transportation
General Shop (includes metalworking, woodworking, and plastics)

AUGUSTA INDEPENDENT SCHOOLS (Bracken County)

No Industrial Arts or Industrial Education courses are taught at the high school. All students who take vocational classes are transported to the Maysville Area Vocational Education Center.

FLEMING COUNTY HIGH SCHOOL

Fleming County High School offers the following classes in Industrial Arts:

Industrial Arts
General Industries
General Woods

Vocational Programs offered at Fleming County High School are:

Welding
Auto Body
Auto Mechanics

LEWIS COUNTY HIGH SCHOOL

Lewis County High School offers the following classes in Industrial Arts:

General Shop
General Woodworking
General Drafting

TOLLESBORO HIGH SCHOOL

No Industrial Arts or Industrial Education courses are taught at the high school. All students who take vocational classes are transported to the Maysville Area Vocational Education Center.

MASON COUNTY HIGH SCHOOL

Mason County High School offers the following Industrial Arts classes:

Woodworking I & II
Drafting I & II
General Shop (includes woodworking, drafting, crafts, electricity/electronics, power mechanics, and metals).

MAYSVILLE INDEPENDENT SCHOOLS: MAYSVILLE HIGH SCHOOL

Maysville High School offers the following Industrial Arts classes:

Metalworking
Woodworking
General Drafting
General Industries (includes metalworking, woodworking, and drafting)

ROBERTSON COUNTY HIGH SCHOOL

No Industrial Arts or Industrial Education courses are taught at the high school. All students who take vocational classes are transported to the Maysville Area Vocational Education Center.

ROWAN COUNTY AREA VOCATIONAL EDUCATION CENTER

Rowan County Area Vocational Education Center offers the following programs:

Carpentry
Drafting
Auto Mechanics
Air Conditioning and Refrigeration (proposed)

Rowan County Area Vocational Education Center serves the following counties and high schools:

BRECKINRIDGE UNIVERSITY

Breckinridge University offers the following classes in Industrial Arts:

General Industries

ROWAN COUNTY HIGH SCHOOL

Rowan County High School offers the following Industrial Arts classes:

Woodworking
Power and Transportation

MONTGOMERY COUNTY AREA VOCATIONAL EDUCATION CENTER

Montgomery County Area Vocational Education Center offers the following programs:

- Auto Mechanics
- Carpentry
- Drafting
- Electricity

Montgomery County Area Vocational Education Center serves the following counties and high schools:

BATH COUNTY HIGH SCHOOL

Bath County High School offers Industrial Arts classes in:

- Technical Drawing
- Advanced Technical Drawing
- Woodworking
- Graphic Arts
- Land Surveying
- General Industries (includes woodworking, metalworking, drafting and plastics)

MONTGOMERY COUNTY HIGH SCHOOL

Montgomery County High School offers the following Industrial Arts classes:

- General Drafting
- Manufacturing
- Metalworking
- Woodworking
- General Industries

MORGAN COUNTY AREA VOCATIONAL EDUCATION CENTER

Morgan County Area Vocational Education Center Schools offer programs in the following areas:

Auto Body
Electricity
Drafting
Auto Mechanics
Welding

Morgan County Area Vocational Education Center serves the following counties and high schools:

MORGAN COUNTY HIGH SCHOOL

Morgan County High School offers the following Industrial Arts classes:

Woodworking
Metalworking
Drafting

APPENDIX A

Final Competency Lists

Industrial Education Level II

Competency Task List for: GENERAL CRAFTS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Generic Competencies						
Develop knowledge of design types.	69*	69	29	0	3	0
Develop knowledge of the basic principles of design.	65*	72	25	0	7	0
Develop skill in sketching.	72*	75	19	3	0	0
Develop skill in reducing or enlarging a drawing.	57*	54	29	3	7	0
Develop skill in measuring.	69*	82	7	0	0	0
Develop skill in pattern transfer.	69*	50	36	0	3	0
Develop safety attitudes and skills in working with individual crafts.	69*	89	7	0	0	0
Competencies in Leather						
Develop knowledge in the types of leather-craft products.	72*	68	25	0	0	3
Develop knowledge of the characteristics of leather.	72*	79	14	0	0	3
Develop skills in the use of leather-craft tools.	72*	79	7	0	0	7
Develop skills in installing fasteners.	72*	64	25	0	0	7
Develop skills in carving leather.	68*	68	18	0	3	3
Develop skills in finishing leather.	68*	79	11	0	3	3
Competencies in Wood Crafts						
Develop knowledge of common types of woods.	75*	82	14	0	0	0
Develop skills in cutting wood.	71*	82	14	0	0	0
Develop skills in laminating woods.	46	43	25	3	18	3
Develop skills in wood finishing.	71*	75	14	3	0	0
Competencies in Art Metal						
Develop skills in working with metal foil.	39	43	21	3	11	3
Develop skills in enameling.	25	32	32	0	19	3
Develop skills in making designs by shaping.	36	46	25	0	11	0
Develop skills in making designs by cutting metal.	46	61	14	3	3	0
Develop knowledge of terms used in metal crafts.	54*	71	11	3	3	0
Develop skills in the use of common metal craft tools.	50	57	18	3	3	0
Transfer a design to metal in preparation for cutting operation.	39	57	14	0	3	7
Select and use the proper file for a given piece of work.	54*	57	19	3	3	3
Select and use appropriate abrasive cloths and papers to obtain a smooth finish.	54*	61	11	3	7	0
Join two metals by the use of a third metal (soft or hard solder)	57*	46	19	3	7	3
Clean metal surfaces through the use of pickling solutions.	25	36	25	3	0	0
Soften metal by heating it.	29	39	19	3	11	0
Perform buffing and polishing operations.	43	46	19	7	3	0
Textiles	No Other Competencies Validated					

Industrial Education Level II

Competency Task List for: GENERAL CRAFTS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies in Ceramics						
Develop skills in mixing and wedging of clay.	7	36	14	0	7	19
Develop skills in finishing ceramic pieces.	7	43	7	3	7	14
Competencies in Jewelry and Lapidary						
Transfer a design to metal in preparation for cutting operation	7	36	7	0	14	18
Select appropriate blades for the jeweler's saw and cut metal to within acceptable dimensions.	7	36	7	0	14	18
Select and use the proper file for a given piece of work.	7	36	7	0	14	18
Select and use appropriate abrasive cloths and papers to obtain a smooth finish.	7	36	11	7	14	14

Industrial Education Level II

Competency Task List for: GENERAL ELECTRICITY/ELECTRONICS

Note: All numbers expressed as percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Generic Competencies in General Electricity/Electronics						
Identify the law of charges.	75*	85	10	0	0	0
Explain the direction of current flow.	75*	80	15	0	0	0
Explain the difference between conductor and insulator.	75*	85	10	0	0	0
Identify different sources of electricity.	75*	85	10	0	0	0
List the different types of primary cells and their application.	65*	55	30	5	5	0
Differentiate between a battery and a cell.	70*	50	35	0	5	5
List the component parts of a simple circuit.	75*	85	15	0	0	5
Develop skills in measuring wire size using the American Wire Guage.	60*	30	45	10	5	5
List the factors that determine the resistance of wire.	80*	80	15	5	0	0
Describe the different types of resistors and their functions.	70*	55	30	10	0	0
Develop skills in reading color-coded resistors.	60*	65	20	10	0	0
Develop skills in solving circuit problems in Ohm's Law.	65*	65	25	0	0	0
Develop skills in measuring resistance of resistors.	65*	60	35	0	0	0
Define electrical power.	65*	75	15	0	0	0
Develop skills in measuring D.C. voltage, current, and resistance in electronic circuits.	60*	65	20	5	0	0
Discuss the laws of magnetism.	70*	70	20	0	0	0
Explain how an electromagnet operates.	60*	45	40	5	0	0
Describe how a relay operates.	75*	85	30	0	0	0
Explain the operation principles of a generator.	65*	65	25	0	0	0
Differentiate between AC and DC generators.	60*	60	20	5	5	0
Describe the different types of motors.	55*	40	35	15	0	0
Define inductance.	65*	60	30	0	0	0
Explain the operation of a transformer.	65*	55	35	0	0	0
Define capacitance.	65*	65	25	0	0	0
Demonstrate an understanding of the physical properties of capacitors and their ratings.	55*	60	20	20	0	0
Develop skills in using the volt-ohm milliamp meter (VOM.)	50*	60	20	10	0	0
Differentiate between different types of power supplies.	60*	35	40	10	0	5
Develop skill in using a power supply.	55*	25	40	20	0	0
Develop skill in using an oscilloscope.	55*	25	50	10	0	5
Develop skill in checking a capacitor.	55*	25	50	5	0	10
Describe the physical characteristics of semi-conductors.	65*	40	40	10	0	0
Demonstrate an understanding of the difference between half-wave and full-wave specification.	60*	40	40	5	0	5
Check and replace batteries.	60*	50	30	5	0	5
Repair broken and shorted wiring.	60*	65	15	0	5	5
Identify and describe the use and need for the appropriate tools.	60*	60	20	5	5	0
Demonstrate proper care and maintenance of tools.	70*	60	20	5	0	0
Draw a career path for a selected career in the electronics field.	55*	55	10	10	10	0
Explain the effects that electricity/electronics has had on the development of industry and society.	60*	65	20	0	15	0

Industrial Education Project II

Competency Task List for: GENERAL ELECTRICITY/ELECTRONICS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies in Communication Electronics						
Check and/or replace capacitors.	55*	55	20	0	5	15
Check and replace resistor.	65*	60	15	0	0	15
Check and replace speaker.	55*	65	10	0	5	15
Check and replace tone control.	55*	60	15	0	5	15
Check and replace transistors.	60*	65	15	0	0	15
Cehck, repair, and/or replace tube socket.	45	55	10	0	10	20
Check and replace tubes.	50*	60	15	0	5	15
Cehck and replace volume control.	50*	60	15	0	5	15
Repair cables.	60*	55	20	0	5	15
Replace plugs.	60*	55	20	0	5	15
Explain the purpose of filter circuits.	55*	55	15	10	5	10
Explain electron amplication.	60*	60	15	5	5	10
Explain amptitude modulation (AM)	55*	60	20	10	5	10
Explain frequency modulation (FM)	55*	60	20	10	5	10
Competencies in Electrical Power						
Mark location of switches on studdings.	40	45	20	5	5	10
Mark location of duplex receptacles on studdings.	40	45	25	5	5	10
Install switch in outlet box.	45	50	15	10	5	10
Install and remove circuit breakers.	35	60	20	10	10	10
Competencies in Industrial and Computer Electronics						
Dismantle and reassemble a gear assembly, making all proper adjustments and lubrications.	0	0	5	5	30	45*
Dismantle and reassemble a cam and cam arm movement.	0	0	5	5	35	40*
Dismantle, inspect and reassemble a clutch mechanism.	0	0	5	5	35	40*

Industrial Education Level II

Competency Task List for: GENERAL DRAFTING

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Generic Competencies						
Make freehand sketches of given objects.	78*	81	12	6	0	3
Demonstrate knowledge of shading techniques.	56*	12	53	17	17	3
Demonstrate proper use and care of drafting equipment.	89*	95	3	0	0	0
Know general history of drafting.	69*	28	39	17	14	0
Know the different types of drafting.	86*	64	33	0	0	0
Know how to choose a career in drafting.	83*	58	33	6	0	0
Letter using vertical lettering techniques.	89*	81	14	6	0	0
Letter using inclined lettering techniques.	56*	31	36	9	19	3
Use of architect, engineer, and metric scales.	86*	92	6	0	0	0
Describe different types of drafting media.	61*	42	44	3	14	0
Operate reproduction equipment.	72*	36	39	8	8	3
Know common abbreviations used in drawing.	83*	72	72	3	0	0
Use notes required on basic drawing.	89*	32	22	3	0	0
Competencies in Technical Illustration						
Demonstrate knowledge of why technical illustration drawings are made.	72*	58	22	3	11	0
Make isometric drawings of given objects.	83*	81	11	0	3	0
Demonstrate knowledge of basic techniques and procedures used in Technical Illustration.	75*	56	22	6	11	0
Demonstrate knowledge in layout and construction methods.	75*	61	22	3	8	0
Demonstrate knowledge in the proper use of templates.	75*	69	25	3	3	3
Demonstrate knowledge of perspective drawings.	81*	64	22	3	6	3
Demonstrate knowledge of oblique drawings.	81*	72	17	0	6	0
Competencies in Architecture						
Sketch a functional floor plan.	72*	75	11	0	6	0
Identify General Architectural Styles.	72*	59	19	0	6	3
Describe careers in the field of Residential Architecture.	64*	47	31	8	6	3
Describe how environmental factors should affect the design of the structure.	75*	68	17	3	3	3
Describe factors involved in designing funtional traffic patterns for residences.	69*	61	19	6	6	3
Knowledge of kitchen design.	72*	64	11	0	6	3
Knowledge of local building and planning codes	67*	61	28	6	6	3
Knowledge of residential living styles	61*	45	31	6	8	6
Knowledge of Architectural Symbols.	75*	72	14	3	11	3
Produce a functional plan for a single family residence.	78*	78	14	0	3	3
Knowledge of basic structural standards.	64*	56	25	6	6	3

Industrial Education Level II

Competency Task List for: GENERAL DRAFTING

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies in Machine Drawing						
Draw title block and border lines for a standard sheet layout	81*	81	11	3	0	0
Identify and draw line symbols.	83*	89	6	0	0	0
Draw basic geometric constructions.	86*	68	8	0	0	0
Know the general rules and the two different systems of placing dimensions on drawings.	86*	81	17	3	0	0
Determine and draw necessary views to completely describe the shape of a given object.	89*	95	6	0	0	0
Demonstrate knowledge of isometric, oblique, cavalier, and cabinet drawings.	83*	86	8	3	0	0
Demonstrate knowledge of one and two point perspective.	75*	61	22	6	0	6
Draw necessary auxiliary views.	81*	58	25	3	6	3
Demonstrate use of revolutions.	45	33	33	6	8	14
Demonstrate knowledge of sectioning symbols.	83*	92	17	0	0	0
Demonstrate knowledge of threads.	75*	53	31	6	3	3
Demonstrate knowledge of fasteners.	69*	42	42	6	3	3
Use tolerances required on basic drawings.	69*	45	33	6	6	6
Demonstrate knowledge of detailed drawings.	81*	75	17	0	3	3
Draw necessary intersections and developments of a series of given objects.	47	33	31	8	11	0

Industrial Education Level II

Competency Task List for: GENERAL GRAPHIC ARTS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Generic Competencies in General Graphic Arts						
Observe the purpose and influence of Graphic Arts Technology.	71*	82	12	0	0	0
Use Graphic Arts materials and equipment safely.	71*	82	12	0	0	0
Differentiate between the basic processes of transferring an image.	65*	71	18	6	0	0
Develop skills in the safe use of a paper cutter.	71*	76	12	0	0	6
Handle combustible materials safely.	65*	71	12	6	6	0
Discuss the types of jobs available and the qualifications needed for Graphic Arts Technology.	71*	59	29	6	0	0
Identify printers units of measure.	65*	59	24	12	0	6
Make image adjustments.	59*	59	18	12	0	6
Convert standard measurements to points and picas.	59*	53	24	12	0	6
Identify the major type styles.	65*	53	29	6	0	12
Identify the principles of design.	65*	53	24	18	0	0
Make thumbnail sketches.	59*	47	29	12	0	6
Make a rough layout.	71*	71	18	6	0	0
Make a comprehensive layout.	71*	65	18	6	6	0
Hand draw copy.	65*	12	65	12	6	0
Competencies in Letterpress Printing						
Identify layout of California Job Case.	53*	65	6	6	12	12
Be able to set and justify a line of type.	59*	71	12	0	6	6
Be able to correctly replace all type used in a type form in the California Job Case.	53*	59	12	0	12	18
Demonstrate knowledge of locking up type form in a given case.	59*	65	12	0	12	6
Demonstrate correct use of a platen press.	53*	71	0	0	12	12
Print single color job.	59*	71	6	0	12	6
Competencies in Graphic Layout and Design						
Draw horizontal and vertical lines.	71*	53	29	12	0	0
Develop skills in making mechanical layout or camera-ready artwork.	53*	65	12	18	0	0
Develop skills in the use of clip art and preprinted type.	65*	59	24	12	0	0
Develop skills in the use of a typewriter for strike-on image generation.	65*	29	53	6	6	0
Develop skills in photocomposition.	59*	59	24	12	0	0
Competencies in Screen Process Printing						
List the basic materials and equipment needed for screen process printing.	76*	82	6	0	0	6
Develop skill in preparing stencils for screen process printing.	76*	76	12	0	0	6
Develop skills in using types of block-out.	71*	71	18	0	0	6

Industrial Education Level II

Competency Task List for: GENERAL GRAPHIC ARTS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies in Screen Process Printing (con't)						
Match various types of inks, stencils, and solvents for screen process printing.	71*	65	18	0	6	6
Develop skills in making positives and negatives to use in the photographic indirect screen process printing method.	71*	47	29	12	0	6
Make a two-color print.	76*	24	59	6	0	6
Develop skills in making a stencil for screen process printing	76*	71	12	6	0	6
Demonstrate proper procedure used in opaguing.	76*	59	29	0	0	0
Competencies in Photo-Offset Lithography						
List and describe the parts of the process camera.	65*	76	18	0	0	0
Reduce and enlarge artwork.	53*	71	18	0	0	0
Develop skill in preparing the camera for enlarged, reduced or 100% sized copies.	53*	65	18	0	0	0
Expose and process a line negative and positive.	59*	82	12	6	0	0
Differentiate between line copy, halftone copy, and continuous tone copy.	65*	71	24	0	0	0
Differentiate between line negative and positive.	65*	82	12	6	0	0
Develop skills in stripping and masking a flat.	65*	59	29	6	0	0
Explain the basic principles of offset operation.	65*	71	24	0	6	0
Develop skill in coprating the offset press.	71*	53	41	6	0	0
Develop skills in camera operations and darkroom procedure.	65*	47	41	6	6	0
List the main parts of the offset press.	59*	41	41	0	0	0
Competencies in Photography						
Knowledge of history of photography.	53*	65	24	0	0	6
Identify the six basic parts of a camera.	59*	71	18	0	0	6
Knowledge of depth of field and the use of f-stops.	53*	71	6	12	0	6
Identify various types of cameras.	59*	47	35	6	0	6
Explain the historical development of film.	59*	41	47	6	0	6
Differentiate between panchromatic and orthochromatic film.	65*	59	35	6	0	0
Knowledge of how light produces a picture.	65*	71	18	6	6	0
Identify the basic characteristics of film.	59*	53	24	18	0	6
Differentiate between artificial light and daylight with respect to film.	53*	53	29	6	6	6
Identify different types of artificial light.	47*	47	35	6	6	6
Clean the camera.	53*	59	24	11	0	6
Demonstrate knowledge of typical loading procedures.	59*	65	24	0	0	11
Demonstrate knowledge of proper camera care.	47*	71	11	6	6	6
Demonstrate knowledge of camera usage.	59*	71	11	6	6	6
Identify elements of good composition.	59*	59	29	0	6	6
Identify the major elements of a picture.	53*	47	35	0	6	11
Identify materials needed for the development of roll film.	59*	76	11	0	6	6

Industrial Education Level II

Competency Task List for: GENERAL GRAPHIC ARTS.

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies in Photography (con't)						
Demonstrate knowledge of loading the film tank.	59*	69	18	0	0	11
Demonstrate knowledge of mixing, handling, and adding chemical in their proper order.	59*	71	11	0	0	11
Demonstrate knowledge of proper techniques in contact printing	59*	59	24	0	0	11
Demonstrate knowledge of print developing.	59*	76	6	6	0	6
Knowledge of mixing and storing of chemicals.	53*	71	11	0	0	11
Identify the operations involved in using the enlarger.	59*	65	11	6	0	6
Demonstrate knowledge in making an enlargement.	53*	59	18	6	6	6
Demonstrate proper use of safelights.	59*	65	11	0	6	6
Identify projection printing techniques-dodging, cropping, and burning.	59*	53	24	6	6	6

Industrial Education Level II

Competency Task List for: GENERAL METALS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Generic Competencies for General Metals						
Identify safety rules to be observed in the metals laboratory.	85*	85	10	0	0	0
Identify the kinds of metals used in the metals class.	85*	85	15	0	0	0
Store tools.	75*	60	25	0	10	0
Identify metal shapes.	85*	65	30	0	5	0
Draw and read plans.	85*	65	25	5	5	0
Fill out bill of materials.	80*	50	40	5	5	0
Identify career opportunities in the metalworking industries.	85*	55	35	10	0	0
Identify bench metal hand tools by name and use.	85*	85	10	5	0	0
Select and use materials for polishing metals.	80*	35	55	5	5	0
File metals to a smooth flat surface.	85*	70	25	0	5	0
Perform heat-treating operations.	75*	55	30	15	0	0
Identify and use basic layout tools.	85*	75	20	5	0	0
Layout the work piece.	85*	80	15	0	5	0
Sharpen drill bits by hand.	75*	60	35	0	5	0
Cut materials with hand hacksaw.	85*	70	30	0	0	5
Drill metal using power drilling equipment.	85*	80	15	0	0	5
Grind metal with power equipment.	75*	70	10	5	5	5
Cut metal with power hacksaw.	60*	45	40	5	0	10
Use wire brushes to clean metal.	70*	50	45	0	0	5
Competencies in Sheet Metal						
Develop sheet metal patterns from drawings.	60*	55	25	10	0	5
Trace templates on sheet metal.	60*	55	15	15	10	5
Transfer design from blueprints to metal.	75*	65	25	5	0	5
Cut sheet metal using sheet metal snips.	85*	85	10	0	0	5
Cut sheet metal using squaring shears.	85*	75	20	0	0	5
Bend sheet metal using hand seamers to produce an edge.	65*	55	40	0	0	5
Form sheet metal with stakes and mallets.	60*	40	40	5	5	10
Bend sheet metal with the bar folder.	40	70	20	0	10	5
Form sheet metal with a beading machine.	45	40	50	5	0	5
Form sheet metal with the Box and Pan Brake.	70*	80	15	0	0	5
Form sheet metal with the Hand Brake.	55*	55	30	5	5	5
Form sheet metal with the Slip Form Roll.	75*	70	25	0	0	5
Form single and double hems on Bar Folder or Brake.	65*	60	30	5	0	5
Drill sheet metal parts.	80*	75	20	0	0	5
Fasten sheet metal parts using rivets.	80*	70	20	5	0	5
Fasten sheet metal parts using bolts.	50*	55	25	10	5	5
Fasten sheet metal parts with sheet metal screws.	55*	50	40	5	0	5
Punch sheet metal parts to produce assembly holes.	60*	35	45	15	0	5
Remove frozen or stripped screws.	40	10	55	10	10	15
Tap holes in metal.	55*	60	10	5	15	10
Solder sheet metal parts with propane torch.	65*	55	35	5	0	5
Spot weld sheet metal parts.	65*	65	25	5	0	5

Industrial Education Level II Competency Task List for: GENERAL METALS Note: All numbers express percentages *Denotes Statistical Significance	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies in Foundry						
Identify tools and materials needed for heat treating.	70*	65	20	5	0	0
Demonstrate knowledge of heat treating metals.	70*	75	15	0	5	5
Identify foundry tools by name and use.	65*	80	5	5	0	0
Demonstrate knowledge of forging metal.	70*	50	45	5	0	0
Identify tools and materials neede for sand casting.	70*	75	15	10	0	0
Identify parts of a flask.	70*	50	30	15	5	0
Demonstrate knowledge of sand casting.	70*	80	10	10	0	0
Competencies in Welding						
Identify equipment needed for oxyacetylene equipment.	80*	80	10	5	0	0
Set up oxyacetylene equipment.	75*	75	10	5	0	0
Open cylinder valves and adjust regulators.	80*	75	10	5	5	0
Adjust torch for different flames.	80*	75	10	5	5	0
Demonstrate knowledge of shutting down oxyacetylene equipment.	80*	85	5	5	0	0
Run beads on mild steel with filler rod.	65*	60	20	5	5	5
Butt weld mild steel.	65*	60	20	5	5	5
Lap weld mild steel.	60*	50	30	5	5	5
Fillet weld mild steel.	65*	55	25	5	5	5
Set up oxyacetylene equipment for cutting metals.	70*	65	20	5	0	5
Identify equipment needed for arc welding.	75*	70	10	0	0	5
Set up and operate arc welder.	80*	75	15	0	0	5
Run bead on flat metal.	80*	70	15	5	0	5
Tack weld mild steel in horizontal position.	75*	65	20	5	0	5
Set up and tack weld tee-joints.	60*	50	30	5	5	5
Competencies in Machine Shop						
Thread stock with hand taps and dies.	70*	75	15	0	0	5
Maintain the lathe.	60*	60	20	0	5	10
Grind lathe tools.	75*	55	20	5	5	10
Face stock on the lathe.	65*	70	10	0	0	5
Turn stock on the lathe.	70*	85	5	0	0	5
Drill and ream on the lathe.	65*	70	20	0	0	5
File and polish on the lathe.	65*	65	25	0	0	5
Knurl stock on the lathe.	70*	70	20	0	0	5
Hand thread stock on the lathe.	50*	55	20	0	5	10
Align lathe center .	15	15	5	5	0	10
Grind stock on the lathe.	65*	75	5	0	5	10
Maintain the drill press.	75*	75	10	0	0	5
Set up and operate the shaper.	50*	60	20	0	10	10
Maintain the milling machine.	60*	70	20	0	0	5
Set up and operate the milling machine.	60*	70	20	0	0	5
Square work on the milling machine.	55*	75	15	0	0	5

Industrial Education Level II

Competency Task List for: GENERAL POWER MECHANICS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Generic Competencies						
Identify, inspect, clean, and repair hand tools.	64*	57	29	14	0	0
Identify six safety precautions to be observed when handling gasoline.	57*	64	7	7	14	0
Define carbon monoxide gas.	64*	71	14	14	0	0
Identify the characteristics of carbon monoxide gas.	57*	64	21	0	7	0
List precautions to be observed when dealing with carbon monoxide.	57*	57	21	0	14	0
Identify safety precautions for the use of hand tools.	71*	79	7	14	0	0
Define work.	71*	57	36	0	7	0
Identify measurement of work.	64*	36	57	0	0	0
Define energy.	71*	64	36	0	0	0
Identify occupational employment areas of power and transportation industries.	71*	50	43	7	0	0
Identify areas of environmental concern of the power and transportation industry.	64*	57	36	0	7	0
Identify ways power usage has affected our environment.	57*	57	36	0	7	0
Competencies in Auto Mechanics						
Inspect and replace points and condensers.	36	50	0	0	0	21
Competencies in Power Generation						
Identify seven sources of power.	50*	36	50	0	0	7
Define seven sources of power.	43	21	50	7	7	7
Define energy.	50*	50	36	0	0	7
Define horsepower..	50*	64	21	0	0	7
Calculate horsepower.	50*	64	14	7	7	7
Identify internal combustion engine.	43	64	7	14	0	7
Identify uses of internal combustion engines.	43	57	14	7	7	7
Identify basic parts of an engine.	50*	64	14	7	0	7
Service oil bath oil cleaner.	50*	36	43	0	0	7
Service the foam type air cleaner.	50*	50	29	0	0	7
Competencies in Transportation						
Identify internal combustion engines.	50*	57	21	0	7	7
Identify use of each internal combustion engine.	43	50	21	7	7	7
Identify means of transportation.	36	21	64	0	0	7
Identify transportation power sources.	43	29	57	0	0	7
Identify basic parts of an engine.	50*	64	14	0	7	7

Industrial Education Level II

Compentency Task List for: GENERAL WOODS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Generic Competencies/Wood Technology						
Acquire an awareness of woodworking occupations.	90*	64	27	13	0	0
Acquire an awareness of General Laboratory safety.	90*	90	7	3	0	0
Acquire an awareness of the nature of wood.	80*	70	20	3	3	0
Differentiate between hardwoods and softwoods.	87*	63	27	7	0	0
Describe the structure of a tree.	63*	33	43	13	10	3
Acquire a knowledge of wood grain.	87*	73	20	3	3	0
Describe lumber seasoning.	83*	53	40	3	3	0
Acquire a knowledge of lumber defects.	80*	60	23	13	3	0
Develop skill in computing board feet.	90*	77	13	10	0	0
Describe the characteristics of plywood.	80*	33	57	10	3	0
Describe the characteristics of veneers.	67*	33	47	20	3	0
Describe the characteristics of hardboard and fiberboard.	60*	23	47	20	10	0
Develop skill in planning.	90*	80	10	13	3	0
Develop skill in using layout tools.	90*	80	13	7	0	0
Develop skill in using hand saws.	90*	70	23	7	0	0
Develop skills in the use of hand planes.	83*	50	40	7	3	0
Develop skill in the use of the chisel, gouge, and carving tools.	83*	67	37	3	3	0
Develop skill in the use of the miter box.	93*	43	43	3	0	0
Develop skill in the use of Surform Tools and wood files.	90*	50	40	7	0	0
Develop skill in the use of the hand scraper and cabinet scraper.	63*	47	37	13	10	0
Develop skill in the use of hand boring tools.	90*	53	37	7	0	0
Develop skill in selecting and using nails and screws.	83*	70	17	7	0	0
Develop skill in selecting and using fasteners.	87*	67	23	7	0	0
Acquire knowledge of adhesives.	83*	73	17	7	7	0
Develop skill in using the table saw.	83*	73	20	3	0	0
Develop skill in using the band saw.	90*	87	10	0	0	0
Develop skill in using the scroll/jig saw.	83*	67	23	3	3	0
Develop skill in using the drill press.	90*	83	13	0	0	0
Develop skill in using portable electric drill.	87*	77	20	[illegible]	0	0
Develop skill in using the electric hand sanders.	90*	63	33	0	0	0
Develop skill in using the Sabre Saw.	83*	50	40	0	0	0
Acquire a knowledge of common machine cuts.	87*	73	20	0	0	0
Develop skill in using the radial arm saw.	70*	63	17	3	10	0
Develop skill in using the portable circular saw.	90*	30	40	[illegible]	[illegible]	0
Competencies for Cabinetmaking						
Apply edge banding.	33	20	30	7	[illegible]	[illegible]
Apply laminate to core.	30	20	33	7	27	10
Apply metal molding.	20	10	20	10	43	10
Apply veneer to core stock.	30*	17	33	10	27	3
Apply wood edges.	50*	43	23	[illegible]	20	7
Cut plastics to size.	37	27	17	17	30	7

Industrial Education Level II

Competency Task List for: GENERAL WOODS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies for Cabinetmaking (con't)						
Cut veneers.	37	27	17	17	27	10
Plane joints.	63*	37	33	0	17	7
Trim edges.	63*	43	23	3	17	7
Assemble clamping devices.	70*	67	13	0	7	3
Assemble drawers.	63*	43	23	3	10	7
Assemble joints.	80*	77	13	0	0	7
Assemble panels	63*	47	17	7	13	7
Attach molding.	67*	60	30	3	10	7
Fasten parts with nails.	80*	60	23	3	0	10
Fasten parts with screws.	83*	80	13	0	0	7
Fasten top to case work.	67*	57	17	3	13	7
Fasten wood with bolts.	60*	37	33	7	10	7
Install catches.	73*	53	23	7	3	7
Install drawer rail and guider.	63*	43	27	7	13	7
Install hinges.	73*	57	30	0	7	0
Install pulls and knobs.	77*	53	33	0	7	7
Install shelves.	70*	53	23	3	13	7
Reinforce joints with blocks.	63*	53	13	10	7	10
Reinforce joints with dowels.	83*	73	3	7	3	7
Reinforce joints with splines.	67*	53	20	7	10	7
Cutt butt joints.	77*	57	27	3	0	7
Cut dado joints.	80*	73	17	0	0	7
Cut dowel joints.	83*	73	17	0	0	7
Cut lap joints.	77*	60	27	0	0	7
Cut miter joints.	70*	53	23	3	3	7
Cut mortise and tenon joints.	57*	37	30	3	13	7
Cut out frames and panels.	77*	63	23	0	0	7
Cut rabit joints.	57*	43	27	3	10	7
Cut spine joints.	63*	43	20	7	7	7
Cut tongue and grove joints.	73*	73	7	0	3	7
Apply antique glazes.	73*	63	17	0	3	7
Apply shellac.	80*	73	10	3	3	7
Apply stains.	57*	47	20	7	10	7
Apply varnish.	63*	63	10	3	10	7
Apply waxes.	77*	67	13	7	3	7
Apply wood filler to nail or screw holes.	77*	67	13	3	3	7
Bleach surfaces.	63*	57	17	7	10	7
Clean surfaces.	73*	60	17	10	7	7
Fit and trim cabinets.	80*	77	13	0	7	7
Develop skill in using the planer/surfacer.	83*	83	10	0	7	7
Develop skill in using the jointer.	50*	57	10	7	17	10
Develop skill in using the router.	83*	70	17	3	3	7
Develop skill in using the belt and disc sander.	80*	73	13	3	3	7
Acquire a knowledge of wood-turning tools.	83*	67	17	0	3	7

Industrial Education Level II

Competency Task List for: GENERAL WOODS

Note: All numbers express percentages
*Denotes Statistical Significance

	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies for Cabinetmaking (con't)						
Develop skill in using the oscillating spindle sander.	43	37	23	3	20	13
Develop skill in using the band saw.	77*	73	10	0	7	7
Develop skill in using the drill press.	77*	73	10	0	7	3
Competencies in Carpentry						
Level with carpenters level.	47	57	7	7	0	17
Drive and set nails.	53*	53	13	7	0	17
Identify framing components.	43	53	10	0	7	17
Frame wall openings.	30	40	10	7	7	20
Frame exterior walls.	33	43	10	3	7	20
Frame interior Walls.	30	40	13	3	7	17
Plan a roof.	37	40	17	0	10	20

Industrial Education Level II Competency Task List for: INDUSTRIAL MATERIALS AND PROCESSES Note: All numbers express percentages *Denotes Statistical Significance	Taught	Essential	Adequate	Modify	No Opinion	Inappropriate
Competencies in lastics						
Develop knowledge in the different types of plastics.	75	75	13	13	0	0
Develop skills in vacuum forming.	63	75	13	13	0	0
Develop skills in casting.	63	75	13	13	0	0
Masonry	No Other Competencies Validated					
Structural Ceramics	No Other Competencies Validated					

APPENDIX B

Teacher Added Competencies and Comments

TEACHER ADDED COMPETENCIES

I. General Crafts

A. Generic Competencies
   1) Develop skills in the design process
   2) Develop skills in using metrics

B. Leather
   1) Develop skills in leather stamping
   2) Develop skills in cutting, punching, sewing, and lacing leather
   3) Develop skills in waterproofing leather

C. Textiles
   1) Plading (square and round) is a part of our curriculum at the present.

D. Wood Crafts
   1) Identify trees woods come from
   2) Develop skill of designing wood products
   3) Develop knowledge of glues and glueing
   4) Develop knowledge of fastening techniques (other than glueing)

E. Art Metals
   1) Develop skill in coloring metal (liver of sulphur, magic markers, etc.).
   2) Metal forming (embossing) is being administered.

F. Ceramics
   1) Construct plaster molds for slip casting

G. Jewelry and Lapidary

H. General Comments for Crafts
   1) Should include metal enameling
   2) I also teach a photography unit in General Crafts.
   3) Leatherwork is a good student interest course but it's relevance to occupations in this area is very limited.
   4) With our Crafts Level II program being only a one hour course it is difficult to cover all areas in much detail. Also, with limited supplies and materials, equipment, room, or available resources (money in which to work with), I do not see a chance for a great change from the present either.
   5) I feel there is a place and need for plastics under General Crafts rather than under Industrial Materials and Processes.
   6) Leather should reflect as a renewable resources for Industrial Use.
   7) Study textiles as a product industry, new materials of the industry.
   8) General Crafts as a course is inappropriate at any level today. This subject is totally outdated for our curricula and should be modified to reflect a course such as General Industry, Technology and Man, Introduction to our Technical Society, etc. My rating therefore is based upon this outlook and should by all means be viewed as to what would be included in such an effort.

II. General Electricity/Electronics

A. Generic Competencies

B. Communication Electronics

C. Electrical Power
   1) How to design and caculate heating/cooling, lighting, service loads of a facility

D. Industrial and Computer Electronics
   1) Discuss logic circuits

E. General Comments
   1) I can[illegible]see a need at Level II for the equipment to teach in depth computer operations. We deal with discussion and film st[illegible] the subject.
   2) Ev[illegible] we do not have facilities for computers, I have had [illegible] college training in this area. Personally, I feel this area inappropriate for Level II.
   3) This is a service program.
   4) Should be a subpart of the area of Energy.
   5) It seems unlikely that most Level II teachers could handle this unless training was provided in some intensive workshops.

III. General Drafting

A. Generic Competencies
   1) Inking - Technical pen
   2) Dimensioning based upon knowledge of shop process

B. Technical Illustration
   1) Pencil and ink sketches
   2) Shading and rendering
   3) Use of air brush techniques

C. Architectural Drawing
   1) Some model building
   2) Understand the factors involved in selling, buying, and financing a residential house.
   3) Energy sources as related to housing
   4) Front and side elevations
   5) Plot plans
   6) Wall sections
   7) Perspective drawing of house
   8) Complete set of house plans
   9) Site visitation
   10) Model building

D. Machine Drawing
   1) Basic surveying (civil engineering) baseline/tops work
   2) Charts/graphs - presentation material
   3) Basic developments

E. General Comments
   1) My General Drafting this year does not comply with State Dept. regulations for Level II, but next year we are receiving Vocational Funds for Level II and will comply.
   2) This is an excellent course of study, however there is too much to cover in one years time.
   3) I object to the Level system used. Our program next year will consist of one Level II Drawing course. There is no way I can include all competencies listed. We dropped Drawing II and Archetectural Drawing, courses usually taken by college bound students with no intention of entering Vocational School.

IV. Graphic Arts

A. Generic Competencies
   1) Discuss how paper is made and identify the major types.
   2) Discuss how ink is made and identify the major types.

B. Photo-Offset Lithography
   1) Hold or drop color work by filtration on process camera.

C. Letter Press Printing
   1) Appreciate and use the principles of proof printing.

D. Screen Process Printing

E. Graphic Layout and Design

F. Photography
   1) E-6 reversals (color) film development
   2) Cibachrome prints
   3) C-41 Kodak (color) film negative development
   4) "Par-color" printing positives from C-41 negatives
   5) Photo assignment - essay
   6) Push processing

G. General Comments
   1) There should probably be some competencies listed for the diffusion transfer processor (PMT)
   2) This area should be reflective of Communications.
   3) Letterpress Printing - as relates to rubber stamp making and sign making--not critical.

V. General Metals

A. Generic Competencies
   1) Identify metal properties
   2) Identify physical properties of most commonly used metals
   3) Use the angle head grinder
   4) Shop management (clean up)
   5) Use of abrasives (emery cloth)
   6) Use of binding jigs

C. Foundry
   1) Dsicuss differences in casting metals
   2) Identify various casting methods
   3) Identify types of patterns
   4) Demonstrate ability to make patterns
   5) Demonstrate alternate casting methods
   6) Construct one-time pattern from styrofoam
   7) Use proper gating methods
   8) Demonstrate Knowledge and use of patterns
   9) Knowledge of fluter

D. Welding
   1) Use and techniques of grazing
   2) Demonstrate Knowledge of brazing for new construction and repair work.
   3) Use the torch to heat and bend metal to shape

E. Machine Shop
   1)
   2)

F. General Comments
   1) The emphasis should be on the metal industry. Many of the ideas are good but have the wrong emphasis.

VI. General Power Mechnics

A Generic Competencies

B. Auto Mechnics
   1) Disc Brakes

C. Fluid Power

D. Transportation

E. Power Generation

F. Power Transmission

G. General Comments
   1) You may consider my marking of 5 and 4 to be very near the same.
   2) We do not have the facilities to teach Fluid Power to this depth.
   3) Due to the fact that most students are not of driving age, we rarely work in the automotive area. Students do bring up individual automotive problems throughout the small engine section.
   4) Most of this did not apply to the way I teach Power Transportation at the Junior High level.
   5) Energy and Transportation areas: two needed areas for our field, but not just the mechanics.

VII. General Woods

A. Generic Competencies/Wood Technology
   1) Develop skills in using the portable router.

B. Cabinet Making
   1) Apply lacquer
   2) Develop skill in using the Uni plane
   3) Develop skill in using the panel saw

C. Carpentry
   1) Foundation layout and form construction

D. General Comments
   1) If you get into carpentry, then the things I have checked are good, but since we have identified the level II program we have not gotten into carpentry in our General Woods program. Time has not allowed.
   2) My woods this year does not comply with Level II regulations, but will comply next year with Vocational Education guidelines
   3) Carpentry is not appropriate in this system, but would be in some systems.
   4) Carpentry was not covered this school year. Next year the course will be included.
   5) I have not taught cabinetmaking as such, but many of these tasks are taught in woodworking.
   6) We need to reflect the modern-day wood industry/company.
   7) Space limitations would make it very difficult (or impossible) for five woods classes to do all the identified tasks in carpentry. We need to have some alternate ways of accomplishing the carpentry objectives.
   8) Out teacher would like to (and need) more information and/or examples of different overall approaches to the carpentry unit.

VIII. Industrial Materials and Processes

A. Plastics
   1) Develop skills in mold making
   2) Develop knowledge of careers in plastics
   3) History
   4) Testing and identification
   5) Industrial production, organization and careers

B. Masonary

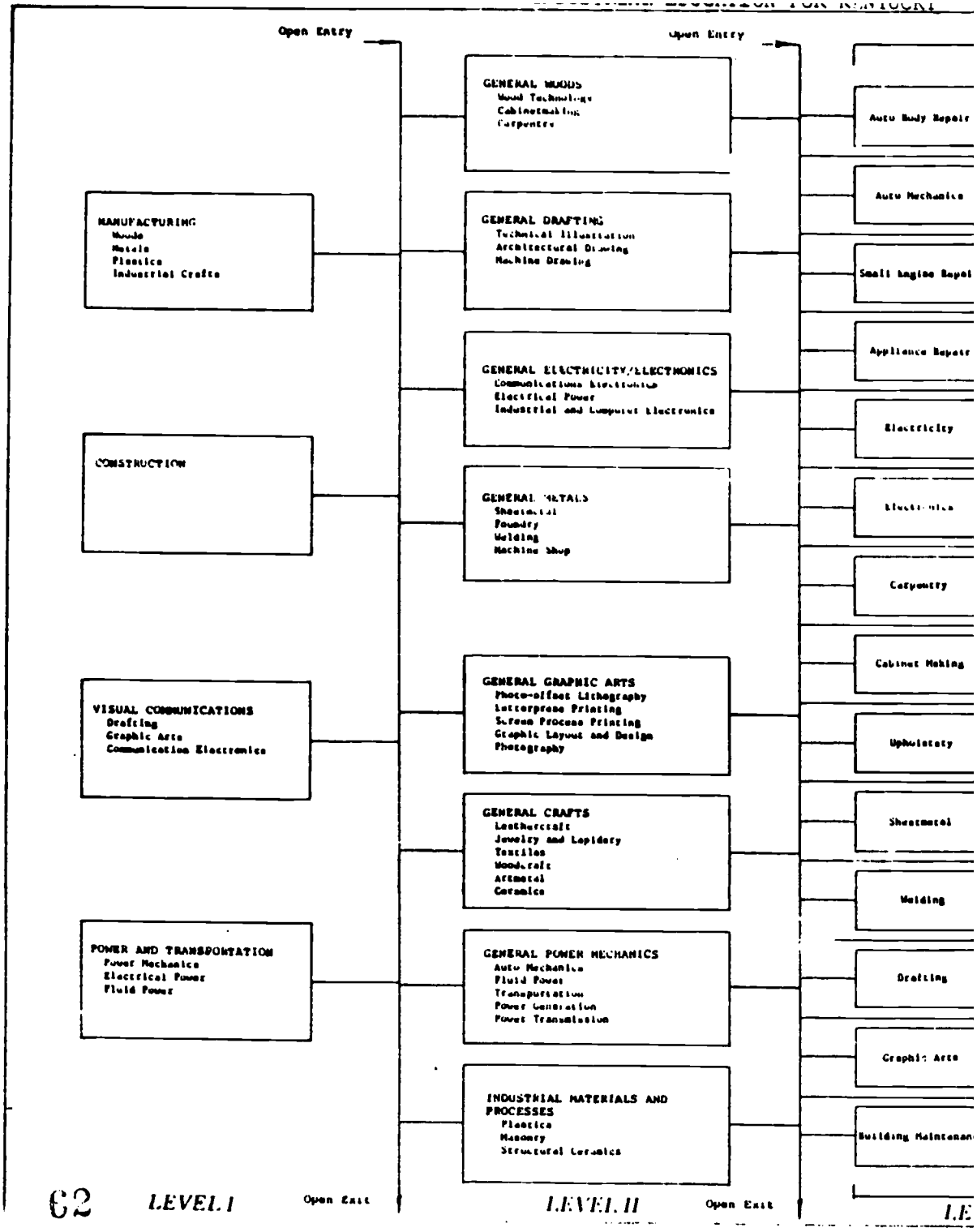
C. Structural Ceramics
   1) Develop skills in preparing plastic clay and slip clay
   2) Develop skills in mixing raw materials for flazes
   3) Develop skills in product design

D. General Comments

1) Industrial Materials and Processes should capitolize upon the major areas of Industry (Primary and Secondary Materials and Processing and Catalog), therein to reflect the use and/or abuse of earths finite resources. Rating is carried out according to this idea.
2) This total area needs much developing to reflect a strong program.
   a) No industrial processes were listed
   b) Too few industrial materials were listed

APPENDIX C

Continuum of Industrial Education for Kentucky


Open Entry
Open Entry
GENERAL WOODS
Wood Technology
Cabinetmaking
Carpentry
MANUFACTURING
Woods
Metals
Plastics
Industrial Crafts
GENERAL DRAFTING
Technical Illustration
Architectural Drawing
Machine Drawing
GENERAL ELECTRICITY/ELECTRONICS
Communications Electronics
Electrical Power
Industrial and Computer Electronics
CONSTRUCTION
GENERAL METALS
Sheetmetal
Foundry
Welding
Machine Shop
GENERAL GRAPHIC ARTS
Photo-offset Lithography
Letterpress Printing
Screen Process Printing
Graphic Layout and Design
Photography
VISUAL COMMUNICATIONS
Drafting
Graphic Arts
Communication Electronics
GENERAL CRAFTS
Leathercraft
Jewelry and Lapidary
Textiles
Woodcraft
Artmetal
Ceramics
POWER AND TRANSPORTATION
Power Mechanics
Electrical Power
Fluid Power
GENERAL POWER MECHANICS
Auto Mechanics
Fluid Power
Transportation
Power Generation
Power Transmission
INDUSTRIAL MATERIALS AND PROCESSES
Plastics
Masonry
Structural Ceramics
Auto Body Repair
Auto Mechanics
Small Engine Repai
Appliance Repair
Electricity
Carpentry
Cabinet Making
Upholstery
Sheetmetal
Welding
Drafting
Graphic Arts
Building Maintenan
62
LEVEL I
Open Exit
LEVEL II
Open Exit

APPENDIX D

Non-Validated Competency Lists

GENERAL CRAFTS - GC

General Crafts is a broad based course dealing with many aspects of a specialized industry. The content of General Crafts should include activities and instruction in at least three (3) of the followins areas: (1) leather, (2) textiles, (3) wood crafts, (4) art metal, (5) ceramics, and (6) jewlry and lapidary.

Code	
GCGC	Generic Competencies
1.1	Develop knowledge of design types.
1.2	Develop knowledge of the basic principles of design.
1.3	Develop skill in sketching.
1.4	Develop skill in reducing or enlarging a drawing.
1.5	Develop skill in measuring.
1.6	Develop skill in pattern transfer.
1.7	Develop safety attitudes and skills in working with individual crafts.
LEA	Competencies in Leather
2.1	Develop knowledge in the types of leather-craft products.
2.2	Develop knowledge of the characteristics of leather.
2.3	Develop skills in the use of leather-craft tools.
2.4	Develop skills in installing fasteners.
2.5	Develop skills in carving leather.
2.6	Develop skills in finishing leather.
TEX	Competencies in Textiles
3.1	Develop knowledge of terms in weaving.
3.2	Develop skills weaving on a loom.
3.3	Develop weaving skills on frames.
3.4	Develop skills in creating and constructing a string art design.
WCr	Competencies in Wood Crafts
4.1	Develop knowledge of common types of woods.
4.2	Develop skills in curring wood.
4.3	Develop skills in enlarging and/or overlaying.
4.4	Develop skills in laminating wood.
4.5	Develop skills in carving wood.
4.6	Develop skills in wood finishing.
AMe	Competencies in Art Metal
5.1	Develop skills in working with metal foil.
5.2	Develop skills in etching.
5.3	Develop skills in enameling.
5.4	Develop skills in making designs by shaping.
5.5	Develop skills in making designs by cutting metal.
5.6	Develop skills in spinning metal on a lathe.

5.7 Develop knowledge of terms used in metal crafts
5.8 Develop skills in the use of common metal craft tools.
5.9 Transfer a design to metal in preparation for cutting operation.
5.10 Select appropriate blades for the jeweler's saw and cut metal to within acceptable dimansions.
5.11 Select and use the proper file for a given piece of work.
5.12 Select and use appropriate abrasive cloths and papers to obtain a smooth finish.
5.13 Join two metals by the use of a third metal (soft or hard solder).
5.14 Clean metal surfaces through the use of pickling solutions.
5.15 Soften metal by hearing it.
5.16 Perform buffing and polishing operations.

CER Competencies in Ceramics

6.1 Develop skills in mixing and wedging of clay.
6.2 Develop skills in slip casting.
6.3 Develop skills in use of clay slabs.
6.4 Develop skills in the use of the potters wheel.
6.5 Develop skills in finishing ceramic pieces.

JEW Competencies in Jewelry and Lapidary

7.1 Define stone.
7.2 Explain how igneous, sedimentary, and metamorphic stones are made.
7.3 Perform operations of sculpturing and polishing.
7.4 List at least six uses of stone.
7.5 Identify various stones.
7.6 Describe the characteristics of various stones.
7.7 Perform mounting operations.
7.8 Transfer a design to metal in preparation for cutting operation.
7.9 Select appropriate blades for the jeweler's saw and cut metal to within acceptable dimensions.
7.10 Select and use the proper file for a given piece of work.
7.11 Select and use appropriate abrasive cloths and papers to obtain a smooth finish.
7.12 Join two metals by the use of a third metal (soft or hard solder).
7.13 Clean metal surfaces through the use of pickling solutions.
7.14 Soften metal by hearing it.
7.15 Perform buffing and polishing operations.
7.16 Preserve the finish on a piece of jewelry by applying lacquer.
7.17 Apply an antique finish to a piece of jewelry by using an oxidizing solution.
7.18 Give depth and richness to jewelry by using domes or hemispheres of metals.

References for General Crafts

Competency Catalogs for Industrial Crafts. Industrial Arts Education Service, Department of Education, Commonwealth of Virginia, Richmond, VA, 1979.

GENERAL ELECTRICITY/ELECTRONICS - ELE

General Electricity/Electronics is a comprehensive study of electrical theories and equipment that leads to a general study of the fields of electricity and electronics. The content should include activities and instruction in all of the following areas: (1) communication electronics, (2) electrical power, and (3) industrial and computer electronics.

Code GLE	Generic Competencies in General Electricity/Electronics
1.1	Identify the law of charges.
1.2	Explain the direction of current flow.
1.3	Explain the difference between conductor and insulator.
1.4	Identify different sources of electricity.
1.5	List the different types of primary cells and their application.
1.6	Differentiate between a battery and a cell.
1.7	List the component parts of a simple circuit.
1.8	Develop skills in measuring wire size using the American Wire Guage.
1.9	List the factors that determine the resistance of wire.
1.10	Describe the different types of resistors and their functions.
1.11	Develop skills in reading color-coded resistors.
1.12	Develop skills in measuring resistance of resistors.
1.13	Develop skills in solving circuit problems using Ohm's Law.
1.14	Define electrical power.
1.15	Develop skills in measuring D.C. voltage, current, and resistance in electronic circuits.
1.16	Discuss the laws of magnetism.
1.17	Explain how an electromagnet operates.
1.18	Describe how a relay operates.
1.19	Explain the operation principles of a generator.
1.20	Differentiate between AC and DC generators.
1.21	Describe the different types of motors.
1.22	Define inductance.
1.23	Explain the operation of a transformer.
1.24	Define capacitance.
1.25	Demonstrate an understanding of the physical properties of capacitors and their ratings.
1.26	Develop skills in using the volt-ohm milliamp meter (VOM.)
1.27	Differentiate between different types of power supplies.
1.28	Develop skill in using a power supply.
1.29	Develop skill in using an oscilloscope.
1.30	Develop skill in checking a capacitor.
1.31	Describe the physical characteristics of semi-conductors.
1.32	Demonstrate an understanding of the difference between half-wave and full-wave specification.
1.33	Check and replace batteries.
1.34	Repair broken and shorted wiring.
1.35	Identify and describe the use and need for the appropriate tools.
1.36	Demonstrate proper care and maintenance of tools.

1.37 Draw a career path for a selected career in the electronics field.
1.38 Develop a list of educational courses that would help prepare an individual for a career in electronics.
1.39 Explain the effects that electricity/electronics has had on the development of industry and society.

CEL Competencies in Communication Electronics

2.1 Check and/or replace antenna.
2.2 Check and/or replace audio output transformer.
2.3 Check and/or replace band change switch.
2.4 Check and/or replace battery holders.
2.5 Check and/or replace capacitors.
2.6 Check, repair, or replace case or cabinet.
2.7 Check and replace dial cord.
2.8 Replace dial light.
2.9 Check and repair/replace earphone/earplug.
2.10 Check and replace IF transformer.
2.11 Check and/or replace oscillator coil.
2.12 Check and repair/replace printed circuit board.
2.13 Check and replace resistor.
2.14 Check and replace R.F. coil.
2.15 Check and replace speaker.
2.16 Check and replace tone control.
2.17 Check and replace transistors.
2.18 Check and replace transistor sockets.
2.19 Check, repair, and/or replace tube socket.
2.20 Check and replace tubes.
2.21 Check and replace tuning capacitor.
2.22 Check and replace volume control.
2.23 Adjust stylus pressures.
2.24 Align tape heads.
2.25 Check and repair microphones.
2.26 Describe the characteristics in an RCL circuit.
2.27 Describe the resonance in an RCL circuit.
2.28 Develop skill in using the signal generator.
2.29 Clean and lubricate R/C drive mechanism.
2.30 Clean heads on tape player.
2.31 Demagnetize tape heads.
2.32 Repair record changer change mechanism.
2.33 Repair record changer cut-off mechanism.
2.34 Repair record changer spred change mechanism.
2.35 Repair cables.
2.36 Replace cartridge in a record changer.
2.37 Replace stylus in record changer.
2.38 Replace plugs.
2.39 Replace tape heads.
2.40 Adjust mechanical detent switch.
2.41 Align oscillators.
2.42 Check and replace antenna coils.
2.43 Check and replace feed through capacitors.
2.44 Explain the purpose of filter circuits.

2.45 Explain electron amplication.
2.46 Develop skills in testing and using data associated with audio amplifiers.
2.47 Explain amptitude modulation (AM).
2.48 Explain frequency modulati n (FM).
2.49 Develop skills adjusting the monochrome television receiver control.

EPO Competencies in Electrical Power

3.1 Draw Electrical Floor plans.
3.2 Mark location of switches on studdings.
3.3 Mark location of duplex receptacles on studdings.
3.4 Mark location of heating-cooling unit outlet and control.
3.5 Mark location of main distribution panel.
3.6 Install single-guage flush-mounted box.
3.7 Install switch in outlet box.
3.8 Install hanger-bar mounted box.
3.9 Drill holes for wiring.
3.10 Route and pull cable.
3.11 Install cable in outlet box.
3.12 Install conductors in conduit.
3.13 Cut and fit surface metal raceway.
3.14 Cut electrical metallic tubing.
3.15 Cut flexible conduit.
3.16 Install duplex receptacles.
3.17 Install lighting fixtures.
3.18 Install meter socket.
3.19 Cut openings in roof and soffit.
3.20 Cut openings in roof and soffit.
3.21 Install roof flangs.
3.22 Install rigid conduit fitting.
3.23 Install service conductors.
3.24 Install service head.
3.25 Install meter pedestal.
3.26 Install main distribution panel.
3.27 Ground service.
3.28 Install and remove circuit breakers.
3.29 Install and remove fuses and adopters.

ICE Competencies in Industrial and Computer Electronics

4.1 List computer application.
4.2 Sketch and label the basic block diagram of the computer.
4.3 List duties of computer operators.
4.4 List advantages and disadvantages of the tab card.
4.5 Explain the use of the paper tape reader.
4.6 List the most common types of magnetic media.
4.7 Describe the types of printing output devices.
4.8 Identify the major functions and controls of the basic main frame computer console.
4.9 Perform daily start procedures.
4.10 List the functions and methods of communication of the operating system software.
4.11 Assign and reassign peripherals successfully.

4.12 Copy program from one disc to another.
4.13 Print disc directions, memory maps, log statements.
4.14 Successfully load and execute a program.
4.15 Construct system flow charts for 3 jobs using varied peripherals and symbols.
4.16 Perform diagnostic routines.
4.17 Write simple low level programs in basic computer language.
4.18 Describe the difference between cobol and basic languages.
4.19 List mechanical devices associated with computers.
4.20 Describe the two types of mechanical movement.
4.21 List the different types of gears most often used in computer equipment.
4.22 Examine belts and pulleys for possible wear.
4.23 Describe the different types of gears most often used in computer equipment.
4.24 Dismantle and reassemble a gear assembly, making all proper adjustment and lubrications.
4.25 Describe the use and action of cams and cam levers.
4.26 Dismantle and reassemble a cam and cam arm movement.
4.27 Identify the purpose and types of clutches.
4.28 Dismantle, inspect and reassemble a clutch mechanism.
4.29 Explain the purpose and theory of operation for solenoids and relays.

References for General Electricity/Electronics

Ashley, William L., Tom L. Hindes, and Faith L. Justice, Task Inventories/ Strategies for Curriculum in Residential Construction, Instructional Materials Laboratory, Trade and Industrial Education, The Ohio State University, Columbus, Ohio, 1979.

Catalog of Performance Objectives, Criterion - Referenced Measures and Performance Guides for Radio - Television, Vocational - Technical Education Consortium of States, Division of Vocational Education, Alabama Department of Education, Montgomery, Alabama, 1975.

Competency Catalogs for Electricity and Electronics, Industrial Arts Education Service, Department of Education, Commonwealth of Virginia, Richmond, Virginia, 1979.

Computer Electronics, State of Louisiana Trade and Industrial Education Section, Division of Vocational Education, State Department of Education, Baton Rouge, Louisiana, 1979.

GENERAL DRAFTING - DRA

General drafting is a broad course dealing with many areas of visual communications. The content should include basic activities and instruction in all of the following areas: (1) technical illustration, (2) architectural drawing, and (3) machine drawing.

Code	
GDR	Generic Competencies
1.1	Make freehand sketches of given objects.
1.2	Demonstrate knowledge of shading techniques.
1.3	Demonstrate proper use and care of drafting equipment.
1.4	Know general history of drafting.
1.5	Know the different types of drafting.
1.6	Know how to choose a career in drafting.
1.7	Letter using vertical lettering techniques.
1.8	Letter using inclined lettering techniques.
1.9	Use of architect, engineer, and metric scales.
1.10	Describe different types of drafting media.
1.11	Operate reproduction equipment.
1.12	Know common abbreviations used in drawing.
1.13	Use notes required on basic drawing.
TIL	Competencies in Technical Illustration
2.1	Demonstrate knowledge of why technical illustration drawings are made.
2.2	Make isometric drawings of given objects.
2.3	Demonstrate knowledge of basic techniques and procedures used in Technical Illustration.
2.4	Demonstrate knowledge in layout and construction methods.
2.5	Demonstrate knowledge in the proper use of templates.
2.6	Demonstrate knowledge of perspective drawings.
2.7	Demonstrate knowledge of oblique drawings.
ARC	Competencies in Architecture
3.1	Sketch a functional floor plan.
3.2	Identify General Architectural Styles.
3.3	Describe careers in the field of Residential Architecture.
3.4	Describe how environmental factors should affect the design of the structure.
3.5	Describe factors involved in designing functional traffic patterns for residences.
3.6	Knowledge of kitchen design.
3.7	Knowledge of local building and planning codes.
3.8	Knowledge of residential living styles.
3.9	Knowledge of Architectural Symbols.
3.10	Produce a functional plan for a single family residence.
3.11	Knowledge of basic structural standards.
MDR	Competencies in Machine Drawing
4.1	Draw title block and border lines for a standard sheet layout.

Code	Competencies in Machine Drawing (con't)
MDR	
4.2	Identify and draw line symbols.
4.3	Draw basic geometric constructions.
4.4	Know the general rules and the two different systems of placing dimensions on drawings.
4.5	Determine and draw necessary views to completely describe the shape of a given object.
4.6	Demonstrate knowledge of isometric, oblique, cavalier, and cabinet drawings.
4.7	Demonstrate knowledge of one and two point perspective.
4.8	Draw necessary auxiliary views.
4.9	Demonstrate use of revolutions.
4.10	Demonstrate knowledge of sectioning symbols.
4.11	Demonstrate knowledge of threads.
4.12	Demonstrate knowledge of fasteners.
4.13	Use tolerances required on basic drawings.
4.14	Demonstrate knowledge of detailed drawings.
4.15	Draw necessary intersections and developments of a series of given objects.

References for General Drafting

Everly, Al, and others, Drafting Competency Based Curriculum, Bureau of Vocational, Technical, and Adult Education, West Virginia State Department of Education, Charleston, West Virginia, August 1977.

GENERAL GRAPHIC ARTS - GAR

General Graphic Arts is a course planned to provide the student with some basic experiences in the massive area of printing. The content should include activities and instruction in at least three (3) of the following areas: (1) photo-offset lithography, (1) letterpress printing, (3) screen process printing, (4) graphic layout and design, and (5) photography.

Code	Generic Competencies in General Graphic Arts
1.1	Observe the purpose and influence of Graphic Arts Technology.
1.2	Use Graphic Arts materials and equipment safely.
1.3	Differentiate between the basic processes of transferring an image.
1.4	Develop skills in the safe use of a paper cutter.
1.5	Handle combustible materials safely.
1.6	Discuss the types of jobs available and the qualifications needed for Graphic Arts Technology.
1.7	Discuss the identification of color with objects and situations.
1.8	Participate in a class/group industry printing project.
1.9	Identify printers units of measure.
1.10	Make image adjustments.
1.11	Trouble shoot press problems.
1.12	Convert standard measurements to points and picas.
1.13	Identify the major type styles.
1.14	Identify the principles of design.
1.15	Make thumbnail sketches.
1.16	Make a rough layout.
1.17	Make a comprehensive layout.
1.18	Hand draw copy.
1.19	Develop skills in making a dummy.
1.20	Differentiate between the two basic classifications of image generation.
1.21	Read and use proofreading symbols.

LPR	Competencies in Letterpress Printing
2.1	Identify layout of California Job Case.
2.2	Be able to set and justify a line of type.
2.3	Be able to correctly replace all type used in a type form in the California Job Case.
2.4	Demonstrate knowledge of locking up type form in a given chase.
2.5	Demonstrate correct use of a platen press.
2.6	Print single color job.
2.7	Print multiple color job.

GLD	Competencies in Graphic Layout and Design
3.1	Draw horizontal and vertical lines.
3.2	Develop skills in making mechanical layout or camera-ready artwork.
3.3	Develop skills in the use of clip art and preprinted type.
3.4	Develop skills in the use of a typewriter for strike-on image generation.

Code	
3.5	Develop skills in photocomposition.
3.6	Make proofs from hand set type.
SPR	Competencies in Screen Process Printing
4.1	List the basic materials and equipment needed for screen process printing.
4.2	Develop skill in preparing stencils for screen process printing.
4.3	Develop skills in using types of block-out.
4.4	Match various types of inks, stencils, and solvents for screen process printing.
4.5	Develop skills in making positives and negatives to use in the photographic indirect screen process printing method.
4.6	Make a two-color print.
4.7	Develop skills in making a stencil for screen process printing.
4.8	Develop skills in producing a multiple color printing job.
4.9	Demonstrate proper procedure used in opaquing.
POL	Competencies in Photo-Offset Lithography
5.1	List and describe the parts of the process camera.
5.2	Reduce and enlarge artwork.
5.3	Develop skill in preparing the camera for enlarged, reduced or 100% sized copies.
5.4	Expose and process a line negative and positive.
5.5	Differentiate between line negative and positive.
5.6	Differentiate between line copy, halftone copy, and continuous tone copy.
5.7	Develop skills in stripping and masking a flat.
5.8	Compare and contrast metal, plastic, and paper plates.
5.9	Explain the basic principles of offset operation.
5.10	Develop skill in operating the offset press.
5.11	Develop skills camera operations and darkroom procedures.
5.12	list the main parts of the offset press.
5.13	Develop skill in adjusting the offset press.
5.14	Develop skills in producing a multiple color printing job.
PHO	Competencies in Photography
6.1	Knowledge of history of photography.
6.2	Identify the six basic parts of a camera.
6.3	Build pinhole camera.
6.4	Knowledge of how a lens collects, bends, and focus' light.
6.5	Knowledge of depth of field and the use of f-stops.
6.6	Identify various types of cameras.
6.7	Explain the historical development of film.
6.8	Differentiate between panchromatic and orthochromatic film.
6.9	Identify the composition of film.
6.10	Knowledge of how light produces a picture.
6.11	Identify the basic characteristics of film.
6.12	Differentiate between artificial light and daylight with respect to film.
6.13	Identify different types of artificial light.
6.14	Clean the camera.
6.15	Demonstrate knowledge of typical loading procedures.

Code

6.16 Demonstrate knowledge of proper camera care.
6.17 Demonstrate knowledge of camera usage.
6.18 Identify elements of good composition.
6.19 Identify the major elements of a picture.
6.20 Identify materials needed for the development of roll film.
6.21 Demonstrate knowledge of loading the film tank.
6.22 Demonstrate knowledge of mixing, handling, and adding chemicals in their proper order
6.23 Demonstrate knowledge of proper film development and drying.
6.24 Demonstrate knowledge of proper techniques in contact printing.
6.25 Demonstrate knowledge of print developing.
6.26 Knowledge of mixing and storing of chemicals.
6.27 Identify the operations involved in using the enlarger.
6.28 Demonstrate knowledge in making an enlargement.
6.29 Demonstrate proper use of safelights.
6.30 Identify projection printing techniques - dodging, cropping, and burning.
6.31 Identify materials needed for contact printing.
6.32 Identify materials needed for projection printing.

References for General Graphic Arts

Competency Catalogs for Graphic Communications, Industrial Arts Education Service, Department of Education, Commonwealth of Virginia, Richmond, Virginia, 1979.

Graphic Communication Education Program, Clemson University, The South Carolina Department of Education, and the PICA Foundation, South Carolina Department of Education, 1977.

Pollock, Steve, and others, To Develop a Competency-Based Curriculum Guide for a Graphic Arts Vocational Program for Secondary Schools, Bureau of Occupational and Adult Education, Washington, DC, 1977.

GENERAL METALS - MET

General Metals is a broad based laboratory course planned to provide a compreheasive introduction to the technology of different metals and metalworking processes - both its theory and practice. The content should include activities and instruction in at least three(3) of the following areas: (1) sheet metal, (2) foundry, (3) welding, and (4) machine shop.

Code GME	Generic Competencies for General Metals
1.1	Identify safety rules to be observed in the metals laboratory.
1.2	Identify the kinds of metals used in the metals class.
1.3	Store tools.
1.4	Identify metal shapes.
1.5	Draw and read plans.
1.6	Fill out bill of materials.
1.7	Identify career opportunities in the metalworking industries.
1.8	Identify bench metal hand tools by name and use.
1.9	Select and use materials for polishing metals.
1.10	File metals to a smooth flat surface.
1.11	Perform heat-treating operations.
1.12	Identify and use basic layout tools.
1.13	Layout the work piece.
1.14	Dress the grinder by hand.
1.15	Cut stock on the vertical band saw.
1.16	Sharpen chisels and punches.
1.17	Sharpen drill bits by hand.
1.18	Clean metals with solvent.
1.19	Cut materials with hand hacksaw.
1.20	Drill metal using power drilling equipment.
1.21	Grind metal with power equipment.
1.22	Cut metal with power hacksaw.
1.23	Use wire brushes to clean metal.
1.24	Select metals for fabrication from blueprint specification.

SME	Competencies in Sheet Metal
2.1	Develop sheet metal patterns from drawings.
2.2	Layout design for construction of templates.
2.3	Layout sheet metal for parts fabrication using parallel line, radial line, and triangular line methods.
2.4	Trace templates on sheet metal.
2.5	Transfer design from blueprints to metal.
2.6	Identify various snips used to cut sheet metal.
2.7	Cut sheet metal using sheet metal snips.
2.8	Cut Sheet metal using Do-All Saw.
2.9	Cut sheet metal using hand hacksaw.
2.10	Cut sheet metal using squaring shears.
2.11	Cut sheet metal using throatless shears.
2.12	Bend sheet metal using hand seamers to produce an edge.
2.13	Form sheet metal with stakes and mallets.
2.14	Bend sheet metal with the bar folder.

2.15 Form sheet metal with a beading machine.
2.16 Form sheet metal with the Box and Pan Brake.
2.17 Form sheet metal with the Hand Brake.
2.18 Form sheet metal with the Slip Form Roll.
2.19 Form single and double hems on Bar Folder or Brake.
2.20 Drill sheet metal parts.
2.21 Fasten sheet metal parts using rivets.
2.22 Fasten sheet meatl parts using bolts.
2.23 Fasten sheet metal parts using epoxy adhesives.
2.24 Fasten sheet metal parts with sheet metal screws.
2.25 Punch sheet metal parts to produce assembly holes.
2.26 Ream holes in metal for fasteners.
2.27 Remove frozen or stripped screws.
2.28 Remove rivets.
2.29 Tap holes in metal.
2.30 Oxyacetylene weld sheet metal parts.
2.31 Solder sheet metal parts with propane torch.
2.32 Spot weld sheet metal parts.

FOU Competencies in Foundry

3.1 Identify tools and materials needed for heat treating.
3.2 Demonstrate knowledge of heat treating metals.
3.3 Identify foundry tools by name and use.
3.4 Demonstrate knowledge of forging metal.
3.5 Identify tools and materials needed for sand casting.
3.6 Identify parts of a flask.
3.7 Demonstrate knowledge of sand casting.

WEL Competencies in Welding.

4.1 Identify equipment needed for oxyacetylene welding.
4.2 Set up oxyacetylene equipment.
4.3 Open cylinder valves and adjust regulators.
4.4 Adjust torch for different flames.
4.5 Demonstrate knowledge of shutting down oxyacetylene equipment.
4.6 Bead weld on mild steel without filler rod.
4.7 Run beads on mild steel with filler rod.
4.8 Butt weld mild steel.
4.9 Lap weld mild steel.
4.10 Fillet weld mild steel.
4.11 Set up oxyacetylene equipment for cutting metals.
4.12 Identify equipment needed for arc welding.
4.13 Set up and operate arc welder.
4.14 Run bead on flat metal.
4.15 Tack weld mild steel in horizontal position.
4.16 Butt weld mild steel in horizontal position.
4.17 Lap weld mild steel in horizontal position.
4.18 Fillet weld mild steel in horizontal position.
4.19 Set up and tack weld tee-joints.
4.20 Demonstrate knowledge of various welding electrodes.

MSH Competencies in Machine Shop

5.1 Thread Stock with hand taps and dies.
5.2 Maintain the lathe.
5.3 Grind lathe tools.
5.4 Face stock on the lathe.
5.5 Turn stock on the lathe.
5.6 Drill and ream on the lathe.
5.7 File and polish on the lathe.
5.8 Knurl stock on the lathe.
5.9 Hand thread stock on the lathe.
5.10 Align lathe centers.
5.12 Groove and part on the lathe.
5.13 Chase external threads on the lathe.
5.14 Grind stock on the lathe.
5.15 Maintain the drill press.
5.16 Set up and operate the drill press.
5.17 Ream stock on the drill press.
5.18 Maintain the shaper.
5.19 Set up and operate the shaper.
5.20 Maintain the milling machine.
5.21 Set up and operate the milling machine.
5.22 Square work on the milling machine.
5.23 Perform end milling operations.

References for General Metals

A Catalog of Performance Objectives, Criterion-Referenced Measures and Performance Guides for Combination Welder, Vocational-Technical Education Consortium of States, The Florida State Department of Education, Division of Vocational, Technical and Adult Education and the University of West Florida, Pensocola, Florida, 1976.

A Catalog of Tasks, Performance Objectives, Performance Guides, Tools, and Equipment for Sheet Metal Worker, Vocational-Technical Education Consortium of States, The Bureau of Vocational Education, State of Delaware, June 30, 1978.

Competency Catalogs for General Metals, Industrial Arts Education Service, Department of Education, Commonwealth of Virginia, Richmond, Virginia, 1979.

Murwin, Roland. Sheet Metal, Performance Objectives, Basic Course, Duval County School Board, Jacksonville, Florida, July 1973.

GENERAL POWER MECHANICS - PME

The course of General Power Mechanics is a broad look at different power systems. The content should include activities and instruction in at least three (3) of the following areas: (1) auto mechanics, (2) fluid power, (3) transportation, (4) power generation, and (5) power transmission.

Code GPM	Generic Competencies
1.1	Obtain parts from stock room.
1.2	Identify, inspect, clean, and repair hand tools.
1.3	Identify, inspect, and repair cutting tools.
1.4	Identify aspects of a defensive attitude in the laboratory.
1.5	Identify six safety precautions to be observed when handling gasoline.
1.6	Define carbon monoxide gas.
1.7	Identify the characteristics of carbon monoxide gas.
1.8	List precautions to be observed when dealing with carbon monoxide.
1.9	Identify safety precautions for the use of hand tools.
1.10	Define work.
1.11	Identify measurement of work.
1.12	Define energy.
1.13	Identify occupational employment areas of power and transportation industries.
1.14	Identify opportunities and responsibilities of employment.
1.15	Identify areas of environmental concern of the power and transportation industry.
1.16	Identify ways power usage has affected our environment.

AME	Competencies in Auto Mechanics
2.1	Service and replace batteries.
2.2	Evaluate charging system.
2.3	Service charging system regulators.
2.4	Replace generators and alternators.
2.5	Repair generators and alternators.
2.6	Test cranking system.
2.7	Repair starters.
2.8	Enspect and replace points and condensers.
2.9	Set ignition timing.
2.10	Maintain spark plugs.
2.11	Maintain electronic ignition.
2.12	Service distributor.
2.13	Adjust engine performance.
2.14	Maintain fuel filter.
2.15	Service carburetor air cleaner.
2.16	Repair and replace fuel lines and hoses.
2.17	Check fuel flow pressure.
2.18	Replace fuel pump.
2.19	Check cooling system.
2.20	Replace hoses, thermostats, and core plugs.
2.21	Perform cylinder balance test.
2.23	Perform cylinder leakage tests.

2.24 Inspect engine lubrication system.
2.25 Change engine oil and filter.
2.26 Inspect hydraulic brake systems.
2.27 Inspect and repair drum brake components.
2.28 Repair and replace brake shoes and drums.
2.29 Lubricate suspension components.

FPO Competencies in Fluid Power

3.1 Differentiate between a liquid and a gas.
3.2 Know why a study of fluid power is necessary.
3.3 Know the differences between fluid movement and electrical and mechanical movement.
3.4 Identify uses of fluid power.
3.5 Identify the basic components of hydraulic system.
3.6 Identify the characteristics of fluids.
3.7 Identify the laws that apply to fluids.
3.8 Know applications of hydraulic systems.
3.9 Define pneumatics.
3.10 Identify laws controlling pneumatic uses.
3.11 Identify the basic cycle of a refrigeration unit.
3.12 List applications of refrigeration units.
3.13 Identify common characteristics of hydraulic and pneumatic systems.
3.14 Identify differences between hydraulic and pneumetic systems.
3.15 Define vacuum.
3.16 Identify uses of vacuums.
3.17 Explain the operation of a vacuum.
3.18 Identify individual parts of a hydraulic input system.
3.19 Explain the operation of a hydraulic system.
3.20 Compare hydraulic input sources to mechanical and electrical input sources.
3.21 Identify individual parts of the pneumatic components.
3.22 Differentiate between pneumatic sources and hydraulic sources.
3.23 Identify common types of directional flow valves.
3.24 Identify the parts of a two-way valve.
3.25 Identify components that are protected by relief valves in a fluid system.
3.26 Adjust relief valves to a given pressure.
3.27 Demonstrate knowledge of a pressure reducing valve.
3.28 Differentiate between back-pressure and check valves.
3.29 Identify adjustable orifice valves.
3.30 Identify various checking mechanisms.

PGE Competencies in Power Generation

4.1 Identify seven sources of power.
4.2 Define seven sources of power.
4.3 Define power technology.
4.4 Identify man's application of power
4.5 Identify four methods of early man's conversion of power sources.
4.6 Identify major inventions in power conversion.
4.7 Write brief history of steam engine.
4.8 Identify basic parts of steam engine.
4.9 Define energy.
4.10 Identify two types of energy.
4.11 Define power.
4.12 Calculate power.

Code

4.13 Define horsepower.
4.14 Calculate horsepower.
4.15 Identify the six basic machines.
4.16 Identify three ways basic machines change or alter applied force.
4.17 Identify examples of a changed force.
4.18 Identify internal combustion engines.
4.19 Identify uses of internal combustion engine.
4.20 Identify basic parts of an engine.
4.21 Define external combustion engines.
4.22 Identify types of steam engines.
4.23 Identify energy path of a steam engine.
4.24 Knowledge of the development of the steam engine.
4.25 Knowledge of stationary steam engines.
4.26 Remove and clean fuel tanks and fuel lines.
4.27 Remove, clean, and re-install fuel filter systems.
4.28 Service oil bath oil cleaner.
4.29 Service the foam type air cleaner.
4.30 Service the dry element air cleaner.
4.31 Disassemble, clean, and reassemble a pulsation type, vacuum type, and float type carburetors.
4.32 Adjust carburetor float valve.
4.33 Disassemble, clean, and reassemble a fuel pump.
4.34 Fine tune carburetor.
4.35 Clean crankcase breather.
4.36 Check and replace field winding if necessary.
4.37 Clean commutator.
4.38 Check manual starter for proper operation.
4.39 Replace a defective or worn starter spring.
4.40 Replace starter clutch if needed.
4.41 Replace a friction brake.

TRA Competencies in Transportation

5.1 Identify internal combustion engines.
5.2 Identify use of each internal combustion engine.
5.3 Identify means of transportation.
5.4 Identify transportation power sources.
5.5 Identify basic parts of an engine.
5.6 Define external combustion engine.
5.7 Identify types of steam engines.
5.8 Identify a steam locomotive and its parts.
5.9 Identify the basic parts of a railroad steam engine.
5.10 Identify four ways power is transmitted from fource to work.
5.11 Identify methods of power transmission.
5.12 Identify application of power transmitting machines.

References for General Power Mechanics

A Catalog of Performance Objectives, Criterion-Referenced Measures, and Performance Guides for Small Engine Repair, Vocational-Technical Education Consortium of States,

South Carolina Department of Education, Office of Vocational Education, Columbia, South Carolina, 1977.

A Catalog of Performance Objectives, Tasks, Performance Guides, Tools, and Equipment, Vocational-Technical Education Consortium of States, Division of Vocational Education, Louisiana State Department of Education, Baton Rouge, Louisiana, May 16, 1979.

Competency Catalogs for General Power Mechanics and Transportation, Industrial Arts Education Service, Department of Education, Commonwealth of Virginia, Richmond, Virginia, 1979.

Goldsbury, Paul and others, American Industries, Junior High, Pre-Vocational, Power and Transportation, Duval County School Board, Jacksonville, Florida, July, 1975.

Industrial Arts Program Goals, and Competencies, Oregon State Department of Education, Salem, Oregon, 1974.

GENERAL WOODS - WOD

General Woods is a comprehensive laboratory course planned to provide the student with meaningful experiences in working with wood related tools and machines. The content should include activities and instruction in all of the following areas: (1) wood technology, (2) cabinetmaking, and (3) carpentry.

Code G/WT	Generic Competencies/Wood Technology
1.1	Acquire an awareness of woodworking occupations.
1.2	Acquire an awareness of General Laboratory safety.
1.3	Acquire an awareness of the nature of wood.
1.4	Differentiate between hardwoods and softwoods.
1.5	Describe the structure of a tree.
1.6	Acquire a knowledge of wood grain.
1.7	Describe lumber seasoning.
1.8	Acquire a knowledge of lumber defects.
1.9	Develop skill in computing board feet.
1.10	Describe the characteristics of plywood.
1.11	Describe the characteristics of veneers.
1.12	Describe the characteristics of hardboard and fiberboard.
1.13	Develop skill in planning.
1.14	Develop skill in using layout tools.
1.15	Develop skill in using hand saws.
1.16	Develop skills in the use of hand planes.
1.17	Develop skill in the use of the chisel, gouge, and carving tools.
1.18	Develop skill in the use of the miter box.
1.19	Develop skill in the use of Surform Tools and wood files.
1.20	Develop skill in the use of the hand scraper and cabinet scraper.
1.21	Develop skill in the use of hand boring tools.
1.22	Develop skill in selecting and using nails and screws.
1.23	Develop skill in selecting and using fasteners.
1.24	Acquire knowledge of adhesives.
1.25	Develop painting skill.
1.26	Develop skill in using the table saw.
1.27	Develop skill in using the band saw.
1.28	Develop skill in using the scroll/jig saw.
1.29	Develop skill in using the drill press.
1.30	Develop skill in using portable electric drill.
1.31	Develop skill in using the electric hand sanders.
1.32	Develop skill in using the Sabre Saw.
1.33	Acquire a knowledge of common machine cuts.
1.34	Develop skill in using the radial arm saw.
1.35	Develop skill in using the portable circular saw.

CAB	Competencies for Cabinetmaking
2.1	Apply edge banding.
2.2	Apply laminate to core.
2.3	Apply metal molding.
2.4	Apply veneer to core stock.

2.5	Apply wood edges.
2.6	Cut plastics to size.
2.7	Cut veneers.
2.8	Plane joints.
2.10	Trim edges.
2.11	Assemble clamping devices.
2.12	Assemble drawers.
2.13	Assemble joints.
2.14	Assemble panels.
2.15	Attach molding.
2.16	Fasten parts with nails.
2.17	Fasten parts with screws.
2.18	Fasten parts with staples.
2.19	Fasten top to case work.
2.20	Fasten wood with bolts.
2.21	Install catches.
2.22	Install doors.
2.23	Install drawer rail and guider.
2.24	Install glass and mirrors.
2.25	Install hinges.
2.26	Install pulls and knobs.
2.27	Install shelves.
2.28	Reinforce joints with blocks.
2.29	Reinforce joints with dowels.
2.30	Reinforce joints with splines.
2.31	Cut butt joints.
2.32	But dado joints.
2.33	Cut dowel joints.
2.34	Cut lap joints.
2.35	Cut miter joints.
2.36	Cut mortise and tenon joints.
2.37	Cut out frames and panels.
2.38	Cut rabbit joints.
2.39	Cut spline joints.
2.40	Cut tongue and grove joints.
2.41	Square up solid stock.
2.42	Apply antique glazes.
2.43	Apply lacquers.
2.44	Apply linseed oil.
2.45	Apply paints.
2.46	Apply shellac.
2.47	Apply stains.
2.48	Apply varnish.
2.49	Apply waxes.
2.50	Apply wood filler to nail or screw holes.
2.51	Apply wood plugs to nail or screw holes.
2.52	Bleach surfaces.
2.53	Clean surfaces.
2.54	Swell dents.
2.55	Fasten base cabinets to walls.

Code

2.56 Fasten wall cabinets to walls.
2.57 Fit and trim cabinets.
2.58 Develop skill in using the planer/surfacer.
2.59 Develop skill in using the jointer.
2.60 Develop skill in using the shaper.
2.61 Develop skill in using the belt and disc sander.
2.62 Develop skill in using the router.
2.63 Acquire a knowledge of wood-turing tools.
2.64 Develop skill in using the wood lathe.
2.65 Develop skill in using the oscillating spindle sander.
2.66 Develop skill in using the band saw.
2.67 Develop skill in using the drill press.

CAR Competencies in Carpentry

3.1 Level with carpenters level.
3.2 Drive and set nails.
3.3 Identify framing components.
3.4 Install columns and sills.
3.5 Install floor joints.
3.6 Install bridging and sub-floors.
3.7 Frame wall openings.
3.8 Frame exterior walls.
3.9 Frame interior walls.
3.10 Plan a roof.
3.11 Install a ceiling frame.
3.12 Frame an equal pitch roof.
3.13 Frame a Gambriel Roof.
3.14 Build roof trusses.
3.15 Build framing gables.
3.16 Install wall sheathing.
3.17 Install roof flashing.
3.18 Install shingles.

References for General Woods

Competency Catalogs for Woods Technology, Industrial Arts Education Service, Department of Education, Commonwealth of Virginia, Richmond, Virginia, 1979.

Occupational Inventory for Cabinetmaker, Vocational-Technical Education Consortium of States, State of Tennessee, Department of Education, Nashville, Tennessee, 1978.

Catalog of Performance Objectives, Criterion Referenced Measures, and Performance Guides for Carpenter, Vocational-Technical Consortium of States, Bureau of Vocational Education, State Department of Education, Frankfort, Kentucky, 1975.

INDUSTRIAL MATERIALS AND PROCESSES - IMP

Industrial Materials and Processes is a course designed to study a variety of materials, such as ceramics, plastics, and how the materials are converted into different products. The content should include activities and instruction in all of the following areas: (1) plastics, (2) masonry, and (3) structural ceramics.

Code	
PLA	Competencies in Plastics
1.1	Develop knowledge in the different types of plastics.
1.2	Develop skills in transferring plastics.
1.3	Develop skills with tools used for sawing plastics.
1.4	Develop skills with tools used for dressing edges.
1.5	Develop skills in drilling, tapping, and threading plastics.
1.6	Develop skills with tools used for carving.
1.7	Develop skills needed for the joining.
1.8	Develop skills in the cold method of coloring.
1.9	Develop skills in injection molding.
1.10	Develop skills in vacuum forming.
1.11	Develop skills in casting.
1.12	Describe the basic structure of a polymer.
MAS	Competencies in Masonry
2.1	Identify body mechanics for lifting.
2.2	Blend mortar by hand.
2.3	Blend mortar using a machine.
2.4	Identify tools and materials.
2.5	Construct return corner.
2.6	Lay brick in a line.
2.7	Perform motion studies.
2.8	Spread mortar.
2.9	Read mason's rule and layout story pole.
2.10	Identify and remove mortar stain.
2.11	Lay block in a line.
2.12	Read modular rule and layout story pole.
2.13	Estimate for Parge and Stucco.
2.14	Set up and parge foundation.
2.15	Layout tile.
2.16	Install ceramic wall tile.
2.17	Install cloor tile.
2.18	Grout tiles.
2.19	Construct straight stone veneer wall.
2.20	Calculate concrete and concrete blocks.
SCE	Competencies in Structural Ceramics
3.1	Specify the nature, properties, and ingredients of ceramics.
3.2	Develop knowledge of ceramic materials.
3.3	Develop skills in designing with ceramics.

Code

3.4 Develop skills in wedging.
3.5 Develop skills in shaping.
3.6 Develop skills in making molds.
3.7 Develop skills in casting with slip clay.
3.8 Develop skills in decorating the surface of ceramic objects.
3.9 Develop skills in the use of glazes.
3.10 Develop skills in firing.

References for Industrial Materials and Processes

Abramson, Theodore, and others, Instructional Support System--Occupational Education Building Industries Occupations, New York State Education Department, Albany Division of Occupational Education Instruction, September, 1977.

Catalog for Performance Objectives, Criterion Referenced Measures, and Performance Guides for Carpenter Vocational-Technical Consortium of States, Bureau of Vocational Education, State Department of Education, Frankfort, Kentucky, 1975.

Competency Catalogs for General Industrial Arts I and II, Industrial Arts Education Service, Department of Education, Commonwealth of Virginia, Richmond, Virginia, 1979.