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ABSTRACT

This paper outlines a method of transforming traditional learning methods into a competency-based approach in a series of steps. The paper is organized in three sections. The first section defines competency-based education (CBE) and explains how this approach differs from traditional education. It also advances reasons why the competency-based approach is superior to traditional methods. In the second section, the paper outlines the steps to be taken to make the transition to CBE. These steps include focusing instruction on specific competencies (tasks) rather than on content or material, and shifting from large-group instruction delivered by or dependent on the instructor to a modularized, well packaged and well media approach in which students can master each task at their own pace before going on to the next. The final section deals with management concerns and approaches in competency-based learning, such as planning each student's work, keeping up with daily and weekly progress, and organizing and managing the facility (learning resource center). Samples of instructional materials and administrative materials are included in the outline. (KC)

Going From Traditional To CBE Without Going Crazy

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Going From Traditional To Competency-Based Without Going Mad

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I. What Is "Competency-Based Education?

A. Goes by many lables: personalized instruction, individualized instruction, programmed learning, mastery learning, performance based instruction, etc. Each of these terms are not entirely synonomousbut are loosely inter-changerable.

B. Arose out of criticism of the "conventional", system. Among the often heard criticisms of the more conventional approach to education and training are:

1. Often, instructors and students are not sure exactly what is to be learned.
2. There is lack of a systematic, well thought out approach to curriculum.
3. Not enough high quality student learning materials are available or, are used.
4. Students are forced to move on to the next learning task before fully mastering the one they are on.
5. Students complain about long, boring lectures, too many lengthy reading assignments, not enough hands-on work and irrelevant activities.
6. Trainees must sit through instruction in tasks they have already mastered previously.
7. Too few trainees reach a high level of proficiency in each task.
8. Too must subjectivity in evaluation and grading.
9. Many marginally competent students slide by with low grades and yet successfully complete the programme.
10. New students must wait weeks or months to begin training, even when there are vacancies.
11. Too many trainees drop out and never complete trairing programmes.
12. When the instructor leaves, too often, the curriculum leaves too.
13. All students are treated the same - they must start at the same point, proceed with the group and exit at the same point.
14. Students spend too little time actually engaged in learning.
15. Students are given very little feedback about how well they may or may not be learning along the way.

C. Basic Differences Between the Competency-Based and the Traditional Approach (Handbook for Developing Competency-Based Training Programs by William Blank, Prentice-hall. 1983):

	COMPETENCY-BASED EDUCATION (CBE)	TRADITIONAL
WHAT Students learn (outcomes)	CBE programs are based on precisely stated, occupationally verified competencies or tasks required by successful workers on the job.	Traditional programs are usually based on instructional content taken from textbooks, course outlines and other sources removed from the job itself.
HOW Students learn (instruction)	Students learn from carefully developed, high quality packaged and mediated learning materials supported by instructor interaction at appropriate points.	Most or all of the instruction is delivered by live instructor demonstrations and lectures.
WHEN Students proceed from task to task (pacing)	Typically, students continue working on each task until a high level of mastery is reached and only then, move on to the next task.	Students usually proceed through the program as a large group spending predetermined time periods on each task. (50 minutes, 3 hours, 6 weeks, etc.).
IF Students learned (testing)	Each student must actually demonstrate ability to perform each task to a high level of proficiency before being considered competent.	Heavy reliance on paper and pencil testing and group testing. Marginal performance (C or D) may be acceptable

II. Making The Transition To CBE

A. Focus instruction on specific "competencies" (tasks) rather than content or material. These are usually listed on a task listing or competency profile. Approaches for identifying and validating competencies include:

1. Review of literature or other documents
2. Based on instructor's knowledge
3. Professional concensus
4. Observation of workers
5. DACUMprocess

PROGRAM TASK LISTING 0000 RVTC

TASK	HOURS	DEPT./PROG. IN 9273 INDUSTRIAL ELECTRICITY
A	12	PARTICIPATING IN ORIENTATION TO RVTC
01	7	Complete orientation to CBVE
02	3	Complete orientation to good work habits
03	2	Identify electrical and shop safety practices
B	552	ACQUIRING FUNDAMENTALS OF ELECTRICITY
01	10	Acquire general knowledge of electricity
02	15	Demonstrate and use ohm's law
03	10	Define electrical terminology and draw electric symbols
04	10	Analyze DC circuits with a volt-ohm-milliameter (VOM)
05	10	Calculate values in DC series circuits
06	10	Determine resistor values
07	15	Calculate values in DC parallel circuits
08	10	Connect batteries in DC circuits
09	15	Calculate and measure electrical energy
10	9	Identify conduction in liquids and gases
11	10	Identify magnetic properties and electromagnetism
12	10	Describe and test rectifiers and semi-conductors
13	10	Describe and analyze AC circuits
14	15	Analyze AC and DC circuits containing inductance
15	15	Identify and analyze AC and DC circuits containing capacitance
16	15	Analyze and calculate AC series circuits
17	15	Analyze and calculate AC parallel circuits
18	10	Describe generation of electromotive force
19	15	Connect DC generators
20	15	Connect DC motors
21	15	Describe basic principles of transformers
22	20	Make polyphase connections of transformers
23	15	Make polyphase connections using commercial transformers
24	10	Describe special transformer applications
25	20	Connect alternators
26	18	Connect single-phase AC motors
27	20	Connect three-phase motors
28	25	Identify principles of automatic motor controllers
29	30	Describe and connect DC motor controllers
30	80	Describe and connect AC motor controllers
	55	Work on special assignments
C	285	INSTALLING ELECTRIC WIRE AND EQUIPMENT
01	15	Determine electrical conductor ampacity and conduit conductor capacity
02	15	Identify wiring methods and materials (splicing)
03	15	Wire bell circuits
04	10	Wire ceiling light controlled by wall switch
05	10	Wire three-way switches
06	10	Wire four-way switches
07	10	Wire a switched receptacle
08	10	Install and connect a flourescent lamp
09	15	Explain the use of the National Electric Code (NEC)

B. Shift from large group instruction delivered by or dependent on the instructor to a modularized, packaged mediated approach in which each student can spend as much or as little time working on one taks to reach mastery before having to go on to the next.

Basic assumptions and principles:

1. The instructor can only be at one place at a time.

2. If various students are allowed to spend sufficient learning time on each task to reach mastery, they will soon be working on different tasks even if they start at the same time and place.

3. If students will be working on different tasks, something else other than the instructor must deliver the bulk of the routine, initial instruction in each task.

4. Most students can learn efficiently and effectively from well developed packaged and mediated self-instructional learning materials.

5. Most anything an instructor can demonstrate live can be captured on media.

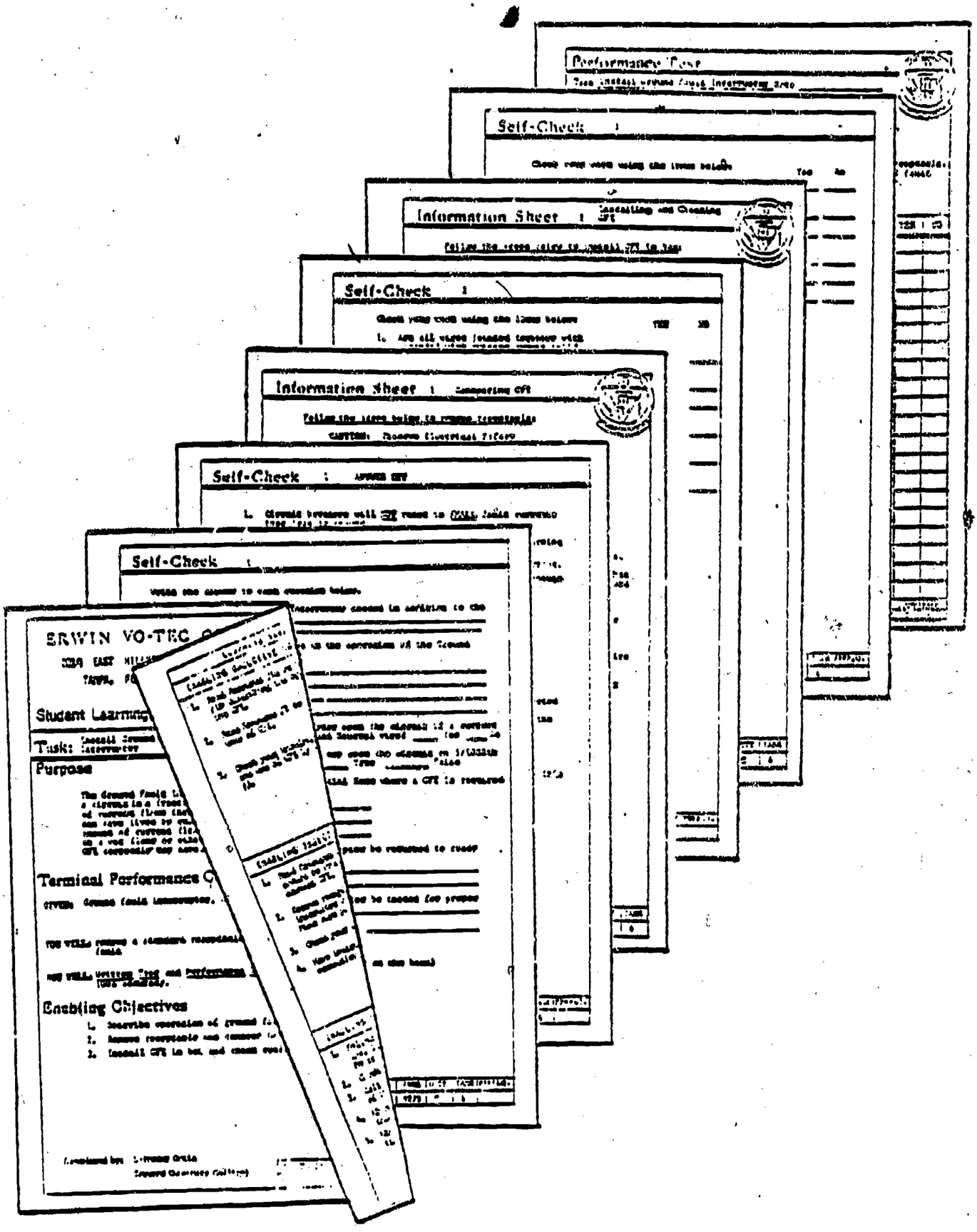
6. Most anything an instructor can explain verbally can be captured on tape or put in print.

There are two popular approaches to developing learning packages:

1. Self contained modules (everything is contained within the module itself.)

2. Student learning guides (the learning guide refers the student to a variety of already available, external learning resources.

3. Competency-based curriculum has three parts: (a) competencies, (b) existing resources to teach competencies (books, media, etc.). The missing link is (c) set of directions in how to use resources on a self-paced basis to master competencies.


Performance Test
Self-Check
Information Sheet
Self-Check
Information Sheet
Self-Check
Self-Check
ERWIN VO-TEC
Student Learning
Purpose
Terminal Performance
Enabling Objectives

Advantages of Using Packaged, Mediated Materials

1. The pace of instruction can be controlled by the student, not the instructor. When giving a lecture, the instructor can only guess at what the best rate should be. Whatever rate is followed, it is too fast for some and too slow for others. When the instructor controls the pace of instruction it's almost like someone else turning the pages for you as you read a book! They can only guess when to turn. Sometimes it will be too soon and you will miss some of what was on a page; sometimes it will be too late and you'll become bored or distracted waiting. Learning packages and media allow the student to decide when to turn the page, when to advance the filmstrip, when to attempt the practice.

2. Instruction can be stopped and restarted or repeated if necessary to learn efficiently. With learning packages the student can stop at most any point along the way and begin again in a few minutes, tomorrow or on Monday and pick-up exactly where he or she left off without missing anything in between. Another plus is the ability to repeat instruction as often as needed to learn. This simply is impossible in the group oriented approach. Once a lecture or demonstration or class discussion is over, its gone forever. It can never be repeated again. If a student failed to understand or was absent (physically or mentally) during a key portion, chances are, the group will move right on to the next topic. When instruction is captured on the printed page, in drawings, diagrams, videotapes, slides, etc., a student can repeat all or part of it twice, three times or how often needed to learn.

3. Students can spend most of their day actively engaged in learning. Many studies show that over half of the day in group instructional settings is wasted just getting the class settled, getting students all started on their work and keeping the group under control. Mastery learning studies show that when students have learning packages and media available, they spend the great majority of the day working rather than waiting for the lecture to begin or waiting for Johnny to sit still and be quiet so it can continue.

4. Learning materials are available when and where needed. If instruction is packaged and mediated and stored in a place easily accessible to students, instruction in each task is theoretically available 24 hours a day, 7 days a week, all year long. A student who was absent doesn't have to miss out. A student enrolling a month after school starts doesn't have to catch up. Materials can be used during the day, the evening, the summer and could even be taken home and used. They are available for use in the classroom, the shop, the lab, the library or at a remote site. They can be used where they are most useful.

A word about quality. Delivering instruction by learning packages is no different than delivering instruction by instructor lectures and demonstrations or by computer in terms of the need for quality. A poorly developed learning package is just as bad (actually worse) than a poorly prepared and delivered demonstration or lecture. Learning packages will only lead to mastery learning when they have been developed in a quality manner.

C. Move away from using the clock, calendar or schedule to dictate when students begin and end a task. Let students have some say (if appropriate) in which task they will learn next and how long they will spend on each task. Require students to fully master one task before going on.

D. Shift away from testing that is heavily paper and pencil oriented and that is done solely to evaluate learning. Incorporate more "self-checks" and other such informal tests that are designed to help students learn. Evaluate mastery of each task rather than waiting to give only a unit test, mid-term or final.

STATHS

SELF CHECK NO. 1

Dept. CST | Course PLUM | Duty B | Task 02

DIRECTIONS:

Evaluate your knowledge by completing these questions on a separate sheet of paper.

1. Match the terms on the right to the correct definitions.

_____ a.	Rigid plastic pipe	1. Tube
_____ b.	Name size of pipe rather than actua size	2. Galvanize
_____ c.	Plastic pipe which comes in a roll and uses slip-in fittings with clamps	3. Plumbing code
_____ d.	Laws and regulations which stipulate type, size and quality of pipe material to use	4. Nominal size
_____ e.	Short piece of pipe 12 inches or less in length	6. Nipple
_____ f.	Fluid-carrying pipe which has a thin wall	7. Flexible plastic pipe
_____ g.	To coat metal, by hot dipping, with zinc in order to prevent rusting	

2. Select six types of pipes used in residential plumbing by placing an 'X' in the appropriate blanks.

_____a. Black steel	_____f. P.E.
_____b. Galvanized steel	_____g. Ivory
_____c. Cast iron	_____h. Copper
_____d. Brick	_____i. Wood
_____e. PDT plastic	_____j. Vitrified clay

3. Match the types of copper pipe on the right to the correct identification colours.
(NOTE: Some colours identify two types of copper pipe.)

_____a. Yellow	1. L-soft	5 M-Rigid
_____b. Red	2. K-soft	6. L-Rigid
_____c. Blue	3. DMV-Rigid	
_____d. Green	4. K-Rigid	

Self-Check 2

Check your work using the items below:

	YES	NO
1. Are all wires jointed together with stranded wire twisted around solid wire?	____	____
2. Are all wire nuts secured tightly and are wire ends completely covered?	____	____
3. Are all joined wires color matched?	____	____
4. Are GFI Line wires connected to the circuit Line wires?	____	____
5. Are GFI Load wires and circuit Load wires connected?	____	____
6. Are all insulated wires without nicks or cuts?	____	____

DEPT	PROG	DUTY	TASK	PREREQ.
Indust	9273	C	6	

STATHS

KNOWLEDGE TEST

TASK NO. B 1 2

Dept. CST | Course ELEC | Duty B | Task 12

TASK: Analyze AC Circuits

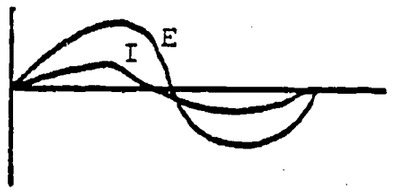
DIRECTIONS:

The items below are Multiple Choice. On the separate Answer Sheet, put the letter of the correct answer on the blank to the left of the number of the question.

DO NOT MARK ON THIS TEST!

1. For a circuit to be called AC it must change:
   a. direction.
   b. polarity.
   c. direction and polarity.
   d. phase.

2. In this diagram, the circuit is:



   a. in phase.
   b. not resistive.
   c. out-of-phase.
   d. a true DC circuit.

3. In a complete cycle, the voltage and current go to zero value:
   a. once.
   b. never.
   c. twice.
   d. three times.

4. The number of electrical degrees in a complete cycle is:
   a. 360.
   b. 180.
   c. 270.
   d. 90.

5. The time of one cycle is called the:
   a. frequency.
   b. period.
   c. abscissa.
   d. phase.

Student	Instructor	Date	Attempt	Result
			☐ ☐ ☐ ☐ 1 2 3 4	☐ Mastery ☐ Non-Mastery

PERFORMANCE TEST FOR TASK NO. E-05 | RVTC

TASK: Weld 3-Pass and 6-Pass Tee Joints in Flat Position

STUDENT'S NAME _____ DATE _____

DIRECTIONS TO STUDENT: At a school work station, you will weld 3-pass and 6-pass tee joints in the flat position. Based upon items listed below, your instructor's evaluation will determine if you are competent in this task.

ITEM NO.	ITEMS TO BE EVALUATED: For successful attainment ALL items must receive a "YES" response.	YES	NO
1.	Were the leg lengths of all 3-pass welds approximately equal?		
2.	Were the welds free of undercut and porosity?		
3.	Were the finished welds approximately the same size from end to end on each workpiece?		
4.	Was distortion held to a minimum?		
5.	Were the craters filled?		
6.	Were the throat sizes of all 6-pass welds approximately equal?		
7.	Was the surface ripple of all weld beads uniform?		

☐ ATTAINED
☐ NOT ATTAINED

Score _____ EVALUATOR'S SIGNATURE _____

DEPT.	PROG.	DUTY	TASK	ATTEMPT
IN	9943	E	05	

Page 1 of 1

RIDGE VO-TECH CENTER 1980

IN-9943-E-05

III. Management of Competency-Based Learning

A. Planning each student's work - Once enrolled, students need to know what they should accomplish and in what sequence if there is a required sequence. Typicall the student and instructor sit down together.and jointly decide what the student will accomplish during the upcoming week, weeks, month or other time period. Factors to consider in helping students to decide what to work on next include:

- what has the student just completed?
- in what areas are they most interested?
- availability of equipment, media, supplies in each area.
- have necessary prerequisites been mastered?
- grouping of students of similar levels, interest, etc.
- other factors.

B. Keeping up with daily and weekly progesss - This is one of the more pressing management concerns. Since students may be pacing themselves, theinstructor must be able to keep accurate tabs on who is working on what. Resons for this are:

- So necessary learning resources and materials can be made available when needed.
- So sutdents who are getting bogged down can be spotted and helped bofore becoming frustrated.
- For efficient scheduling of equipment, tools, work stations, live work, etc.

C. Organization and management of the facility - One of the often overlooked areas of management in implementing competency-based instruction is the design, layout and management of the physical facility. In the traditional approach, the facility is typically organized to accommodate a group of 20 or 30 students in a classroom area for lectures, theory, etc. and a shop, lab or work area for performing hands-on activities. This approach is not compatible with self-paced, individualized, mastery oriented programs.

On the following pages are shown layouts of calssrooms and labs for the more conventional group oriented approach and layouts for competency-based learning. One of the common changes that must be made in the traditional layout is to create a "learning resource center". This is some area(s) where individuals and small groups of students can read resource materials, view and listen to mediated materials, complete written assignments, etc.

Approaches to setting up a learning resource center include:

- convert entire classroom into LRC.
- convert a portion of classroom into LRC.
- utilize centralized LRC for several programs or departments.
- convert portion of shop or lab into LRC.

Typical areas included in the LRC might be:

- storage of modules
- storage of references
- storage of media
- storage of projectors, etc.
- conference table
- testing center(s)

SAMPLE

STUDENT:	AVTI MONTHLY STUDENT PLANNING FORM	MONTH:	NO.:
[illegible] Thompson		Ver.	3

Listed below are tasks planned for mastery this month:

Task	Begun	Mast.	Instr. Sig.
0-01	11-2	11-5	M. [illegible]
0-02	11-9	11-12	M. [illegible]
0-03	11-13		
0-04			
0-05			

Task	Begun	Mast.	Instr. Sig.
2-21			
8-131			
2-01			

Student No.	Program No.	Entry Date	Initials	Initials
481-72-9186	520	9-12	J. T.	M. S.

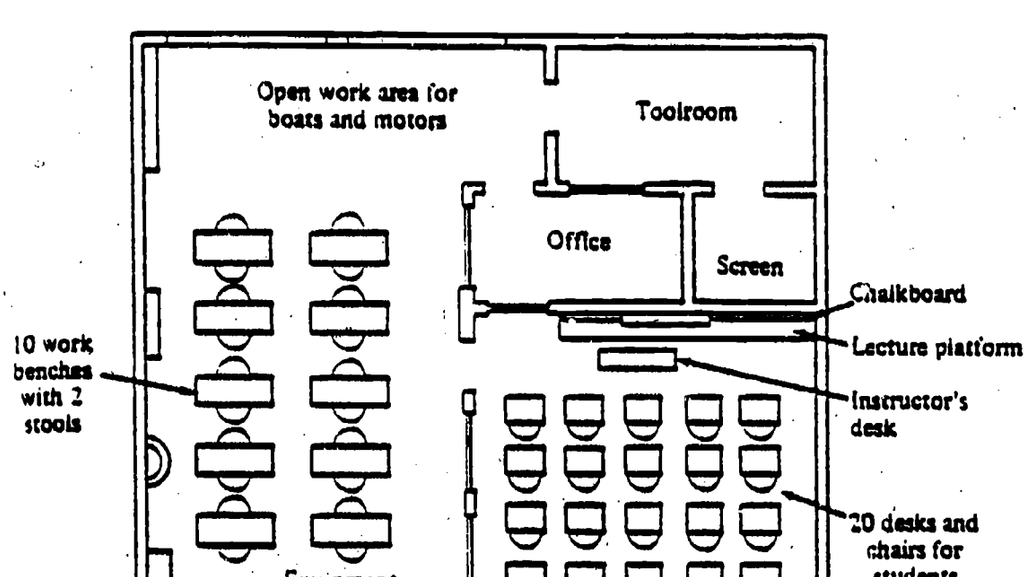


FIGURE 7-1 Traditional Classroom and Shop Layout for *Teaching*

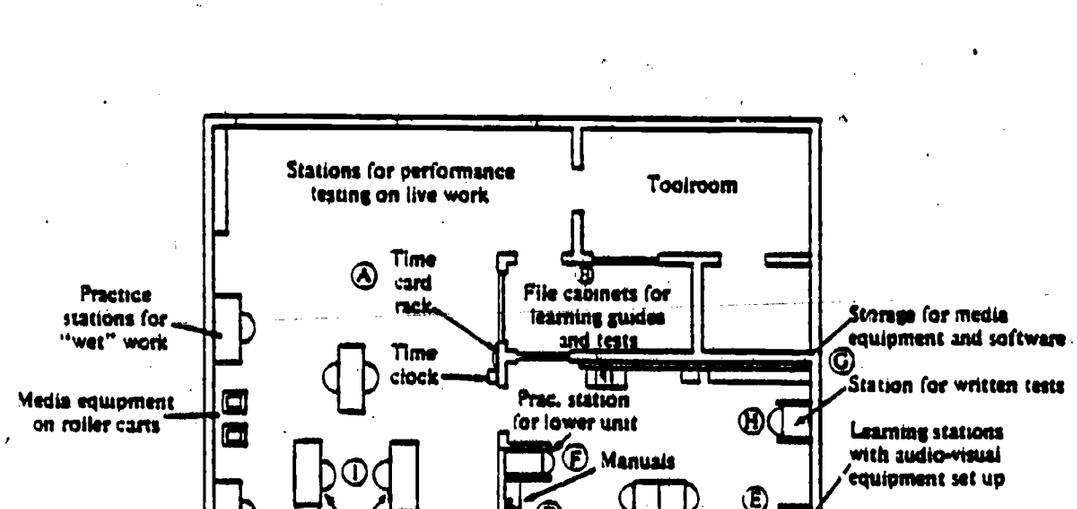


FIGURE 7-2 Layout of Classroom and Shop for Competency-based Learning

Sample

Record Of Tasks Mastered

Student Johnson, Charles D. Number 123-45-6789 Date 03/02

Program Motorcycle Mechanics Program No. 146875

Entry Date 01/12 Exit Date _____ Program Tasks 74 Mastered 10

Task No	Std Hrs	Task Name	Task Status
Duty A: Orientation, Hand Tools, Fasteners and Lubricants			
A-01	03	Fill out student forms	Mastered
A-02	04	Use a learning package to master tasks	Mastered
A-03	04	Use and care for common hand tools	Mastered
A-04	03	Select, use and remove various fasteners	Tested Out
A-05	03	Select and apply various lubricants	Mastered
A-06	04	Describe overall operation of motorcyle	Tested Out
Duty B: Servicing Wheels and Brakes			
B-01	12	Repair tires and tubes	Mastered
B-02	22	Remove and replace wheel hubs	------
B-03	18	Remove and replace wheel bearings	Mastered
B-04	08	Overhaul drum type brakes	Tested Out
B-05	24	Overhaul disc type brakes	Mastered
B-06	12	Set up and service new motorcycle	------
Duty C: Maintaining and Repairing Drive Train			
C-01	18	Overhaul primary drive	------
C-02	10	Service transmission	------
C-03	40	Overhaul transmission	------
C-04	12	Replace chain and sprockets	------
C-05	30	Overhaul drive shaft	------
Duty D: Servicing Fuel System			
D-01	08	Identify components of fuel system & describe their opera	Tested Out
D-02	20	Disassemble and service carburetor	Mastered
D-03	04	Clean and repair fuel tank and petcock	Tested Out
D-04	20	Troubleshoot slide type carburetor	Mastered
D-05	20	Troubleshoot C.V. type carburetor	Mastered
D-06	22	Troubleshoot fixed venturi type carburetor	------