DOCUMENT RESUME

ED 355 393   CE 063 241

TITLE   Job Enhancement Training (JET) Program. A
                 Demonstration Workplace Training Program in
                 Partnership with Armstrong World Industries, Inc.,
                 Pensacola, Florida. Training Period: May 1991-October
                 1992.
INSTITUTION   Pensacola Junior Coll., Fla.
SPONS AGENCY   Office of Vocational and Adult Education (ED),
                 Washington, DC. National Workplace Literacy
                 Program.
PUB DATE   Oct 92
CONTRACT   V198A10277
NOTE   159p.
PUB TYPE   Reports - Research/Technical (143) -- Guides -
                 Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE   MF01/PC07 Plus Postage.
DESCRIPTORS   Adult Basic Education; *Adult Literacy; Adult
                 Programs; Basic Skills; Course Content; Inplant
                 Programs; Lesson Plans; *Literacy Education;
                 Mathematics Instruction; On the Job Training;
                 *Outcomes of Education; *Program Effectiveness;
                 *Program Implementation; Reading Instruction; Skill
                 Development; *Social Environment; Two Year
                 Colleges
IDENTIFIERS   Armstrong World Industries; Pensacola Junior College
                 FL; *Workplace Literacy

ABSTRACT
         The Job Enhancement Training (JET) Program was a
partnership between Pensacola Junior College (PJC) and Armstrong
World Industries (Florida). The partners implemented a workplace
literacy training program at the company's Pensacola plant using a
five-phase social context curriculum model. The curriculum, based on
job analysis, used small-group settings to increase employees' skills
in mathematics, reading, writing, listening, speaking, and using
printed materials in actual job tasks. Employees also improved their
attitudes toward literacy and their jobs. During the program, the
employees' mean test score growth was one grade level, and employees'
scores on job tasks also improved measurably. The external
evaluator's final report, along with teacher observations, employee
comments, supervisor comments, and management comments indicated that
communication skills and confidence improved for the 184 JET
participants. The project is expected to be replicated in other
Armstrong plants. (Four appendixes, which make up about half of the
report, include a description of the curriculum knowledge base, job
enhancement training structured interview procedures, the JET exit
interview, and sample learning activities and lesson plans.)
(Contains 39 references.) (KC)

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JOB ENHANCEMENT TRAINING (JET) PROGRAM

A Demonstration Workplace Training Program
in Partnership with

Armstrong World Industries, Inc.
Pensacola, Florida

Training Period:
May 1991 - October 1992

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TABLE OF CONTENTS

2

TABLE OF CONTENTS CONTINUED

3

OVERVIEW

JOB ENHANCEMENT TRAINING (JET) PROGRAM

The Job Enhancement Training (JET) Program was an overwhelming success as a National Workplace Literacy grant program.

The JET Program was a demonstration grant partnership between Pensacola Junior College (PJC) and Armstrong World Industries, Inc. The partners implemented a workplace literacy training program at the Armstrong World Industries, Inc., Pensacola plant. A five-phase, social context curriculum model developed by the University of West Florida (Dixon-Krauss & Jennings, 1990) was used in the project.

The goal of this project was to train Armstrong employees in the basic literacy skills needed to perform current job duties and in those skills required for career advancement. Training targeted employees who lacked basic literacy skills.

The following measurable objectives were based upon the goal of the project.

1.) Implement a workplace literacy program at Armstrong World Industries Pensacola, Florida plant, that will serve 100 employees during the grant period. The employees will either maintain their present employment or advance in position.

2) Increase employees' literacy skills in the areas of mathematics, reading, writing, listening, speaking and using printed information with actual job tasks.

3)   Improve employees' attitudes toward literacy and their Armstrong job tasks.

4) Replicate the training model at two (2) other Armstrong Industries facilities by the end of the grant period.

The business partner, Armstrong World Industries, Inc., a ceiling tile manufacturing facility, clearly acknowledges that the goal of the JET program was achieved.

Results will clearly indicate that Objectives 1, 2 and 3 were achieved during the grant period. Objective 4 was not fully achieved during the grant period since the JET program has not yet been replicated at another Armstrong plant. However, the JET program has been continued beyond the grant period between the current business and educational partners. The curriculum model which was implemented during the grant period has been adopted as a model that works with the employees at the Armstrong ceiling tile facility.   Therefore, it is believed that Objective 4 will be achieved and the JET program will be replicated at other Armstrong facilities in the future.

Two general measures of the success of the JET program are the business partner's evaluation of the effectiveness of the program as it was implemented on-site with its employees and the quantitative measures of success obtained from comparisons of available test scores.

OBJECTIVE 1 - (ACHIEVED):   The following excerpt from a letter written on October 12, 1992, to the JET Project Director at Pensacola Junior College by the business partner

8

representative attests to the business partners' positive evaluation of the JET program. "The Job Enhancement Training Program has been an unqualified success, by many measures. Designed to serve a target population of 100 over the 18 month grant period, we have assessed approximately 190 of our 247 production and maintenance employees. Results in other areas of measurement are equally as impressive. We will have exited approximately 85 of the 150 current participants by the end of October, those 85 having achieved the competencies required to function adequately in the workplace."

OBJECTIVE 2 - (ACHIEVED): Pre and post test scores from the Test of Adult Basic Education were compared from a representative number of the employees enrolled in the JET Program. In each of the subtests and in the total battery, the mean change was over one grade level of growth. Of the 114 subtest scores in this group, only 18 (16% showed a decline between the pre- and post- test scores. The mean change in reading was 1.1 grade level, mathematics was 1.2 grade level, language and total battery were 1.3 grade level. Mean grade levels on the tests varied between 5.0 on the language pre-test and a high of 8.2 on the mathematics post-test.

The Job Task Activities Test which was developed by the grant staff at the ceiling tile facility, was based on an extensive analysis of the tasks done by the workers in the plant. Sixty-six employees had both pre- and post- test scores. The pre-test scores ranged from 11% correct to 100% correct with a mean of 54% correct. Post-tests ranged from 42% correct to 99%

correct with a mean of 80%. Changes in scores ranged from -23 to +70 with a mean of 26. When compared to the pretest score, these changes ranged from -23% of the original score to an improvement of 377% over the original score with a mean of 67% improvement over the original score. The business partner's postulated that an employee who performed at 80% or above on the Job Task Activities Test would likely be able to function adequately in the workplace.

OBJECTIVE 3 - ACHIEVED: The external evaluator's final report along with teacher observations, employee comments, supervisor comments, and management comments indicate that communication skills and confidence have improved for JET participants. Students said that they felt more confident, that they felt that could say things to the engineers when they came into the plant, and that they were not intimidated by discussions involving measurements and math as they had been in the past. The number of grievances is down, especially those centered around miscommunication.

OBJECTIVE 4 - PENDING ACHIEVEMENT: While the JET program was not replicated during the period of the federally funded grant, it is felt that with the continuation of the JET program beyond the grant period, replication at another facility is eminent.

The report that follows is a recapitulation of the intricate process involved in the successful implementation of the JOB ENHANCEMENT TRAINING PROGRAM.

Armstrong World Industries, Inc.
Job Enhancement Training Project

INTRODUCTION

This document provides an overview of the Job Enhancement Training Project (JET) conducted at the Armstrong World Industries Plant in Pensacola, Florida from May 1991 through October 1992. Funding for the project was provided through the U.S. Department of Education National Workplace Literacy Program. Additional funding was provided by Armstrong World Industries, Inc. in cooperation with in-kind support from Pensacola Junior College (PJC).

The JET Project is based on The University of West Florida (UWF) adult literacy curriculum model designed for workplace literacy training, and does not rely on traditional adult basic education instructional methodology (See curriculum knowledge base in Appendix A). This UWF social context model contains four phases: planning, assessment, transition, and maintenance. In the Planning Phase, common interest and needs of the social unit cluster are identified, employees are accessed through their social unit, and small learning groups are formed. Three intermittent Assessment Phase sessions are then conducted to identify employee self-perceptions used to guide content of the literacy instructional activities. The Transition Phase includes charting, graphing, mathematics, reading, writing, speaking, and listening activities to build peer support and transform employees negative resignations toward learning. This final Maintenance Phase contains more structured literacy activities used to teach employees self-

4

directive mediational devices that promote independence in continued literacy improvement. (Please refer to Appendix A for a more detailed review of the rationale/knowledge base for the social context activity model.)

ARMSTRONG NEED FOR JET PROJECT

Initially a key Armstrong administrator:

- Interviewed staff personnel to identify common tasks (such as completion of benefit enrollment forms, filing medical claims, completing Error Cause Removal and Maintenance Work Orders) with which employees required assistance. Problems noted included reading, writing and explanatory skills; unwillingness to ask for assistance, poor communications skills, and the unwillingness to indicate inability to write or read.

- Reviewed the history of employees who had requested transferring to maintenance department. A number of them had been unable to complete the requisite mathematics and reading courses, and had dropped out.

- Talked with Quality Assurance Manager and Supervisors about dimension claims which included employees' inability to read a rule, to calculate for production reporting and their lack of understanding of measurement charts of key process items.

5

- Reviewed the personal educational level of all employees, as well as age (for dates when in school, how long out of school).

- Discussed changes in the workplace which included a focus on continuous process improvement to ensure competitive position in marketplace and employee's need to make decisions about benefit plan participation (medical plan coverage, amount of life insurance, and savings plan participation).

- Examined the (1) elimination of Quality Inspectors, and assumption of responsibility for quality by all employees, (2) need for each employee to identify and write work orders for more highly participatory environment, (3) introduction of SPC (statistical process control) on line which requires measurement and an understanding by employees, (4) key measurement items as changeover times (to measure and then work to reduce these times), (5) need to understand numerically expressed data for process improvement, and (6) reduction of setup times required better understanding of tolerances.

Prior to the Job Enhancement Training Project, several efforts to teach SPC had been unsuccessful. When new IMD department was created, and people had the opportunity to bid, generally those who elected to go into it were those with less service and had been out

15

of school a shorter time. A significant part of the decision by longer service employees not to transfer to the new department was probably due to people needing to have "skills for high tech" environment, in order to take a more active part in all aspects of the decisions for which they felt less adequately prepared.

DEMOGRAPHICAL DATA

At the time the grant application was submitted to U.S. Department of Education, Armstrong World Industries Inc. had approximately 585 employees with 504 of them employed in production and maintenance. Of the 504 employees, 87% were males, and 13% were females. The average age of all 504 employees was 45 and the average years of service at Armstrong was 20. Approximately 62% were white and 38% were minorities.

However, employees' layoffs throughout 1990 and January, 1991, resulted in a reduced workforce of 365 employees in production and maintenance. The reduction in employees occurred during a series of 3 layoffs. Of the 365 production and maintenance employees, 96 (38%) of them still had not graduated from high school, 89% were males and 11% were females, 63% white and 37% minorities. The average age was 48.

The following describes the demographical data of the employees who participated in the JET Program:

- Number of employees enrolled in the JET Program: 184
- Number of male students: 149
- Number of female students: 35

- Average age of male students: 47.2 years
- Average age of female students: 42.9 years
- Average years of service at Armstrong among males: 22.5 years
- Average years of service at Armstrong among females: 16.8 years
- Average age of students: 46.8 years
- Average years of service at Armstrong among students: 21.6 years
- Number of students age 60 or above: 4
- Number of students age 50 or above: 68
- Number of students age 40 or above: 82
- Number of students age 30 or above: 30

GOALS AND OBJECTIVES

The goal of the Job Enhancement Training Project curriculum model is to use a group setting to move employees from states of isolation to the formation of shared and personal goals and motives for integrating literacy into the daily activities of the workplace. Attainment of this goal is dependent upon: (1) accessing and instructing employees through the social units in which they are grouped, and (2 using the concept of activity, a learning theory that acknowledges employee motives and goals as a product of each learning activity.

PLANNING PHASE

The planning phase was crucial for the success of the program. This phase consisted of several key elements: recruitment and selection of project staff, planning of instructional activities,

recruitment of employees as project participants, training project staff, arrangement of instructional facilities at the plant, and scheduling for instruction.

SELECTION OF PROJECT STAFF

The Job Enhancement Training (JET) project staff consisted of two teachers, one program coordinator, one facilitator, and one recruiter. The teachers were selected on the basis of their experience with adult learners. Program coordinator selection was based upon experience with adult learners in addition to industry and management experience.

Two project staff members were Armstrong retirees, each with 35 years of service to the company. They were selected for their familiarity with the day-by-day workings of the plant. Specifically, the facilitator was familiar with the complex shift schedules as well as the technological changes that had taken place at the plant over the last five years and are projected to continue into the future. The recruiter had established a very high level of credibility with the work force and became invaluable in breaking down any initial mistrust by the employees regarding management's motives in implementing the program. Employees were afraid that coming forward, admitting they need instruction, would label them negatively in the eyes of management. The reputations of the two retirees and confidentiality on the JET staff facilitated employees ability to overcome these fears.

10

Having former Armstrong employees as recruiters, allowed employees who had been identified by departmental supervisors to be in great need of basic skills training but who did not yet have the confidence to come forward and request training. These employees did enroll gradually, one at a time, due to the counseling and encouragement of the recruiter. The recruiter also served as liaison between the JET staff and the employees. There were times when employees had concerns that they were reluctant to share with the staff but felt comfortable sharing them with the recruiter.

INSTRUCTIONAL ACTIVITIES

This activity included planning learning activities which were related to the needs and interests of both the employees and Armstrong World Industries. Planning activities included identifying and collecting data on the employees as well as collecting job-specific instructional materials.

The UWF curriculum team worked closely with the project staff facilitator who had recently retired as a plant supervisor. This provided an ideal opportunity to collect basic data on the various job responsibilities employees were expected to perform in the various departments. Data from the job descriptions were analyzed to determine the functional skills in the areas of reading, math, and language. For example, the Distribution Center Operator used a variety of skills in the course of the workday.

> "Transport, load, unload, and check finished material
> into and out of the Distribution Center with a lift
> truck."

10

17

While this seems simple enough, the working procedure for accomplishing this job is complex and involved:

"Inspect cars and trucks prior to loading. Install '5th' wheel. Remove nails, bands, and debris. Inform DC Supervisor or Coordinator if unloadable conditions exist. Read instructions for loading order. Resequence material picks, as needed, after load assignment through Logisticon system. Give unitizing area mixed pallet configurations. Operate lift truck to pick pallet loads of material from Logisticon directed zones or racks. Transport directly to truck or unitizer area as directed. Determine the best method for loading. Notify Distribution Center Assistants when unloading assistance is required. Have a thorough working knowledge of the Logisticon system and its operating screens. Make sure vehicles are loaded correctly and that damaged material is taken to unitizer area. Determine best method for top loading material. On rail shipments, have doors closed and door seals properly installed. Perform cycle counts, as required. Coordinate the activities of the flatbed loading crews.

Coordinate the activities of an unloading crew to repalletize and/or mechanically unload finished stock. Operate lift truck and hand pallet transporter, as required, to remove material. Make sure that vehicles are unloaded correctly and that damaged material is taken to the unitizer. Transport unloaded finished stock material to the warehouse and stock in the Logisticon directed zones/rows and racks.

Use care while operating lift truck and other equipment to prevent damage to material. Check oil and water in truck every shift. Submit maintenance check sheet every shift. Refuel truck as required. Clean truck as necessary. Report as needed for truck maintenance. Maintain clean and orderly work area. Cleanup at the end of each shift. Observe safety precautions and Plant regulations to prevent injury to self and others. Maintain accurate reports as required."

Based on the materials used to perform all of these jobs on a daily basis at Armstrong, the following list was created:

Distribution Center Operator

Writing: Loading Diagram
             Vehicle Inspection Report
             Raw Materials Receiving Report

11

Shipping Department Load List (calculations to
            build loads for trailers)

Reading: Loading Diagram
           Vehicle Inspection Report
           Raw Materials Receiving Report
           Load List - Shipping Manifest
           Labor Contract (Rules of Employment, Benefits)
           Brochures
           Bulletins
           Plant Newspaper
           Correspondence from Medical Benefits Department
           Hourly Rate Brochure
           Mobile Equipment
           Training Program Materials
           Material Safety Data Sheet Basic Format
                 and Information
           Injury Reports

Math: Shipping Department Load List (Calculate number of
                 loads trailer will hold and number of full
           and mixed loads from load list)
           Pay Check

This list, the complete job description, and a sample of each
form appearing on the above list were put into a file folder and
color-coded according to department. These skills were then used
as the basis of curriculum development by the teachers and
coordinator for the duration of the program. The skills were also
competencies used for the development of the Job Task Analysis
Test.

RECRUITMENT OF PROGRAM PARTICIPANTS

     Initial identification of the employees for the training
program was done by self nominations, the facilitator and recruiter
in consultation with the Employee and Labor Realtions Manager. The
recruitment activity included a news release to all employees in
the plant making them aware of the JET project. Peer support, one

on one contacts, and social interaction were essential to developing individual motivation to volunteer in the program, (i.e., the product of the recruitment activity). Although variations existed between the different departments of the plant, interests common to all employees existed. The following structural elements of the recruitment activity included:

1. Begin each contact by stating up front that the Armstrong World Industries Inc. is beginning a job enhancement training program for employees. Explain the internal support incentives of the program.

2. Have each member of the group complete a sign-up flier that contains only their name, department and check yes/no box for interest in participation. Open admission to and confidentiality the program was essential for maintaining employees interest and motivation.

The initial recruitment efforts of the JET recruiter and facilitator and Armstrong's Human Resources Manager yielded approximately 150 employees interested in participating in the JET program. All 150 employees who expressed an interest in the program were granted two hours release time every week for participation in the JET Project.

PROJECT STAFF TRAINING

Staff training also occurred during the planning phase. The staff development program was designed to train the staff to implement the Social Context Activity Model of adult literacy instruction. Pre-service training included two components: (1) orientation to the project goals and strategies to adopt the model to the workplace environment, and (2) training in the design and implementation of the Social Context Curriculum. Orientation to

13

the project goals and worksite was conducted simultaneously with the curriculum training. The curriculum component of staff development included the following eight training topics:

1. Orientation to adult learners. A discussion of the research base used as a rationale for the curriculum design.

2. Orientation to the five phases of the curriculum.

3. Training in general teaching strategies used in the social context model.

4. Training in ·designing literacy instructional activities directly from printed material used on the job.

5. Training in designing Job Task Activities directly related to employee needs on the job.

6. Training on how to administer assessment and use the results to guide instruction.

7. Training in keeping assessment and anecdotal records on students.

Additionally, staff received training in Statistical Process Control (SPC) and Gainsharing from Armstrong personnel. SPC is a way of measuring a range of performance on a process in order to reduce variability in both quality and productivity. Gainsharing is a means of sharing the fruits of increased productivity and quality between the company and the employees. Staff were provided guided plant tours to expose them to the actual working tasks and as experienced by the employees. The staff was included in management meetings in order to become familiar with plant organization and operation. In addition, meetings with supervisors provided insight into the skills most needed on the plant floor.

14

PLANT INSTRUCTIONAL FACILITIES

During the planning phase, the physical facilities were also prepared. The Old Yard Lunchroom, approximately 20' x 15' was available and provided direct access to the plant floor. This was transformed to a dual classroom divided by a sound-soak partition. Two round tables, five feet in diameter, were placed on either side of the partition. Bookshelves were placed on either side also and were stocked with magazines donated by the Pensacola Junior College Library, used paperbacks donated by a local used book store, and functional adult workbooks covering the areas of math, reading, and language published by Paradigm, Steck-Vaugh, and Contemporary. Manipulatives for math instruction, including plastic blocks for teaching area and plastic cut-out circles and squares for teaching fractions, were ordered. Two chalkboards were mounted on either side of the room. Posters about metrics, the multiplication tables, problem-solving, and word-attack skills were put on the walls. Two PCs were purchased for the program by Armstrong. These were set up in a corner of the room. Instructional software for graphing, measuring, typing, reading, and writing was installed. As enrollment increased, a small conference room was designated as another classroom. One of the round tables and a bookshelf were taken from the original classroom to furnish it. Two additional PCs were put in the original classroom in their place and additional software was installed. Software programs used in this program were: Harvard Graphics, Professional Write, Lotus 1-2-3, Using graphs, charts and tables, Touch Typing for Beginners, Math

15

Practice, Level 2.4, Parts of Speech Level 3, Punctuation, Levels 2-4, Spelling, Levels 1-3, Vocabulary, Level 4, Reading for Information, Level 2, Reading for Meaning, Levels 1 and 2, Math Concepts, Levels P, 2, 3, 4 and Geometry 1 and 2.

SCHEDULING FOR INSTRUCTION

The final planning activity was scheduling instructional sessions. As with any instructional process among students of diverse interests and abilities, grouping is one of the most important aspects of transferring knowledge. Groups were designed to encourage cooperative learning through small group work, taking into consideration the needs and abilities of employees. Employees were grouped according to four established characteristics: the employee's previous educational background as determined by the structured interviews, their reading ability as determined by the informal reading inventory, scores on the TABE, and the employee's own goals. Groups were formed according to the time employees could be released from their work schedules. Attention was given to minimizing the least interruption in production within the various departments. Thus, the groups were made up of a mixture of employees from throughout the plant.

Data from the interview process allowed the staff to determine those employees who lacked a high school education and were interested in obtaining a GED. It also provided staff with information on employees' perceptions of their strengths and weaknesses in areas such as math, reading, and writing.

16

Allowing employees to determine particular areas of interest indicated the staff what the individual's goals were. These goals were broadened to include their goals for the workplace. Employees were also asked to decide which areas of instruction they felt were needed in their personal lives. In this manner, connections were made between the skills needed to perform their jobs and those skills that they used in their lives.

Logistically, the most important element in grouping employees for training was job schedules. Scheduling was done around five different operating schedules within the context of three rotating shifts and six different departments. A number of different shift schedules operate in the plant, thus, it was crucial that this be the starting point in grouping efforts.

The majority of the employees were on a 3-shift rotating scheduling. Nearly 72% of the students attend class two out of three weeks during the day shift (7 a.m. to 3 p.m.) and the afternoon shift (3 p.m. to 11 p.m.) During the third, or graveyard, shift (11 p.m. to 7 a.m.) no employee would attend class. The result was that the teachers saw a particular employee one week during the day shift, the next week during the afternoon shift, and the third week not at all. The fourth week started the entire rotation all over.

The next largest group schedule that had to be integrated was day shift. This shift accounted for 15% of all employees. These employees usually came from the Maintenance Departmen. which comprised persons who were usually very familiar with mathematics.

17

24

This shift also had the advantage of being able to attend class every week, instead of only two out of three weeks.

The three remaining shifts were made up of a 3-shift rotating on a two-week cycle, a 4-shift rotating schedule, and a 2-shift rotating schedule.

Armed with all of this information, the facilitator designed the schedule. It was also necessary for him to confer with plant supervisors to determine when it would be easiest to provide relief workers for those who left the line to come to class. At the beginning of the program, employees came to class two times a week for one-hour sessions. Based on employee, supervisor, and teacher feedback, the decision was made at the beginning of the second term to make the switch to one two-hour session per week.

Because of the complexity of scheduling, the following example is provided.

> Bill (a fictional employee), is in the Fabrication Department, which is involved in the cutting and shaping of ceiling tiles. He is on a rotating shift that has him working from 7 a.m. to 3 p.m. one week; from 3 p.m. to 11 p.m. the next week; and from 11 p.m. to 7 a.m. the third week. This shift rotation will continue throughout the year. Bill is not a high school graduate, but is a strong reader and requires only slight remediation in reading to place him at a ninth grade level. His TABE results show that he is below a ninth grade level in math and writing skills, but Bill feels that math is the more important of these two subjects as they relate to job performance. He feels that writing is important to him on a more personal level and would welcome some instruction in writing, but, again, prefers to concentrate on math. Bill's personal goal is to achieve a GED, but he does not know if he is ready for it.

Bill would then be grouped with other employees of the same or nearly the same interests and abilities. Strict adherence to this

18

grouping formula was not always practical, but it was the rule for all employees entering the program. Only scheduling conflicts had the power to override the importance of any other factors. In a situation in which an employee's attendance in class was irregular, class times were set aside to provide those employees with regular instructors and classmates.

Following these procedures for grouping employees, staff were able to approximate a homogeneous grouping of employees. Employees cooperated well within the groups because their needs and interests were often the same. Because they often came from the same department and shift schedule, most of the employees had already established patterns of working together.

When necessary, new groupings were assigned to accommodate advancing employees and to cope with any new employees coming into the program. Due to the fact that enrollment was open, new employees entered, were evaluated, and then assigned to a complementary group throughout the program. Occasionally, this addition of new employees overloaded certain class periods, which made it necessary to redistribute groups with each new term.

This redistribution of employees and groups had a number of benefits. It allowed employees the opportunity to apply cooperative skills in several different groups, extended the range of the instructors to implement cooperative learning strategies, and challenged employees with new learning situations.

ASSESSMENT PHASE

Assessment sessions were conducted following the recruitment of employees for participation in the program, to obtain base-line data on employees' job enhancement training needs. Informal data was also collected for individual employee folders containing writing samples and from teacher anecdotal reports maintained throughout the program.

In the first individual assessment sessions, employees were surveyed in reading, writing, and self-perceptions related to literacy instruction. Consistent with the concept of activity, assessment yielded the products of the activity, motives and goals related to the activity, and the process used by the employee during engagement in the activity. Products of the initial assessment activities and measures of reading and writing skill were not used to determine content for the curriculum instructional phases. Instead, data from surveys of students' self-perceptions provided diagnostic information that determined the content for instructional activities.

The Ekwall Informal Reading Inventory (IRI) (Allyn and Bacon, 1986) was administered to give a view of each employee engaged in a text reading activity. The IRI diagnostic focus was the employee's use of context, message information, syntax, and graphophonic knowledge to comprehend the text passages. Following the comprehension questions, the employees were asked how they figured out some of their answers. This type of informal text reading assessment frequently emerged later in the maintenance

phase of instruction. The Test of Adult Basic Education (TABE) test was also administered to determine baseline data on each employee's mathematics, language and reading abilities. The data from both the IRI and the TABE were used to group employees into groups for instruction.

Initial writing samples were collected by asking employees to write about their previous experiences in school reading or writing activities. The diagnostic focus of the writing assessment was on content. Identification of the employees' patterns of internalized failure which could affect their job enhancement training performance in the program were rated. Products from the writing assessment activity (i.e., spelling, mechanics, and sentence structure skills) were not used to determine specific writing skills taught in the instructional phases of the program.

A structured interview (See Appendix B, page 46) was conducted using the following questions relevant to the individual employee and the social unit. Questions related to the individual were structured to obtain information about school history, reading and writing in everyday life, speaking and listening performance, and strategies used when unknown words or difficult reading tasks are encountered. The social unit questions were structured to obtain information about employees' personal goals related to their past, present, and future employment, and to establish rapport with the teachers. Thus, it was very important to make employees feel as relaxed as possible.

21

The assessment data was analyzed to identify some basic employee characteristics common to the total group. In general, the employees expressed resignation toward learning and low expectations of success. They felt their jobs were good and improvement would help them very little at work. Many employees expressed a desire to learn to use computers and felt they need help in mathematics. Initially most employees could not see a direct connection between the job enhancement training and their jobs.

COMMUNITY OF LEARNERS

An important aspect of the Job Enhancement Training Project was to enhance each employee's ability to become a self-directed individual. Becoming self-directed was crucial for continuous learning to occur once the JET Project ended. Self-directed means personally initiated or one who relies on self or fellow-employees for self-improvement. Self-educated without formal instruction is the key to becoming a community of learners. The term, community of learners, refers to the concept of shared learning interaction and group modeling as originally proposed by the Soviet theorist Vygotsky. Since employees in the JET Project were already scheduled into small groups for instruction, it was easy to analyze the group for tasks and socioemotional roles.

A review of the literature on group dynamics showed the following nineteen (19) different roles people play in group

interactions (Benne & Sheats, 1948; Books, 1990; Hare, 1976). (See

Figure 1).

Figure 1: GROUP STRUCTURE
Task Roles and Socioemotional Roles in Groups.

Role	Function
	Task Roles
Initiator/contributor	Recommends novel ideas about the problem at hand, new ways to approach the problem, or possible solutions not yet considered.
Information seeker	Emphasizes getting the facts by calling for background information from others.
Opinion seeker	Asks for more qualitative types of data, such as attitudes, values and feelings.
Coordinator	Shows the relevance of each idea and its relationship to the overall problem.
Procedural technician	Cares for operational details, such as the materials, machinery, and so on.
Recorder	Takes notes and maintains records.
	Socioemotional Roles
Encourager	Rewards others through agreement, warmth, and praise.
Harmonizer	Mediates conflict among group members.
Compromiser	Shifts his or her own position on an issue in order to reduce conflict in the group.
Follower	Accepts the ideas offered by others and serves as an audience for the group.

Systematic and frequent use of small group procedures had profound positive impact upon the classroom climate as the instructional site became a community of learners. The small group arrangement allowed employees the opportunity to work together and enhanced each other's mathematical knowledge. This resulted in

24

their increased job proficiency, while at the same time, enhanced their own self-worth and trust in fellow employees.

Using small-group cooperative learning groups as a means to developing a community of learners, addresses these problems in several ways:

1. Small groups provide a social support mechanism for learning. Employees have a chance to exchange ideas, to ask questions freely, to explain to one another, to clarify ideas and concepts, to help one another understand the ideas in a meaningful way, and to express feelings about their learning. This is part of the social dimension of learning.

2. Small-group learning offers opportunities for success for all employees. Employees within groups are not competing one against another to solve problems. The group interaction is designed to help all members learn the concepts and problem-solving strategies.

3. Unlike many other types of problems in life, a job related problem can actually be solved in reasonable lengths of time, such as a class period. Moreover, job-task problems are ideally suited for group discussion in that they have solutions that can be objectively demonstrated. Employees can persuade one another by the logic of their arguments.

4. Job task problems can often be solved by several different approaches. Employees in groups can discuss the merits of different proposed solutions and perhaps learn several strategies for solving the same problem.

5. Employees in groups can help one another master basic facts and necessary computational procedures. These can often be dealt with in the context of the more exciting aspects of mathematics learning through games, puzzles, or discussion of meaningful problems.

6. The Armstrong World Industries Inc. Plant is filled with exciting and challenging ideas that merit discussion. One learns by talking, listening, explaining, and thinking of others, as well as by oneself. Buck (1962, p.563) puts it this way:

   "Let me remind you that employee-employee interactions are also important in learning, and that at any level, much can be learned from discussions between employees. Moreover, a test of understanding is often the ability to communicate to others; and this

25

32

act itself is often the final and most crucial step in the learning process."

7. The workplace offers many opportunities for creative thinking, for exploring open-ended situations, for making conjectures and testing them with data, for posing intriguing problems, and for solving non routine problems. Employees in groups can often handle challenging situations that are well beyond the capabilities of individuals at that developmental stage.

8. Small-group work, large-group discussions, and presentation of individual and group reports - both written and oral - provide an environment in which employees can practice and refine their growing ability to communicate mathematical and other thought processes and strategies. Small groups provide a forum for asking questions, discussing ideas, making mistakes, learning to listen to others' ideas, offering constructive criticism, and summarizing discoveries in writing. Whole group discussions enable employees to pool and evaluate ideas; they provide opportunities for recording data, sharing solution strategies, summarizing collected data, inventing notations, hypothesizing, and constructing simple arguments.

Employees' learning is supported when they have opportunities to describe their own ideas, hear others explain their thoughts, speculate, question, and explore various approaches. To provide for this, learning together in small groups gives them more opportunities to interact with concepts than do the traditional class discussions. Not only do employees have the chance to speak more often, but they may be more comfortable taking the risks of trying out their thinking during problem-solving situations in the setting of a small group. The JET Project sought to establish a community of learners in which working in cooperative groups is part of the basic culture of the classroom learning process. Such an environment maximizes the active participation of each employee and reduces the isolation of individuals. A setting that values

and promotes social interaction provides employees with an ingredient essential for learning.

In summary, a community of learners, with problems and search for strategies, can learn to work with problems, search for strategies and evaluate their solutions. The team coordinator/facilitator must have developed the following learning characteristics:

- Interest in finding solutions to problems.

- Confidence to try various strategies.

- Willingness to risk being wrong at times.

- Ability to accept frustration that comes from not knowing.

- Willingness to persevere when solutions are not immediate.

- Understanding of the difference between not knowing the answer and not having found it yet.

The leader then engages other employees in cooperative problem-solving lessons. With an understanding of the problem situation, the group can work toward finding solutions, and finally evaluate of the solutions. Specific teaching techniques are useful at each of these three stages: introducing, exploring, and summarizing.

During the introducing stage, the leader's goal is for the employees to understand the problem, the scope of solutions possible, and whatever guidelines are necessary to record their results. At this stage, some or all of these teaching steps are needed:

1. Present or review concepts that are needed.

34

2. Pose a part of the problem or a similar but smaller problem for the students to try.

3. Present the problem to be solved.

4. Discuss to make sure students understand what they are to do.

The leader must make sure all employees understand the tasks and know what's expected of them. It is useful to have students give examples and restate the problem to check their understanding.

Exploring begins when employees work cooperatively toward a solution. When the groups are working, the leader has two responsibilities.

1. Observe the interaction, listening to each group's ideas, strategies, and work procedures for use in summarizing.

2. Offer assistance when needed to keep the group working productively and independently.

In summary, there are three goals to accomplish:

1. Have groups share their processes, both group procedures and strategies used.

2. Have groups present their findings and solutions.

3. Generalize from the solutions by extending it to other workplace situations.

Before summarizing, it is important that all employees have ended their explorations and that their attention has returned to group discussion. It helps, if possible, to have the employees come together in a single gathering place to help them focus. They should be encouraged to listen and respond to each other's comments. It may be helpful for the leader to record data on the chalkboard or chart paper as it is presented.

It is from this direct experience with their co-workers that the group becomes more comfortable working and learning together as a community of learners.

TRANSITION/MAINTENANCE PHASES

Curriculum development and implementation were the major activities of the transition and the maintenance phases. The design of the curriculum for the JET Program was based upon and included a number of influences. Learning activities (see Appendix D for samples) involved the use of Armstrong workplace materials, meetings with Armstrong staff personnel, supervisor expressed needs, employee expressed needs, and instructor tours of the plant.

Early in the program the instructors evaluated the Armstrong workplace materials that were gathered and condensed by project facilitator. These identified skills that were inherent in the plantwide materials, as well as those skills that were required for each department.

Plantwide materials required such skills as:

1. paycheck calculations
2. time sheet calculations
3. reading plant published information, such as the plant newsletter, benefits brochures, and work orders.
4. reading graphs and charts

Departmental materials required such skills as:

1. plotting points on a coordinate graph
2. adding and subtracting decimals and fractions
3. basic keyboarding skills

The JET staff also consulted with Armstrong personnel to determine what skills are required on a daily basis at the plant. These consultations included workshops in SPC (Statistical Process Control) and Gainsharing.

Consultation also took the form of meetings with supervisors, which provided insights into which competencies gathered from the

30

plant materials, would be of use to employees on the floor. For example, supervisors brought out that employees often spent a great amount of time trying to set machinery to exact measurements, without considering the tolerances allowed. As a result, instruction moved to focus on the concept and use of tolerances.

Employees themselves, often provided valuable information on what was worth teaching, and what was not. It was explained to the employees from the very first structured interview, that the major force of the program was to help them strengthen their work related skills. Thus employees were aware that classroom instruction would be aimed at those skills needed in their own jobs. Employees, as was the case with supervisors, would quite often inform the teachers of those skills that were or not applicable to their situation. It is important to note here, that many employees specifically requested instruction on basic skills in math concepts, computation and application. Some employees also expressed the need in improving reading comprehension. Lessons were designed to meet these individual needs. For many employees, an understanding of the "basics" was essential before work related materials could be introduced.

The instructors also embarked upon numerous tours of the Armstrong plant, in order to observe first hand the skills being used on the plant floor. It was noted that graphs and charts are apparent almost everywhere in the plant, and are, in fact, a form of communication that is quite heavily relied upon at Armstrong. Paretto charts, for example, are a primary tool of SPC.

31

Specifically, the learning activities developed centered on the
following concepts:

CURRICULUM CONCEPTS

I. Application of Math Skills

   A. Computation
      1. Pay Check Calculations

   B. Measurement
      1. Board Area
      2. Board Measurements
      3. Word Problems
      4. Hourly Week
      5. Paycheck calculations
      6. Paint Volumes

   C. Conversion of Units of
      Measure
      A. Square Area in
         Standard to Standard
      B. Square Area in
         standard to Metric
      C. Square Are in Metric
         to Standard
      D. Square Area in Metric
         to Metric
      E. Paint Volume in
         Standard to Standard
      F. Paint Volume in
         Standard to Metric
      G. Paint Volume in Metric
         to Standard
      H. Paint Volume in Metric
         to Metric

   D. Computation of Units of
      Measure
      A. Same as C above
      E. Fractions
         A. Ruler Measurements
         B. Pie Charts
         C. Daily hours
      F. Decimals
         A. Fraction to
            Decimal Conversion
            and Equivalents
         B. Rounding Off
         C. Money
         D. Margin of Error

   E. Graphing

   F. Percents
      1. Sales Discounts
      2. Taxes
      3. Armstrong Goals

   G. Area
      1. Board/Area
      2. Paint/Area
      3. Garden/Area
      4. Carpet/Area

   H. Volume
      1. Paint Mixing Volume

   I. Graphing
      1. Reading and
         Interpreting Graphs
      2. Graphing Daily
         Hours
      3. Graphing Birdhouse
         Heights

   J. Geometry/Trigonometry
      1. Squaring
         Foundations
      2. Finding Area and
         Perimeter of Non-
         square Shapes

II. Whole Number Computation
   A. Addition
   B. Subtraction
   C. Multiplication
   D. Division

III. Units of Measurements
   A. Measures of Length
      1. Standard Measures
         a. miles
         b. yards
         c. feet
         d. inches
      2. Metric Measures
         a. kilometers

b. meters
c. decimeters
d. centimeters
e. millimeters

B. Measures of Weight
1. Standard Measures
   a. ounces
   b. tons
   c. pounds
2. Metric Measures
   a. kilograms
   b. grams

C. Liquid Measures
1. Standard Measures
   a. cups
   b. pints
   c. ounces
   d. quarts
   e. gallons
2. Metric Measures
   a. kilometers
   b. liters

D. Measures of Time
1. years
2. months
3. weeks
4. days
5. hours
6. minutes
7. seconds
A. Standard to Standard
B. Standard to Metric
C. Metric to Metric
D. Metric to Standard

V. Computation of Units of Measure
A. Standard Units
1. Addition
2. Subtraction
3. Multiplication
4. Division
B. Metric Units
1. Addition
2. Subtraction
3. Multiplication
4. Division

VI. Fractions
A. Fundamentals of Fractions
1. Whole numbers to Fractions
2. Fractions to Whole Numbers
3. Fraction Forms
   a. proper fractions
   b. mixed fractions
   c. improper fractions
4. Reducing fractions
5. Finding Common Denominators
6. Addition to Fractions (All)
7. Subtraction of Fractions (All)
8. Multiplication of Fractions (All)
9. Division of Fractions (All)

VII. Decimals
A. Decimal Place Value
B. Fractions to Decimals
C. Decimals to Fractions
D. Comparing Decimals
E. Addition
F. Subtraction
G. Multiplication
H. Division

VIII. Percents
A. Fractions to Percents
B. Decimals to Percents
C. Percents to Fractions
D. Percents to Decimals

IX. Area
A. Determining Area
B. Computation in Area
C. Area Opposed to Perimeter

X. Volume
A. Determining Volume
B. Volume Opposed to Area

33

40

XI. Graphing
   A. X, Y Axis
   B. X, Y Coordinates
   C. Plotting Points on a
      Graph
   D. Line Graphs
   E. Bar Graphs
   F. Circle Graphs
   G. Reading Graphs (All)
   H. Drawing Graphs (All)
   I. Average
   J. Mean
   K. Median
   L. Baseline
   M. Margin of Error

XII. Geometry/Trigonometry
   A. Shapes
   B. Circles
   C. Degrees in a Circle
   D. Angles
   E. Right Angles
   F. Pythagorean Theorem
   G. 6-8-10 rule

41

PROGRAM RESULTS

The Job Enhancement Training Project was a success. Of the 150 employees who participated in the project, approximately 50% reached or surpassed the goals identified in August, 1991. The other 50% showed growth in basic literacy skill (reading, writing and computational skills). All 150 employees attitudes about learning improved. Thus, they demonstrated an improved self-concept. The employees became more open to discuss ideas and concepts as the project progressed. Other accomplishments worth noting were:

- Employee participation and motivation were extremely high, which sets the stage for continuous learning through collaborative groups.

- Through collaborative group learning activities, employees have learned to communicate more readily and effectively in problem solving.

- Employee's attendance is excellent, and the drop out rate is less than 10%, indicating high interest.

The JET Project participants demonstrated increased productivity and more safety hours as compared to June, 1991. In addition, the plant realized a decreased scrap rate and less downtime, which was attributed to the impact of upgrading employees' skills and morale.

Additionally, there was marked improvement in the achievement levels of all employees. Those improvements were in reading and math skills necessary to perform current duties as well as acceptance of new roles in the workforce. This conclusion was supported by test results and also teacher, employee, and

35

42

supervisor assessments. Because supervisors saw a change in employees' attitudes toward their jobs, which yielded in increased production, they were more willing to cooperate with the work force scheduling demands of the project. This in turn, provided frequent opportunities to tailor the project to meet the changing needs of the plant.

Employees were also administered the exit structured interview (see Appendix C, page 50) at the end of the program. A copy for the exit interview is found in Appendix C.

The following is a short summary of some of the pertinent information regarding the graduated employees' exit interviews. To date, 140 employees have graduated, and all except one of those have been interviewed. The one exception was ill at the time of the interviews.

Indicated Employee Interest in College Credit Courses

All students indicated that they would like to continue their education if something could be offered to suit them and their schedule. The staff took these areas of interest and matched them with existing PJC classes.

The specific areas of interest were:

Accounting

Algebra

Business Management

Business Math

Communication Skills

48

Computer (general)

Computer (Lotus)

Mini Courses/Seminars

Reading Improvement

Writing Skills Improvement

Tutor Volunteers from Employee Graduates

When asked if they would consider tutoring other employees on their own time, 21 employees responded that they would consider the prospect. Some of these responses were given on the condition that they be presented with more information before asked for commitment. Of the remainder, 15 employees indicated that they would not like to tutor, and 4 were not sure, or did not answer the question.

Graduate Responses to Assistance in the Workplace

When asked to indicate the areas in which they as employees would be willing to apply their new or refreshed skills, (see attached listing) 11 students said that they would be interested in working on 2 or more of the areas. Further, many of the students that did not respond said that they were already assisting in or had assisted in some of the same areas, and therefore, did not feel inclined to make more commitments. Specifically, graduate responses to assistance in the workplace follow:

Sam: Writing Work Orders

        Conduct Plant Tours

        ECR Committees

Eugene: Writing Work Orders

Designate Trainers

Assist with benefit re-enrollment

Ron: Reporting on status of work orders to crew

Monitor process audits for accuracy/Dept.

Review minutes/indicate areas for improvement

Assist in devising easy to read forms for process audits

Assist with designed experiments

SPC for line operations on stretch goal category

measurements

Designated trainers

Corrective Action Teams

Assist in gathering information for documenting

standardized operating procedures for training

Larry: Yes to all areas on checklist

Jimmie: IE per 6-10-92 QIT minutes

Record downtime

Darryl: Safety crew meetings

Stretch goal measurement

Writing work orders

Designated trainers

Corrective action teams

Conduct plant tours

Willard: Explaining Gainsharing results at monthly business crew

meetings

Reporting on status of work orders to crew

Assist in devising easy to read forms for process audits

Assist with designed experiments

Assist with tests

SPC for line operations on stretch goal category
   measurements

Conduct plant tours

OFI Coordinator for Team/Crew

STOP tours

Assisting in gathering information for documenting
   standardized operating procedures for training

Maintain safety statistics

Ron: Writing work orders

Assist with designed experiments

Assist with tests

SPC for line operations on stretch goal category
   measurements

Corrective Action Teams

Data gathering on "customer" problems with material--
   reporting same to team/crew

Bill: Corrective Action Teams

Plant newspaper contact

Assist in gathering information for documenting
   standardized operating procedures for training

Assist with benefit re-enrollment

Maintain safety statistics

40

Steve: Plant newspaper contact for department or crew

STOP tours

Revise FAB Spec sheets to better meet needs of new
organization

Assist in gathering information for documenting
standardized operating procedures for training

Assist with benefit re-enrollment

Maintain safety statistics for crew/team; Obtain
incident reports on outside cares which could apply
to that operation and report on same

Graduate Interest in Own-Time Computer Use

Thirty-two of the employees indicated that they would like to
spend some of their own time using and learning the computer. The
most commonly given times for use were:

6 a.m. - 7 a.m.

2 p.m. - 4 p.m.

9 p.m. - 10 p.m.

Graduate Comments on Jet Program's Effectiveness

A number of common comments surfaced during the graduation
interviews. In general, they are:

- Most employees saw changes in their ability to do job
related mathematics.

- Most employees expressed desire to continue their education;
through correspondence schools such as ICS, vocational
classes, and more advanced college credit courses such as
business math, computer science. or algebra.

- Many employees expressed willingness to help as tutors.

- Most employees willing to come in on their own time and work with the computers.

Some specific employee responses are as follows:

- The program helped me to do problems better, and to write better.

- I feel more self confident and comfortable doing math problems since attending the JET Program.

- This program has helped in many ways that do not show up on paper. Learning stimulates your mind and excites me.

- The purpose of this program was to help me keep up with the future and it succeeded.

- (JET Program) Couldn't have been done any better than what we have now. I would like to see the JET Program continue just as it is.

- Helped me in my work in measuring and formulas for measuring.

- It (the computer) doesn't seem impossible now and I'm not afraid to learn.

- The JET Program has helped me to do my mental math quicker and helped me in my set-ups.

RECOMMENDATIONS

Although the project was a success, the project staff identified certain variables which would enhance future replication. Based on the experiences with the Armstrong World

Industries, Inc. Job Enhancement Training Project, the staff

recommends the following:

1. Limit program enrollment to a maximum of 60 employees at any given time, thereby, not affecting the line operations as much as during the grant period.

2. Provide collaborative learning instruction for teachers up front with a focus on math skills and reading abilities needed for functional literacy at work and in society.

3. Open classroom and computers to individuals several hours a week to work on necessary skills on their own time with teacher assistance. Develop a point system whereby employees are rewarded for this participation.

4. Encourage other employees through recruiting and interviewing to participate in the JET classes. As employees complete the course objectives other employees would enter.

5. Limit expenses since the classroom is already furnished, computers purchased and learning materials are reusable. In addition to employee release time, we foresee primary expenses as that of teacher salaries and purchase of several software programs and workbooks.

6. Consult with supervisors during planning phase for input on needed skills development. Meet with them at regular intervals during the life of the program for continuing curriculum input and feedback on student performance in the workplace as it relates to instruction.

7. Provide flexibility in program administration to reflect the needs of the plant.

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43

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Curriculum Knowledge Base

The project was based on the social context activity model (Leont'ev, 1981) which was validated by Jennings and Krauss (1989). Failure of the traditional basic skills instructional model was attributed to its retrospective focus on employee attainment of preestablished literacy skills and the assumption that employee motives and goals in literacy activities are compatible with these skills. The social context activity model posits that literacy is a relative phenomena and literacy needs are specific to the employee and the social context within which the employee operates. Instruction was based on the concept of activity with a prospective focus on the formation of employee's shared and personal literacy motives and goals.

In the social context activity job enhancement training project, emphasis is placed on the employees' literacy motives and goals that were formed within the contexts of their previous learning activities that may have affected their future performance in an adult education program. The Social Context Adult Literacy curriculum at Armstrong World Industries Inc. guide employees toward literacy improvement by providing instruction that focused on employee goal formation as related to specific jobs they were expected to perform in the various departments at the plant rather than skills attainment.

The project model was developed from Soviet learning theory (Vygotsky, 1962, 1978, 1981), the concept of activity (Leont'ev,

46

1981), and Western motivational research. Vygotsky (1981) described learning as individuals mastering and internalizing social forms of behavior during social interaction with others. Vygotsky's learning theory was particularly applicable to Job Enhancement Training Project at Armstrong due to its emphasis on language and social interaction. For Vygotsky, language was the means of social interaction and thought because words mediated learning in a social context (Leont'ev, 1981).

In the concept of activity, Leont'ev (1981) explained how the learner's self-knowledge, motives, and goals develop during activity. As an employee engaged in an activity, she or he correlated the activity, the product of the activity, and the self. Cognition, new self-perceptions, motives, and goals emerged from the activity (Davydod, 1981; Leont'ev, 1978, 1981). Diener and Dweck (1978, 1980) reported that as high achieving students engaged in a difficult learning activity, they applied self-monitoring strategies and attributed their success to effort, an internal controllable factor.

The curriculum integrated mathematics, reading, writing, speaking, and listening through philosophy, instructional organization, and teaching methods. It was not a prepackaged set of basic skills tests and workbook drills used in the traditional tutor-learner diad. The model represents a design specifically for the employees at Armstrong World Industries that would have practical significance for them within their real workplace situational context. The goal, design, and content of the social

47

context curriculum were based on the common interests, attitudes, and perceptions that bond the employees into social units. The curriculum uses the social unit from which it was developed, a group of employees working in the same industry.

The curriculum was prefaced with two important conditions crucial to successful implementation. First, the project coordinator and teachers accepted the definition of literacy as a personal and social act that is context-bound and were knowledgeable in the area of adult learning as opposed to lay tutors. Second, the curriculum was not a linear instructional design. The four program components were a planning phase, an assessment phase, a transition phase, and a maintenance phase. The curriculum phases were reported sequentially, but each frequently emerged within the other three phases throughout the project.

Appendix B

Job Enhancement Training Structured Interview Procedures

1. Begin session by explaining the program including these specific points:

   - Program is funded by U.S. Department of Education and Armstrong.

   - Reading and writing are personal activities. Program is designed to help you in reading, writing, and math.

   - Program participation will lead to certificates of completion.

   - Job training materials will be used if you want them.

   - Personal reading, writing and math needs.

   - No tests to pass or fail.

   - Regular attendance is expected.

   - Initially, we will figure out your reading, writing and math strengths and weaknesses so we know what you need to practice and learn.

   - You will help us identify your needs by telling us how you think you are doing as we go along.

   - We will read things together in groups and discuss things I read to you, but you will not be asked to read to anyone else unless you want to.

   - No one will read your writing. You may read what you have written to others if you choose.

2. Do you have any questions for me now?

3. Structured interview.

4. Writing sample.

   Topic: I want you to write anything you want to say about your previous experiences in school.
   Did you like school? Why or why not?
   Do you feel like you did well in school? Why or why not?
   Do you have any specific memory of school you want to write about (good or bad)?

49

Structured Interview Questions

Name: Date of Birth:

Address:

Phone:

JOB INFORMATION (state the topic)

1. What department do you work in?

2. What shift are you on?

3. What is your job title?

4. Who is your supervisor?

5. How many years have you been working at Armstrong?

6. Did you have any other jobs before coming to Armstrong?

7. Why did you first apply for a job at Armstrong? (a friend or relative works here, etc.)

8. Have you been in any on-the-job training programs at Armstrong? Did this training prepare you for a new job, or did it help you in the job you were in at that time? (did you get a promotion, etc.) Was the training helpful, or not? Why?

EDUCATIONAL BACKGROUND (state topic)

1. What was the last grade you completed in school?

2. Do you have a high school diploma or GED?

3. Have you had any other educational training outside of Armstrong? (vocational school, technical training)

4. What was the last grade your mother completed in school? Your father?

5. Do you have any children in school? What grades are they in? What grades did they complete?

6. How well do you think your children are doing in school?

7. Let's go back to when you were in school.

   Did you do well in school? (NO: Why not?)

   What did you like about school?

   What did you dislike about school?

   What was your favorite subject?

   What was your least favorite subject?

   Have you had any experience in using a computer?

   Would you like to learn how to use a computer?

PERSONAL INTERESTS

1. I'd like to know what you are interested in away from work.

   Do you have any hobbies?
   Do you like sports?
   What do you like to do in your free time?
   What kinds of movies/TV shows do you like to watch?

READING/WRITING

1. Do you do any reading in your free time?

2. How often do you read? (daily, weekly, etc.)

3. What time of day do you usually read? (morning, evening, etc.)

4. What type of material do you read? (newspaper, magazines, TV Guide, phone book, directions, etc.)

5. Do you ever use a dictionary, encyclopedias, or reference books?

6. Do you have any reference books at home?

7. Do you feel that you have any difficulty in reading? (If so, what?)

8. What types of things would you like to be able to read better?

9. What kinds of things do you write (letters, forms, work orders, shopping lists, notes to remind you to do something, etc.)

10. How often do you write?

11. Do you feel that you have any trouble writing? (If so, why?)

GOALS

1. Why did you enroll in this program? What do you think the purpose of this program is?

2. Do you think this program will help you in your work? Why or why not?

3. Do you think this program will help you with other activities outside of work? What kinds of activities? (home, church, etc.)

4. What do you want to ask me?

JOB ENHANCEMENT TRAINING PROGRAM (JETP) EXIT INTERVIEW

Name: Date of Birth:

Address:

Phone:

Work Department:

PERSONAL INTERESTS

Do you have any hobbies?

Do you like sports?

What kinds of movies/TV shows do you like to watch?

MATHEMATICS

1.   Do you feel that you have less trouble doing math now than before you started in the JET Program?

2.   Did you check out any math books from the classroom?

3.   Did you purchase any math books for your personal use since enrolling in the program?

4.   Do you have any other math books at home?

5.   If you have children, grandchildren, etc. in school, do you help them with their math homework?

6.   Do you feel better about your ability to work math problems then you did before starting the JET Program? Why?

7.   Do you use a calculator to help you solve problems? How often?

8.   Did you find computers useful when learning math concepts? If so, how and why?

9.   What do you do in your life outside your job at Armstrong that requires you to use math? Do you feel prepared to do it?

READING/WRITING

1. Did you check out any reading material from the program? If so, what kinds of books?

2. How often do you read outside the JET Program? (daily, weekly, etc.)

3. What time of day do you usually read? (morning, evening, etc.)

4. What type of material do you read other than what you read in the JET Program?

5. Do you ever use a dictionary, encyclopedias, or reference books?

6. Do you have any reference books at home? Do you have more now than before you started the program?

7. Do you feel that you have any difficulty in reading? (If so, what?)

8. What types of things would you like to be able to read better?

9. What kinds of things do you write? (letters, forms, work orders, shopping lists, notes to remind you to do something, etc.)

10. How often do you write?

11. Do you feel that you have any trouble writing? If so, why?

GOALS

1. Why did you enroll in this program?

2. What do you think the purpose of this program was? Was that goal achieved?

3. Do you think this program helped you in your work? Why or why not?

54

4. Do you think this program helped you with other activities outside of work? What kinds of activities? (home, church, recreation/leisure, etc.)

5. In what area would you say the program helped you the most? Explain.

6. Do you plan on continuing any formal education beyond the JET Program?

7. What sort of educational program should continue at Armstrong? What suggestions would you give to meet your needs or the need of other employers? (Write your answer in the space below.)

Please answer the following:

8. Would you be interested in working on the computers in the classroom on your own time?   yes_____   no_____

9. What times would be convenient for you?

10. Would you consider assisting in the classroom as a tutor on your own time?   yes_____   no_____

55

62

Appendix D

SAMPLE LEARNING ACTIVITIES

Lesson Format - Tolerance: Fractions

Review: Reading Fractions
        Writing Fractions
        Adding Fractions
        Subtracting Fractions
        Decimal to Fraction Conversion
        Decimal Tolerances, Tolerance Ranges, and Upper and Lower
        Control Limits

New: Determining Fractional Tolerances

Materials Needed: 'Tolerance: Decimals' worksheet
                    'Tolerance: Fractions' worksheet
                    Decimal to Fraction Conversion Chart

Activity:
    Review and discuss the use of tolerance in measurements. Use decimals as examples.
    Discuss the use of upper and lower control limits and tolerance range.
    Review the reading and writing of fractions.
    Review the addition and subtraction of fractions.
    Discuss the process of changing fractions to decimals and have the employees review the 'Decimal to Fraction Conversion Chart'.
    Have the employees use their 'Tolerance: Decimals' worksheet and 'Decimal to Fraction Conversion Chart' to fill in the spaces on the 'Tolerance: Fraction' worksheet. (For example, number 1 on the 'Tolerance: Decimal' worksheet will convert to fraction form to become number 1 on the 'Tolerance: Fractions' worksheet.
    Have the employees work the fraction addition problems in the first section.
    Discuss their answers and any difficulties.
    Have the employees work the fraction subtraction problems in the second section.
    Discuss their answers and any difficulties.
    Have the employees work the problems in the 3rd section by finding the upper and lower control limits. Have the employees also determine what the tolerance range is for each of these problems.
    Discuss their answers and any difficulties.
    Have the employees answer the last question by writing their own explanation of tolerances.

Evaluation:
    As the group moves through the exercises, make note of any difficulties. Prepare some representative questions and have the class work them in their student notebooks. Give the employees the

answers so that they may check theirs and then discuss any questions.

Tolerance: Fractions

A. Please add 1/32 to the following numbers.

1. _____   7. _____
2. _____   8. _____
3. _____   9. _____
4. _____   10. _____
5. _____   11. _____
6. _____   12. _____

B. Please subtract 1/32 to the following numbers.

13. _____   19. _____
14. _____   20. _____
15. _____   21. _____
16. _____   22. _____
17. _____   23. _____
18. _____   24. _____

C. Please determine what the possible high and low measurements are.

25. _____ +- 1/64   29. _____ +- 1/64
26. _____ +- 1/32   30. _____ +- 1/32
27. _____ +- 1/64   31. _____ +- 1/64
28. _____ +- 1/32   32. _____ +- 1/8

33. How would you describe tolerance in your own words?

_____

_____

_____

_____

_____

_____

DECIMAL AND FRACTION CONVERSION

```
 1/16  -  .0625
 1/8   -  .125
 3/16  -  .1875
 1/4   -  .250
 5/16  -  .3125
 3/8   -  .375
 7/16  -  .4375
 1/2   -  .500
 9/16  -  .5625
 5/8   -  .625
11/16  -  .6875
 3/4   -  .750
13/16  -  .8125
 7/8   -  .875
15/16  -  .9375
```

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Lesson Format - Tolerance: Decimals

Review: Reading decimals
Writing decimals
Adding decimals
Subtracting decimals

New: Tolerance
Determining tolerance ranges
Upper and Lower Control Limits

Materials Needed: "Tolerance: Decimals' worksheet

Activity:
Review with the employees the methods in reading, pronouncing, and writing decimals.
Review the methods in adding and subtracting decimals.
Ask the employees to explain the meaning of the word tolerance. Ask them to explain how the word might be used in their work setting.
Discuss the purpose of establishing tolerances when working with measurements and decimal measurements in particular.
Have the employees work decimal addition problems on the worksheet.
Discuss the answers and any difficulties.
Have the employees work the decimal subtraction problems on the worksheet.
Discuss the answers and any difficulties.
Explain how determining decimal tolerances is just the addition and subtraction of decimals. Introduce the terms 'upper control limit' and 'lower control limit' and demonstrate that they are simply the results of adding and subtracting the tolerance.
Have the employees find the ranges of the 3rd section and have them take special care to record the upper and lower control limits.
Explain that the difference between the upper and lower control limits is often called the tolerance range. Show the employee how to determine the tolerance range by subtracting the lower control limit from the upper control limit.
Have the employees work the last set of problems to determine in the given numbers are within the tolerance range.

Evaluation:
As the group moves through the exercises, make note of any difficulties. Prepare some representative questions and have the class work them in their student notebooks. Give the employees the answers so that they may check theirs and then discuss any questions.

Follow-up Activity: See activity titled 'Tolerances: Fractions'

Tolerance: Decimals

A. Please add .005 to the following numbers:

1. .625
2. .375
3. .875
4. .75
5. .25
6. .5

7. .1875
8. .5625
9. .4375
10. .3125
11. .0625
12. .9375

B. Please subtract .005 from the following numbers.

13. .1875
14. .625
15. .75
16. .5625
17. .0625
18. .5

19. .4375
20. .25
21. .9375
22. .375
23. .3125
24. .875

C. Please determine what the possible high and low measurements are.

25. .3125 +- .003
26. .25 +- .005
27. .1875 +- .004
28. .375 +- .006

29. .5 +- .004
30. .9375 +- .001
31. .875 +- .003
32. .75 +- .002

D. Which of the following numbers are within the following number and its tolerances? (Circle your answers either 'yes' or 'no'.)

33. .624   Y   N   36. .622   Y   N   39. .625   Y   N
34. .627   Y   N   37. .621   Y   N
35. .629   Y   N   38. .628   Y   N

Lesson Format - Maze Days

Review: Reading and Writing Decimals
        Comparing Decimals
        Decimal Addition
        Decimal Subtraction
        Decimal Multiplication
        Decimal Division

Materials: 'Maze Days' worksheet

Activity:
        Preview Maze Days worksheet with class.
        Explain that the answers to the questions, 'A' or 'B', can be used to solve the maze. For example, if the answer to question

number 1 was 'B', then at intersection 1 in the maze, the student would follow the 'B' path. Each question can be used in this manner, thus allowing the student to complete the maze successfully.

Ask the students to look at the first problem and estimate the answer, as the teacher copies the problem onto the board.

Ask the students to choose which they think to be the correct answer and why.

Work the problem on the board, and ask the students to mark the correct choice on their paper, either 'A' or 'B'.

Work all of the problems in this manner.

After all the problems have been worked, direct the students to solve the maze according to the earlier directions.

Evaluation:

During the course of the instruction on decimals the teacher should assess those skills that seem the most difficult for the student. Towards the end of the class, the teacher should embody those skills into 4 to 5 questions that the students will work on a separate sheet of paper. After they have worked them, discussion should take place to see if there are any remaining difficulties.

MAZE DAYS

Questions

1. Which of these two sets of numbers is arranged in the proper order of largest to smallest.

a.		b.
.601	LARGEST	.712
.6004		.71009
.60		.7099
.59024		.72
.5	SMALLEST	.710

2. If the numbers 7.023 and 1.98 were multiplied together, how many decimal places would be in the answer?
    a. 3
    b. 5

3. Which two numbers are equal to one another?
    a. .0010 = .010
    b. .40 = .4000

4. Which is the correct answer to the following division problem?
    a. .005
    b. 5,000
    .007 divided into 35

5. Which is the correct answer to the following subtraction problem?

    5
    - 4.478

    a. 1.478
    b. .522

6. Which of the following two numbers is largest?
    a. Four hundred twenty seven thousand
    b. Four hundred twenty seven thousandths

7. How would the two numbers above be written?
    a. 427,000   b. .427
        .427   427,000

8. What is the correct answer to the following addition problem?
    27,436 + .6578   a. 27,436.6578
                        b. 34014

9. How would 5/8 be written as a decimal?
    a. .375   b. .625

10. How would .375 be written as a fraction. (Answer must be reduced to lowest terms.)
    a. $\frac{3}{16}$ b. $\frac{3}{8}$

11. If .48923 were rounded off to the nearest thousandth, which of the following would be the correct answer.
    a. .489   b. .4000

12. What was the President's name in 1980?
    a. George Bush
    b. Ronald Reagan

LESSON TITLE: STRING ACTIVITY/MEASUREMENT

Objectives:

To develop visual perception of inches in comparison to centimeters. To understand relationship of metric and U.S. measurements. To convert metric to U.S. and U.S. to metric measurements.

Procedure:

In group activity, have students project measurement of string lengths. Write estimate as a team. Then measure with ruler exact length in inches, millimeters and centimeters. Compare answers of groups.

Evaluation:

Students write in notebooks how to convert measurements. From verbal feedback of students, determine need for extra practice. Then develop extra worksheet for next class time. Can be reinforced with "Measuring Volume" lesson.
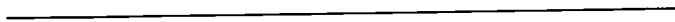
MEASUREMENTS

First, as a team, estimate the length of each line then using ruler measure the lines in inches, millimeters, and centimeters:

(1) _____

Est.\\Act.

__________in.

__________mm.

__________cm.

(2) _____

Est.\\Act.

__________in.

__________mm.

__________cm.

(3) _____
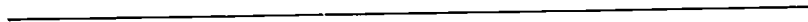
Est.\\Act.

__________in.

__________mm.

__________cm.

(4) Find the perimeter and area of this polygon in inches (sq. in.) and centimeters (sq. cm.)

_____

Est.\\Act.
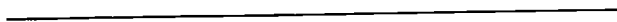
P = __________in.

P = __________cm.

A = __________sq. in.

A = __________sq. cm.

_____

LESSON TITLE: MEASURING VOLUME - TEAM PROBLEM SOLVING

Objectives:

     To reinforce understanding of volume. To practice measuring inches and centimeters on a ruler. To apply formulas to actual containers. To apply volume concept to storage space.

Procedure:

     In teams, work on finding volume of 4 separate containers on table. Use rulers for exact measurements. Write answers on worksheet. Discuss results by comparing answers of groups.

Evaluation:

     Observe number of correct answers and problem areas. Rework problems over on board if necessary. Extra worksheets may be given when requested by students.

● Find the volume of the containers on the table. Remember to use the
following formulas:

$V = (l) \ (w) \ (h)$ when container has square or rectangle base.

$V = (\Pi r^2) \ (h)$ When container has circle base.

Container A V = cu. in.
             V = cu. cm.

Container B V = cu. in.
             V = cu. cm.

Container C V = cu. in.
             V = cu. cm.

Container D V = cu. in.
             V = cu. cm.

How many Container A's could be stored on a shelf measuring 5 ft.
by 3 ft. by 2 ft.?

LESSON TITLE: MEASUREMENT/W/TAPE MEASURE
ACTIVITIES 1 AND 2 MEASUREMENTS/CONVERSIONS

Objectives:

　　　To review parts of a whole

　　　To introduce linear measurement using tape measure.

　　　To compare fractions with different denominators.

　　　To determine exact length of lines using subtraction method.

Procedure:

　　　Begin with Activity 1 for students to begin visualizing measurements on tape measure. Encourage group interaction. Continue with Activity 2 after showing examples of subtraction method.

Evaluation:

　　　Have students check each other's calculations on Activity 2 worksheet. Determine need for extra practice through observation and student comments. Expand activity for more practice at next class meeting.

<u>Concepts</u>

Review: Parts of whole
         Linear measurement
         Inches, equivalence

New: Measurements and fractions

Materials Needed: Tape measure
                   Work sheets
                   Colored pens

MEASUREMENT/ACTIVITY 1 WITH TAPE MEASURE

1.   What is the smallest measurement you can read on this tape?

Therefore every inch is divided into 32 parts. Every marking
between 1 and 2 stand for _____inch.

2.   On tape measure A mark off (with a colored pen) the markings
     for 1/16 inch between the 1 and 2. Remember: 1/16 = ?/32.

3.   On tape measure B mark off (with a colored pen) the markings
     for 1/8 inch between the 2 and 3. Remember: 1/8 = ?/32.

4.   On tape measure C mark off (with a colored pen) the markings
     for 1/4 inch between 3 and 4. Remember: 1/4 = ?/32.

Evaluation

5.   On tape measure D draw a line of any length starting at any
     point. Determine its length and then have another student
     measure the same line. Were your answers the same?_____
     How many different ways can you name the length of the line?
     (Think of different denominators).

Using subtraction, find the length of lines on the attached page.
Hint: Use lowest common denominator to find answer. Then convert as
indicated:

1.   Exact length of line A=_____=_____/32=_____/64.

2.   Exact length of line B=_____=_____/64.

3.   Exact length of line C=_____=_____/32=_____/64.

4.   Exact length of line D=_____=_____/32=_____/64.

5.   Exact length of line E=_____=_____/64.

Lesson: Maze Days

Objectives: Review Decimal Operations

Prerequisite Skills: Decimal Addition
Decimal Subtraction
Decimal Multiplication
Decimal Division

Procedures: Preview Maze Days worksheet with class.

Explain that tne answers to the questions, "A" or "B", can be used to solve the maze. For example, if the answer to question number 1 was "B", then at intersection 1 in the maze, the student would follow the "B" path. Each question can be used in this manner, thus allowing the student to complete the maze successfully.

- Ask the students to look at the first problem and estimate the answer, as the teacher copies the problem onto the board.

- Ask the students to choose which they think to be the correct answer and why.

- Work the problem on the board, and ask the students to mark the correct choice on their paper, either "A" or "B".

- Work all of the problems in this manner.

- After all the problems have been worked, direct the students to solve the maze according to the earlier directions.

MAZE DAYS

QUESTIONS

1. Which of these two sets of numbers is arranged in the proper order of largest to smallest.

   a.   b.

   .601   LARGEST   .712
   .6004   .71009
   .60   .7099
   .59024   .72
   .5   SMALLEST   .710

2. If the numbers 7.023 and 1.98 were multiplied together, how many decimal places would be in the answer?

   a. 3
   b. 5

3. Which two numbers are equal to one another?

   a.   .0010 = .010

   b.   .40 = .4000

4. Which is the correct answer to the following division problem?

   a.   .005

                          .007   35

   b.   5,000

5. Which is the correct answer to the following subtraction problem?

     5   a.   1.478
   - 4.478   b.   522

6. Which of the following two numbers is largest?

   a. Four hundred twenty seven thousand

   b. Four hundred twenty seven thousandths

7. How would the new numbers above be written?

   a. 427,000   b.   .427

      .427   427,000

8. What is the correct answer to the following addition problem?

   27,436 + .6578

   a. 27,436.6578

   b. 34014

9. How would 5/8 be written as a decimal?

   a. .375

   b. .625

10. How would .375 be written as a fraction. (Answer must be reduced to lowest terms.)

    a. $\frac{3}{16}$ b. $\frac{3}{8}$

11. If .48923 were rounded off to the nearest thousandth, which of the following would be the correct answer.

    a. .489   b. .4000

12. What was the President's name in 1980?

    a. George Bush
    b. Ronald Reagan

Job Enhancement Training

Additional

J E T

Program Information

60

JOB TASK ACTIVITIES TEST

The Job Task Activities Test (JTAT) is an instrument designed to measure job-related skills in the areas of mathematics and reading. The instrument was developed to be administered to employees at the Armstrong plant who were volunteer participants in the Job Enhancement Training (JET) program.

The Test consists of six parts:

1) Measurements

2) Pie Chart

3) Conversions and Computations

4) Line Graphs

5) Plotting Coordinates

6) Reading

The contents of this test are listed below.

Part 1 . . . . Measurements

Part 2 . . . . Computation

Part 3 . . . . Line Graphs

Part 4 . . . . Pie Charts

Part 5 . . . . Number Conversions

Part 6 . . . . Plotting Coordinates

Part 7 . . . . Reading

Part 1

Measurements

0 inch   1 inch
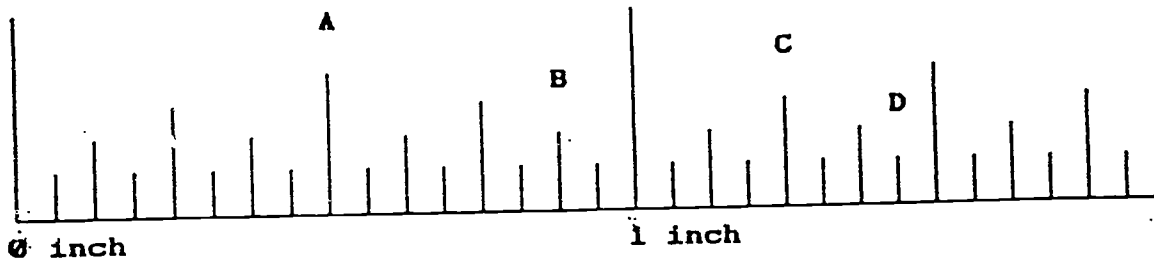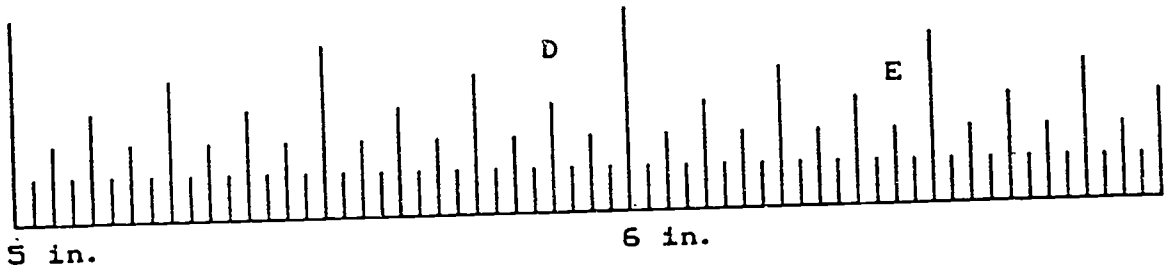
1. What length does this partial ruler measure? _____

2. What is the smallest unit of measure on this
   partial ruler?   _____

   Write the measurement of the points listed below.

3.   A   _____

4.   B   _____

5.   C   _____

6.   D   _____

2

84

D
E

5 in.
6 in.

7. Mark with an 'A' the measurement   5   3/4 in.

8. Mark with a 'B' the measurement   6   1/8 in.

9. Mark with a 'C' the measurement   6   7/16 in.

What are the measurements of the points listed below?

10.   D   _____

11.   E   _____

12. What is the smallest unit of measure shown
     on this ruler?   _____

13. What length does this partial ruler measure?   _____

3   85

Part 2

Computation

Directions: The following problems involve averaging,
              adding, subtracting, multiplying and
              dividing decimals and fractions.

Rewrite the list of numbers below, arranging them from
smallest to largest.

1.   .03   _____ (smallest)

      .267   _____

      .031   _____

      .259   _____

      .002   _____ (largest)

Find the average of the set of numbers below.

2.   .069
      1.3
      .846   Average   _____
      4.93
      10.5

Use division to solve the questions below.

3. 10,000 ÷ 25   6. 1/2 ÷ 1/4

4. 7 ÷ 16   7. 3 ÷ 1/3

5. 46.8 ÷ 3.6   8. 4 1/2 ÷ 1/8

Use multiplication to solve the questions below.

9. 16 x 1000   12. 1/2 x 1/4

10. .016 x 6   13. 3 x 2/3

11. 1.62 x 32.8   14. 4 1/2 x 1/8

5

Use subtraction to solve the problems below.

15.   56.070   -   26.060   18.   2.4   -   .581

16.   9   -   .00984   19.   1/2   -   1/4

17.   3   7/16   -   1/8   20.   2   1/8   -   1/4

Find the area of the following two figures.

21.

8 ft. ┌─────────────┐   Area   _____
      │   │
      └─────────────┘
           8 ft.

22.   8 in.   Area   _____

10 in. ┌────────┐
        │   │
        │   └──────┐
        │   │ 5 in.
        └───────────────┘
            12 in.
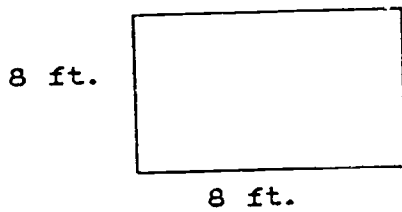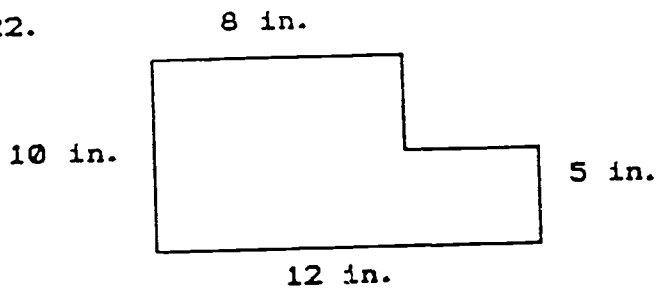
23.   What is the perimeter of Number 21?   _____

24.   What is the perimeter of Number 22?   _____

25.   What is the area of a field that is 130 ft. by 30 yds.?

                                            _____

6
8͜o

UCL = Upper Control Limit

LCL = Lower Control Limit

26. 1.031 ± .016   UCL = _____   LCL = _____

27. 7/32 ± 1/64   UCL = _____   LCL = _____

28. 23.3125 ± .031   UCL = _____   LCL = _____

29. 1/8 ± 3/32   UCL = _____   LCL = _____

30. If a piece of pipe is specified to be cut at 48.625
inches ± .016, will it be acceptable at 48.642?

                    yes   no

Part 3

Line Graphs

A B C Widget Co.
Production and Scrap
Jan – June 1990
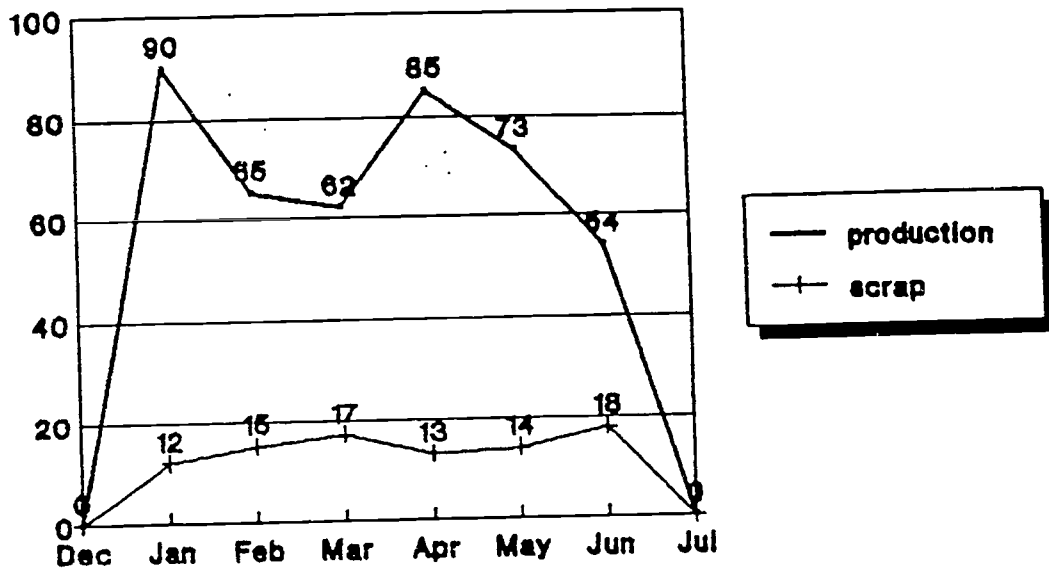
x 1000 widgets

> **Directions:** The graph above indicates the production and scrap for the year 1990. Study the graph and then answer the following questions, using the period from January through June only.

1. Which month has the highest rate of scrap? _____

2. Which month has the highest gross production? _____

3. How many widgets were produced during the months of April, May and June? _____

> **Reminder:** gross production – scrap = net production

4. What was the total net production for the last 3 months? _____

5. Which 3 month period had the highest net production? (Circle the correct period.)

Jan		Apr
Feb	or	May
Mar		Jun

9

91

Part 4

Pie Charts

Digital Doll Co.
Manufacturing Costs
January 1990

Fed Taxes
$16

Indirect
$38

Benefits
$24

State Tax
$12

Profit
$10

Period
$32

Direct
$60

Local Tax
$8
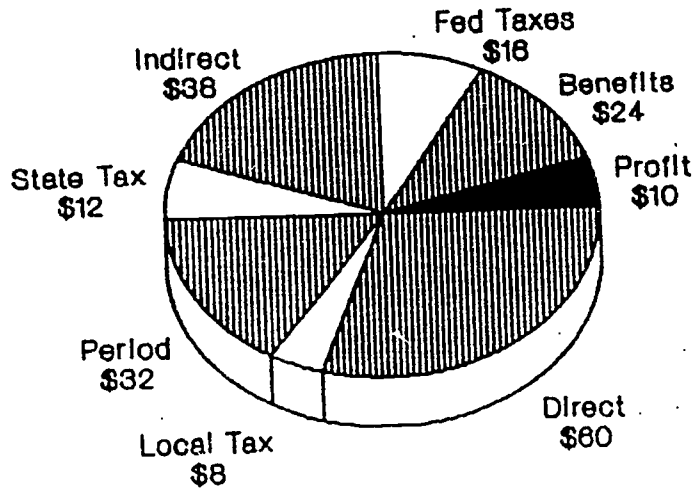
x 1,000 dollars

> Directions: Study the pie chart above, then answer the following questions.

Look at the costs listed below.   Write the amount spent on each cost for January 1990.

1.   Federal tax $ _____

2.   Indirect $ _____

3.   Benefits $ _____

4.   What is the total amount spent during
     January? $ _____

5.   How much was spent on Local taxes,
     Direct costs, and Period costs? $ _____

Digital Doll Co.
Manufacturing Costs
February 1990

Fed Taxes 8%
Indirect 19%
Benefits 12%
State Tax 6%
Profit 5%
Period 16%
Direct 30%
Local Tax 4%
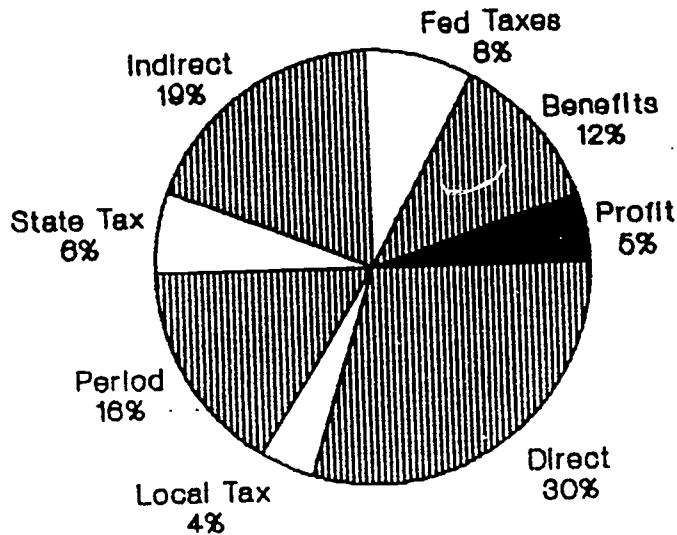
Percent of $1.00

Directions: Study the pie chart above, then answer the following questions.

---

6. What percent of the cost are all taxes combined?

    _____ %

7. Are taxes the 2nd largest cost?

    yes   no

8. Do Direct and Indirect costs account for over half the pie?

    yes   no

9. Are Local taxes 50% lower than State taxes?

    yes   no

10. Are Federal taxes 33.3% more than State taxes?

    yes   no

Part 5

Number Conversions

Directions: In this section you will convert
fractions to decimals and decimals to
fractions. Read the instructions for
each set of items carefully.

Convert the following fractions to decimals.

1. 1/2 = _____   4. 5/8 = _____

2. 3/4 = _____   5. 9/16 = _____

3. 1/3 = _____

Using the conversion table below, convert the following
fractions to decimals.

| 1/64 = .016 | 1/32 = .031 | 1/16 = .063 | 1/8 = .125 |
| 1/4 = .25 | 1/2 = .5 | | |

6. 3/64 = _____   9. 33/64 = _____

7. 5/32 = _____   10. 3 1/2 = _____

8. 17/32 = _____

Convert the following decimals to fractions. Be sure to
reduce to lowest terms.

11. .25 = _____   14. .375 = _____

12. .5 = _____   15. .3125 = _____

13. .40 = _____

14 96

Add or subtract the following decimals and fractions.
Answers can be in decimal or fraction form, but must be
reduced to lowest terms if in fractions.

16. $1\dfrac{3}{4}$ + .5

17. $\dfrac{7}{8}$ + .125

18. .25 - $\dfrac{3}{16}$

19. .875 - $\dfrac{5}{16}$

Answer the word problem below.

20. A customer places an order for 1,000 tiles. The tiles
     must measure 16.625 x 16.625 (+ 0 or - .016).

     What will the specifications in fractions be?

     _____

Part 6

Plotting Coordinates

Widget Stamping Machine
7:00 - 15:00

| | UCL | + Goal | LCL |
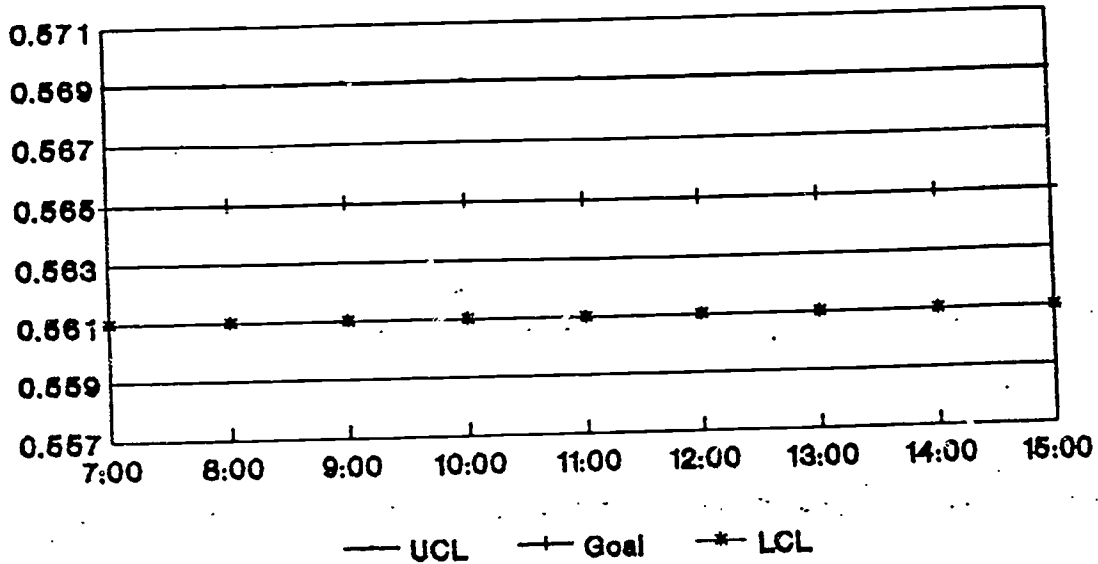
UCL = Upper Control Limit
LCL = Lower Control Limit

Directions: Use the number groups below to answer the
               following questions.

Write the average and range for each of the time periods in
the space provided.

Time:	8:00	11:00	13:00
	.570	.572	.574
	.569	.572	.561
	.575	.561	.559
	.562	.559	.557

1. average _____   3. average _____   5. average _____

2. range _____   4. range _____   6. range _____

7. Plot the average for each of the groups on the graph
   above.

8. Which time periods are within the control limits?

9. Which time period was closer to the goal?

17

o Latitude

o Longitude
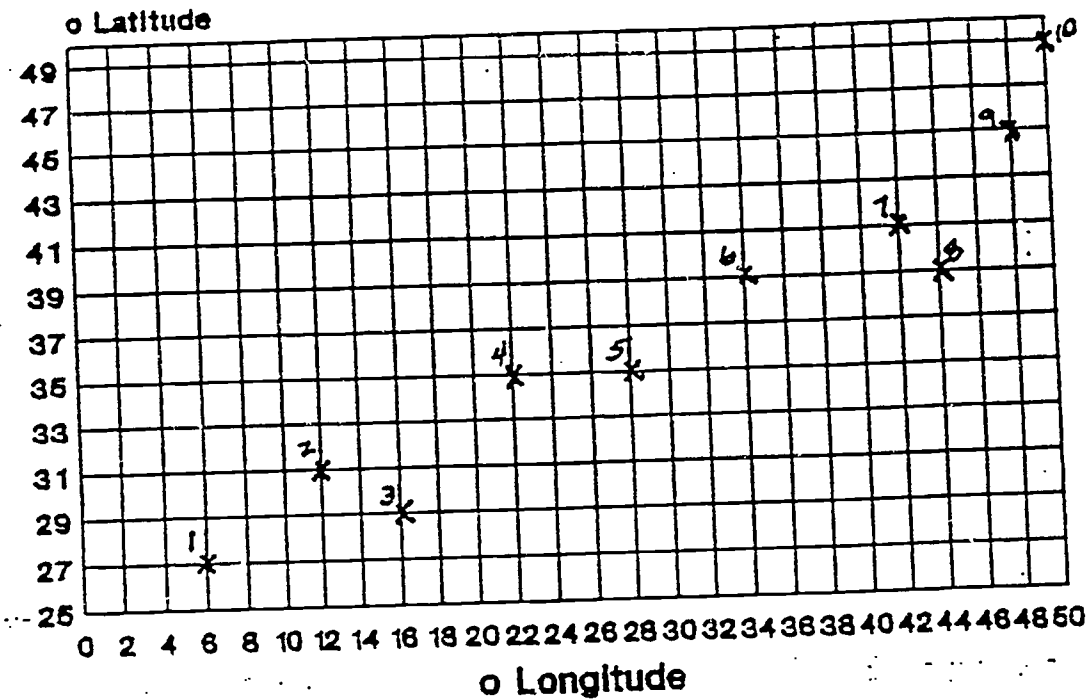
o = Degrees

Directions: The chart above represents 10 days of tracking a hurricane, beginning in the lower left hand corner of the chart. The numbers plotted on the chart represent the day. The numbers on the vertical scale represent degrees of latitude. The numbers on the horizontal scale represent degrees of longitude. Use the chart to answer the following questions.

Supply the correct degrees of latitute and longitude.

1. Day 3 _____ deg latitude _____ deg longitude

2. Day 5 _____ deg latitude _____ deg longitude

3. Day 7 _____ deg latitude _____ deg longitude

4. If you live at 41 deg. latitude and 38 deg. longitude, will you be in the path of the hurricane?   yes   no

5. If the answer to question 4 is yes, from day #3, about how many days will you have to prepare for the hurricane?

_____ days

18

Part 7

Reading

> **Directions:** Read the following passage from a plant newsletter. Some words have been taken out. Fill in the letter of the word that best completes each blank.

WORD LIST

(A) application

(B) competitive

(C) model

(D) quality

(E) educational

(F) readings

(G) industry

(H) locations

(I) refresh

(J) concepts

(K) operation

(L) motivated

"We need to take what you have done here and transport it to other _____ throughout the State," said Betty Castor, Florida State Commissioner of Education, after seeing the Job Enhancement Program. During her November 22 plant visit, Mrs. Castor stopped in to see a class session. She then talked with employees in Fab and IMD about how they apply the _____ being taught on their jobs.

Mrs. Castor had asked to visit the plant's Job Enhancement Training Program as a _____ of new and innovative programs that is steps ahead in the process of achieving the _____ goals she as established for the year 2000. Castor was interested in seeing first-hand the educational skills and concepts required by business and _____.

20

Her first stop was the No. 3 Press, where Buck Harris explained the press _____ and several responsibilities of the Press Leader. From there, Mrs. Castor went on to IMD, where Larry Lambert demonstrated how color _____ were made and their measurement. James Dean was ready to demonstrate gram _____ at the No. 2 Paint Line, but unfortunately Mrs. Castor had to leave for Tallahassee.

"It makes good business sense," commented Mrs. Castor, "to _____ the skills or re-educate such a committed, dedicated group of employees. The employees taking advantage of the program are proving they are _____ to hold their place as an industry leader, and to make their plant _____ as time and job requirements change. And Armstrong is to be commended for the commitment it is making to _____ and the future job security of its employees.

PJC to Provide Job Enhancement Training

Pensacola Junior College has received a $202,958 federal grant to provide Job Enhancement Training (JET) for employees of the Armstrong World Industries plant in Pensacola.

The goal of the JET project is to train 100 Armstrong employees in lifelong learning skills that will aid them in better performance of current duties or that will prepare them for career advancement. The employees will be given instruction in skills needed to perform actual job tasks in areas such as mathematics, reading, writing, listening, speaking and using printed information.

This education partnership between PJC and Armstrong is strengthened by input from the International Association of Machinists and Aerospace Workers, the University of West Florida, Project PLUS, the Private Industry Council of Escambia County, and the Pensacola Area Chamber of Commerce, all of which have been involved in the planning and design of the JET project.

The grant from the U.S. Department of Education will be matched with in-kind contributions by Armstrong and will support services from PJC. The JET project began May 1, 1991 continue until October 31, 1992.

By the end of the grant period, PJC and Armstrong plan to promote replication of the JET project, call Dr. Dan Kaczynski in PJC's Resource Development Office at 484-1709 or Susan K. Bailey, plant employee and labor relations manager of Armstrong's Pensacola plant, 435-2221.

JET Program
Project Coordinator's Report
7/15/91 - 9/13/91

This report begins on 7/15 because that was the first day on
the job for the Project Coordinator. Using that date as
baseline, the timeline for the project that appears in the
grant is amended as follows:

ACTIVITIES   DATES

Expand Advisory Committee   July 1, 1991
Employ Staff   July 1, 1991
Develop recruitment/marketing plan   July 15, 1991
Order materials and equipment   July 15, 1991
Provide project orientation
      meeting   July 15, 1991
Develop job-specific learning
      activities utilizing
      materials provided by
      Armstrong   July 1-30, 1991
Recruit employees   July 13, 1991*
Teacher orientation/in-service   July 1-5, 8-10, 1991
Begin assessment, IEPs   August 8, 1991*
Begin instruction   August 15, 1991*+
Evaluate progress of employees   August 15, 1991*·
Modify curriculum to fit project
      needs   August 15, 1991*+
Annually evaluate project   June, 1991*
Disseminate information regarding
      the project to other Armstrong
      plants   January, 1992
Identify other Armstrong plants for
      replication   April, 1992
Develop job-specific learning
      activities for replication
      sites   June, 1992
Begin instruction at replication
      sites   September, 1992

*On-going
+Actual date September 9, 1991.

105

JET PROGRAM STAFF

The JET program was implemented with the following staff:

Project Director: Dan Kaczynski (In-Kind Position)
Director of Resource Development
Pensacola Junior College
(May 1, 1991 - June 1, 1991)

Project Director: Iowana Whitman-Tims (In-Kind Position)
Assistant Department Head/
Literacy Coordinator
Adult Basic Education Department
Pensacola Junior College

Project Coordinator: Rita Rigby (grant funded)
July 15, 1991 - September 10, 1992
(see job description which follows)

Project Instructors: Karen Gunter (grant funded)
Mark Fisher (grant funded)
(see job description which follows)

Project Facilitator: John Harley (grant-funded)
Part-time position

Project Recruiter: Marvin Andrews (grant-funded)
Part-time position

There were two changes in project staff during the course of the grant period (May 1, 1991 - October 31, 1992). The Project Director was changed due to a reorganization at the College which resulted in the loss of the position of Director of Resource Development. The project coordinator resigned on September 10, 1992 for personal reasons. It is believed that neither change had a negative impact on the desired or actual outcome of the JET program.

106

EXECUTIVE, ADMINISTRATIVE AND MANAGERIAL
POSITION DESCRIPTION
PENSACOLA JUNIOR COLLEGE

TITLE

PROJECT COORDINATOR

DESCRIPTION

Provide supervision and leadership to project staff in order to implement the workplace literacy project with Armstrong Industries and Pensacola Junior College.

Build and maintain a strong linkage with Armstrong staff involved in the development of the workplace literacy project.

Conduct information/recruitment sessions with employees and project facilitator to generate enthusiasm and interest in the program.

Assist in the hiring process of project staff.

Orient/train staff.

Assist in the development of curriculum materials.

Maintain necessary records, reporting requirements, etc.

Maintain communication regarding project goals, activities, etc. with Armstrong personnel PJC staff (as appropriate) and evaluation consultants.

Assist in the development or selection assessment tools (informal reading inventories, questionnaires, etc.).

Provide students/staff with appropriate referral information, if needed.

Assist project staff in developing individualized educational plans for students.

Disseminate information about the project to others business to encourage possible adoption.

MINIMUM QUALIFICATIONS

Graduation from an accredited institution with a bachelor's degree in an educational area with two years of related full-time experience in one or more of the following areas: adult education, reading instruction, workplace literacy program development, and/or administrative experience.

FACULTY POSITION DESCRIPTION
PENSACOLA JUNIOR COLLEGE

TITLE

INSTRUCTOR

Provide instruction to students in the areas of reading, mathematics, writing, and functional literacy skills.

Assist students in incorporating basic skills mastered to job related tasks when appropriate.

Assist project staff in curriculum development, material selection, etc.

Provide instruction in computer literacy skills.

Assist students in developing an individualized educational plan, setting goals, and identifying obstacles that might need to be overcome to accomplish these.

MINIMUM QUALIFICATIONS

Bachelor's degree in an educational area and expertise in one or more of the following areas: Adult Education, Reading Improvement, Vocational Education with emphasis on bask skills, English or Math.

Experience working with adults , experience in individualized instruction, computer assisted instruction, computer literacy skills and good communication skills preferred. Familiarity with business and industry an asset.

PJC

RESPONSIBILITIES OF THE UNIVERSITY OF WEST FLORIDA (UWF)

A. Identify job task literacy activities and prerequisite basic skills needed to insure job task success

B. Identify job task literacy skills: reading comprehension vocabulary, writing, speaking, and listening

C. Design learning activities that include prerequisite basic skills and job task literacy skills that are based upon on-the-job printed materials

D. Train project coordinator, teachers and project facilitator in the use of learning activities

E. Assist project staff in the initial assessment of Armstrong employees and the use of the Individualized Education Plan
(A - E / June 28, 1991)

*****

F. Provide on-going technical assistance and training in the implementation of the curriculum model, modifications through the project and dissemination of the model
(October 30, 1992)

RESPONSIBILITIES OF THE EXTERNAL EVALUATOR

Evaluation of the Job Enhancement Training project being conducted jointly by the College and The University of West Florida and Armstrong World Industries, to include: Analysis and summarization of quantitative and qualitative data gathered by College; visits to training sites to conduct observations and interviews with participants; preparation of the formative and summative evaluation reports listed hereinbelow.

A. Preliminary Baseline Data Report - June 28, 1991

B. Formative Report - November 1, 1991

C. Formative Report - May 1, 1992

D. Final Summmative Report - October 30, 1992

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QUANTITATIVE MEASURES OF THE SUCCESS OF THE JET PROGRAM

An external evaluator was contracted to provide an objective evaluation of the JET program, including pertinent quantitative measures of the success of this federally funded, National Workplace Literacy grant program. Both formative and summative evaluations of the JET program were a part of his reporting requirements. The following are the reports provided to the educational partner by the external evaluator following each of his

four visits to the program.

INITIAL REPORT ON THE

JOB ENHANCEMENT TRAINING PROGRAM

AT ARMSTRONG WORLD INDUSTRIES,

PENSACOLA, FLORIDA

Gary Rackliffe
418 Cedar
Sault Ste. Marie, MI 49783

June 23, 1991

INITIAL REPORT ON THE
JOB ENHANCEMENT TRAINING PROGRAM
AT ARMSTRONG WORLD INDUSTRIES,
PENSACOLA, FLORIDA

This report is the outcome of my initial visit to Pensacola and the participants in the Job Enhancement Training program, Pensacola Junior College, Armstrong World Industries, and University of West Florida. The visit took place June 10 - 14, 1991 and focused on the early planning and development stages of the project.

The report is organized around six themes that emerged during my visit:
1. The innovative curriculum developed by Clara Jennings and Lisbeth Dixon-Krauss,

2. The instructional personnel and the training they will need,

3. Mathematics and the typ of understanding of numbers that I saw employees using,

4. Reading tasks,

5. Coordination between and among the three institutions, and

6. The importance of data collection.

Each of the themes includes suggestions for future actions.

The people I had the opportunity to meet and talk with made this trip both informative and enjoyable. I want to thank the people at PJC, AWI, and UWF who were so generous with their time and their enthusiasm for this project. I am looking forward to visiting all of you again in the fall.

CURRICULUM
The curriculum and instructional program as described in the most recent writings of Lisbeth Dixon-Krauss and Clara Jennings brings together the elements of instruction that current research indicates are essential for significant learning to take place. Their plan realistically addresses the personal needs and

1

attitudes of adults, especially adults who have not been successful in school. This is done within an instructional package that acknowledges, and takes advantage of, the fact that people develop unique understandings based on their own backgrounds and experiences. These understandings are developed through interactions with other people. The plan views reading as a complex process of making sense of text rather than the accumulation of a number of individual skills. Finally, it does this in a social setting where people communicate the meaning of what they have read with others. Coupling this view of reading with the program's parallel emphasis on writing provides a realistic view of adult communication as it takes place in the real world rather than some assortment of isolated reading and writing skills that are to be mastered and demonstrated individually.

I would suggest:
This instructional plan is different than what many people in and out of the program might expect, and the developers may need to help some of these people understand why this is a more effective approach than traditional ones.

The use of educational text-editing computer programs will be very helpful for the development of writing skills. It is important that computers be available for use by the project participants because simple text-editing programs have been shown to be effective in overcoming resistance to writing instruction.

The program mentions mathematics instruction but is not explicit about the form and content of that instruction. This is understandable given the background of the authors, but it is a limitation that will have to be addressed.

TEACHERS

It was unfortunate that the teacher selection was not completed when I visited and I was not able to meet the people who will be carrying out the important day-to-day instructional activities of the program.

Training the people responsible for delivery of this innovative program is essential. It is this different approach to teaching and learning that makes this a potentially effective program in areas where others have often failed. Because this program is based on a different set of assumptions about the nature of teaching and learning than are traditional programs, it should not be assumed that previous work in adult education will be sufficient preparation. Instructional personnel will have to understand the theoretical basis of the program and the implications that has for instructional activities, classroom

2

organization, and interactions with students. Trying to deliver this plan using traditional teaching and class organization techniques will not be effective.

I would suggest:
Thorough training for instructional personnel including consideration of the theoretical foundations of the program before classes begin coupled with frequent follow up activities.

The training sessions and follow up activities should be structured in the same way as the classes so the instructors can experience learning as their students will experience it.

MATHEMATICS

The mathematics needs of Armstrong production workers, as well as production workers in other industries, go far beyond developing computational skills. During my plant tour I was struck by the number of times I saw numbers used as a form of representation – a way of describing production processes – rather than as a part of some calculation. People recorded measurements and plotted points on graphs that showed trends in machine operation. Production personnel were responsible for interpreting their graphs and those of previous shifts in order to monitor the quality of the product. There were also several bulletin boards on which production charts were posted. This use of numbers for process control is much different than simply using numbers as part of a multiplication problem.

In another instance of the use of numbers, I was shown a computerized paint-mixing program that required the operator to treat the paint batch as though it was only one tenth its actual size because of the limitations of the computer program. This creative solution to a problem is based on a rather sophisticated use of ratios. Its development and use require more mathematical understanding than is generally taught in remedial mathematics instruction focused on computations.

To work successfully in this environment, people need to have a conceptual understanding of numbers as a form of representation. This includes, but goes far beyond, calculations and the memorization of procedures. It is not enough to know how to multiply – or put numbers into a calculator. People in this situation must know how to choose which numbers to multiply, when to multiply, and what it means to multiply.

3

I would suggest:

Someone with a background in mathematics and/or statistical process control (SPC) should be contacted to help with an analysis of the mathematical understandings needed for current and future work situations.

The instructional staff will need to develop their understanding of the mathematic concepts and ways of thinking people will have to develop to function effectively in a work environment that is increasingly dependent on numbers as a form of representation upon which decisions will be made.

READING

During my plant tour I saw few, if any, instances in which reading was necessary for day-to-day production tasks. I was, however, shown written material workers used during training sessions that preceded the installation of new equipment. The plant also has several well maintained bulletin boards with posted notices and employee information.

I would suggest:

The task analysis used to identify the types of reading employees do should include:

reading employees need to do their jobs,
reading employees need to learn their jobs, and
reading employees need to be complete, informed employees.

COORDINATION

This project involves the coordination of people and resources of three institutions, Pensacola Junior College, Armstrong World Industries, and the University of West Florida. Added to this group are several other organizations playing support roles. These institutions have differing goals and differing ways for people to work toward achieving those goals, and these differences make communication among the participants important, and at the same time, difficult.

During the early stages of the project when individuals and groups are working on separate aspects of the project it will be especially important to maintain open channels of communication. Again, this will be made more difficult, and more important, by the different nature of the institutions and by everyone's limited experience with the other participants.

4

116

I would suggest:

Conversations among the participants will be important to coordinate planning and development activities and to learn about the needs and capacities of the various groups involved in the project.

It is important for participants to stay in touch with each other even though it may seem that there is nothing happening at the moment.

DATA COLLECTION

The outcomes of this project will be of interest to several different audiences, and it is important to gather the information needed to describe and document the results. Although the instructional model developed by Jennings and Dixon-Krauss does not lend itself well to quantitative analysis, there are audiences that will be interested in that form of information. Other audiences will be interested in qualitative information describing the participants' personal changes and facilitating the adoption of this program at other sites. Information needed to document the effectiveness of the program will have to come from a wide variety of sources including some sort of standardized reading assessment, writing samples, personal interviews, employment records and work evaluations, and personal journals.

I would suggest:

I cannot overemphasize the importance of gathering data as the project begins. This is the most hectic time, and it is easy to put off data collection, but this is the only time to capture baseline data and to document the important planning and start-up activities.

Information from participants should include quantitative and qualitative work-related and personal data such as:
Work-related
Evaluations
Promotions
Absenteeism
Personal
Reading and writing evaluations
Attitude survey
Personal interviews
Writing samples.

Information from instructional staff should include reports of activities, especially during training, and reflections classroom activities.

SECOND REPORT ON THE

JOB ENHANCEMENT TRAINING PROGRAM

AT ARMSTRONG WORLD INDUSTRIES,

PENSACOLA, FLORIDA

Gary Rackliffe
418 Cedar
Sault Ste. Marie, MI 49783

November 11, 1991

SECOND REPORT ON THE
JOB ENHANCEMENT TRAINING PROGRAM
AT ARMSTRONG WORLD INDUSTRIES,
PENSACOLA, FLORIDA

This report is the outcome of my second visit to Pensacola and the participants in the Job Enhancement Training program, Pensacola Junior College, Armstrong World Industries, and University of West Florida. The visit took place October 28 - 30, 1991 and focused on the project's early weeks of instruction.

The report is organized around six themes that developed during my visit. All but one of these themes are continuations of those identified during my first visit to Pensacola in June, although some have developed new arcas of emphasis as time has passed and the project has moved from planning to implementation.

1. Job Task Analysis and the Job Task Analysis Test

2. Curriculum

3. Teacher training

4. Coordination between and among the three institutions

5. Group C workers

6. Data collection.

As was true the with my previous trip, the people I had the opportunity to meet and talk with made this trip both informative and enjoyable. Again, I want to thank the people at PJC, AWI, and UWF who were so generous with their time and their enthusiasm for this project. I am looking forward to visiting all of you again in March.

JOB TASK ANALYSIS (JTA) and the
JOB TASK ANALYSIS TEST (JTAT)

Credit should be given to John Harley, Susan Bailey, and the others who have begun work on the job task analysis. Doing this analysis well is a difficult job, but it is central to many of the problems the project is encountering.

There has been a great deal of confusion over which parties were responsible for, and capable of, performing the JTA and the test that is to be based on that analysis. Those problems seem to have been resolved, and there now is a group of people from PJC and AWI that is willing and able to do this. This group, with assistance from the UWF consultants and myself, will

1

complete the JTA and prepare the JTAT.

Completion of the analysis will allow two other tasks to move forward. First, it will be possible to develop the JTAT that is called for in the project proposal. Second, the project coordinator and teachers, working with the UWF consultants and others, will be able to finalize their curriculum.

In doing the JTA it is important to differentiate between skills, knowledge, and attitudes that are needed to perform tasks within the plant and those that are needed to learn how to perform those tasks. For example, the reading done to learn to operate a fork-lift truck is much different than the reading done while operating one. The JTA needs to uncover the skills, knowledge, and attitudes that are necessary for learning new job tasks. These often go beyond the skills needed for a specific job and might include such things as problem solving, higher order thinking, and organizational skills.

For example:
    Math skills go beyond computations and include an understanding of math concepts and the use of numbers as a form of representation.
    Several tasks, especially those involving computer use, require the ability to follow a sequence of operations, following instructions, and responding to a variety of cues.
    There are a wide variety of reading skills used by AWI workers because they are reading for a variety of purposes.
        -Decoding skills for such things as names on labels.
        -Getting information from instructions, manuals, etc.
        -Finding information in tables of contents, indices, organizational schemes, patterns, etc.
        -Interpreting the contract and employee benefit information.

I would suggest:
Completing the JTA and the JTAT as soon as possible because they play such an important role in the final development of the curriculum.

The JTAT should be given as soon as possible to maintain value as a pre-test to measure student learning.

CURRICULUM

The theme of Curriculum is closely tied to both the previous theme of completing the JTA and to the following theme of teacher training. The project curriculum cannot be finalized until the JTA is completed because it flows from the skills identified in the JTA. The on-going teacher development that I suggest below is also tied to the curriculum because the support the teachers need is directly related to the curriculum.

The concerns I expressed about mathematics and mathematics instruction in the first report have not diminished. I still

2

believe it is necessary to help workers develop a conceptual understanding of the use of numbers as a form of representation in addition to developing computational skills and the ability to define and solve problems involving numbers.

Many of the students in the JET program already have some math knowledge, but that knowledge is often fragmentary and more implicitly held than explicitly. After watching a student correctly answer a simple word problem in which he had to find one half of 3/4, I asked him how he had done it. He said, "I don't know what I'm doing, but I can get the answer." We kept talking, and eventually decided he had just known that to find half of any number of fourths you doubled the 4 to an 8. This knowledge would not have been as helpful if the problem had been to find one fifth of 7/10.

Teachers will need to be able to learn what students know, help them formalize it, and then build upon it. For example, when a student looks at a work-sheet about fractions and says, "The most important thing about fractions is least common denominator" the teacher needs to find out what that means to the student. Is this just a name remembered from long ago? Is this a label used for an algorithm that can be mechanically applied in a few situations? Or is this a mathematical concept that the student can use in a flexible way that demonstrates an understanding of the meaning of fractions?

The instructional model developed by Jennings and Dixon-Krause is very good for recognizing and developing the existing reading abilities of adult students. This same type of instructional strategy needs to be used to develop the existing math abilities of the workers.

I would suggest:
Someone with a background in mathematics and/or statistical process control (SPC) should be contacted to help with an analysis of the mathematical understandings needed for learning current and future work job tasks.

The instructional staff will need to continue developing their understanding of the mathematic concepts and the ways of thinking people must develop in order to function effectively in work environments dependent on numbers as a form of representation upon which decisions will be made.

TEACHERS

Mark Fisher and Karen Gunter deserve credit for the work they have done in handling the larger-than-expected number of students and beginning the instructional program with the limited training they received. As I mentioned in the first report, this is a novel approach to adult education and we should expect that it would require an on going program of support for teachers to implement in the way it was designed. It does not seem to me that the early training the teachers received was adequate for the implementation of such a novel program.

As discussed above, the math needs of AWI workers seem to

3

indicate the need for new approaches to math instruction. The teachers will need continuing support as they work with students to develop conceptual understands of mathematical operations and the idea of using numbers to represent real-world processes.

The model of learning suggested by Jennings and Dixon-Krause is an excellent model to use for this on going teacher development. Group discussions of each week's activities would provide a forum for all parties to develop a better understanding of the subtle implications for this form of teaching.

I would suggest:
Continuation of training for instructional personnel including consideration of the theoretical foundations of the program.

Weekly discussion sessions at AWI for the instructional staff and the UWF consultants.

Staff development in mathematics education including such things as teaching math concepts through the use of manipulatives, and math as a problem solving tool.

Continuing development of the ability to diagnose the areas of individuals' math knowledge and to assess the level of that knowledge in order to provide the instruction needed to fill in gaps and to overcome misconceptions.

COORDINATION

Coordination among the three major participating institutions -- Pensacola Junior College, Armstrong World Industries, and the University of West Florida -- continues to be difficult. This should be expected considering the differences among them in terms of their functions, expectations, and cultures. By now individuals within the project should be developing a better understanding of each other's needs and expectations.

In the early stages of the project several problems arose that were related to communication between parties in the project. Some of these were due to a lack of communication while others were due to expectations that were, for one reason or another, unmet. At this point there seems to be little to be gained by continuing debate on these issues. Most of them seem to be resolved, and the remainder can be left in the past while the group continues to concentrate on the work at hand. It seems important at this point for all the parties to be, on one hand, as explicit as possible about their expectations and, on the other hand, to be realistic about their ability to meet the expectations of others.

I would suggest:
Regular conversations among the participants to coordinate activities and to understand the needs and capacities of the various groups involved in the project. These meetings

4

require valuable time but should result in reducing problems.

GROUP C

I heard several comments about the need to provide some sort of service to workers who scored well on the tests and were placed in what is known as "Group C." For several reasons this has been a complicated logistical problem, and I do not want to ignore those logistics. But it does seem important to follow through on implied or explicit commitments made to this group. It would not seem wise to disappoint this most capable group of workers who have expressed an interest in self-improvement. Working within the resources of PJC, AWI, and UWF I am sure you will be able to develop a program that will be a benefit to these workers and to AWI.

I would suggest
While some sort of program is being developed for these workers it is important to stay in touch with them so they do not feel as though they are being ignored. "We're working on it" may not be the most satisfying message to deliver, but it is probably better than no message at all.

DATA COLLECTION

Data collection also remains a problem. Part of this will be resolved with the development of the test based on the JTA. Other information is being gathered that will be helpful in evaluating the outcomes of the project. At this point it is important for all the parties involved to be explicit about the types of information they will need in order to communicate project results to interested groups. There are probably several different audiences that project participants will want to address.

In future data collection efforts it will be important for everyone to have a clear understanding of the nature and form of the information to be collected and the parties responsible for that collection. It is necessary here to remember the time constraints that the project teaching staff are working under and the large number of students they are serving. Even small data gathering activities can become daunting when they involve over 150 students. Whenever possible, data gathering activities should be designed so that they augment the curriculum and fit into students' learning activities. An effort must be made to insure that all tests and other data gathering techniques are appropriate for adult learners.

Several data gathering procedures are in place now or will be in the near future:
 TABE scores will be helpful for pre- and post-assessment of student achievement.
 The Job Task Analysis Test will provide additional

5

information and must be developed and administered as
soon as possible.

Information is being gathered by the teachers on attendance
and learning activities.

Initial interviews and writing samples combined with
students' periodic journal entries can be used to
provide information about changes in attitude. I think
this information will be at least as good as what might
have been gathered using the SDLRS. The journals will
also fit well into the curriculum providing learning
experiences for students and information for the
teachers.

Supervisors' regular worker evaluations and other company
data such as attendance can provide additional data.

I would suggest:

Continued emphasis on documentation of the implementation of the
project. This will be helpful when the project is
replicated at other sites.

Assurance that the information needs of all the participants are
met as well as possible. This will may be complicated by
differences among the participating institutions and may
require careful discussion.

THIRD REPORT ON THE

JOB ENHANCEMENT TRAINING PROGRAM

AT ARMSTRONG WORLD INDUSTRIES,

PENSACOLA, FLORIDA

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March 16, 1991

THIRD REPORT ON THE
JOB ENHANCEMENT TRAINING PROGRAM
AT ARMSTRONG WORLD INDUSTRIES,
PENSACOLA, FLORIDA

This report is the outcome of my third visit to Pensacola and the participants in the Job Enhancement Training (JET) program, Pensacola Junior College (PJC), Armstrong World Industries (AWI), and University of West Florida (UWF). The visit took place March 2 - 5, 1992 and focused on the on-going instructional program and on beginning to plan for the future that lies beyond the end of the current federal grant.

The report is organized around eight themes that emerged during my visit.

1. Vision of the Future

2. Adherence to the Model

3. Job Task Activities Test

4. Teachers and Their Training

5. Collaboration Among the Three Institutions

6. Advisory Committee

7. Mathematics

8. Data Collection.

Progress has been made on several of the issues that were problematic in earlier visits and the participants are to be commended for their work. Several areas do, however, remain from previous visits. Despite my efforts at brevity, each of these reports is longer than the preceding one. I believe that reflects the increasing complexity of the project as it develops.

Again, I want to thank the people at PJC, AWI, and UWF who were so generous with their time and their enthusiasm for this project. I am looking forward to visiting all of you again in the fall.

ISION OF THE FUTURE

AWI has, for several years, been working toward changes in the relations between management and the production workers and in the organization of how decisions are made and how work is done in the plant. This is often seen in workers' increasing participation in the decision making process and responsibilities related to manufacturing processes. The Gain-Sharing Plan is an important part of this changing set of responsibilities and rewards.

The JET program plays several roles in this process. It provides workers with the intellectual tools they will need to take advantage of training and to participate in the modern workplace. It shows the company's willingness to invest substantial resources in the development of its human capital. It also provides an opportunity to develop what many in education are calling a "community of learners." It is these communities of learners that will sustain the teaching and learning efforts initiated by JET beyond the end of the project and into the future.

This is a good time in the life of this project to begin making plans for how the activities of the project will continue after the original grant expires. The Krause and Jennings model, upon which the project is based, describes a maintenance phase in which the social groups developed in what they call the transition phase become self-sustaining. This happens through a process of leadership development and improving group dynamics. These groups of self-directed learners seem to me to fit well into the plant culture that AWI is developing.

I would suggest:
Project leaders and participants develop a shared vision of the future and how formal and informal educational opportunities can be delivered to meet the work-related and personal needs of the employees.

Consideration should be given to the development of levels of instruction and movement between those levels -- a structure that would allow people to participate for a while, reach some goal, and change the nature of participation. The current structure of the program does not publicly recognize any differences in educational level among the students. This has been a useful organizational form for early stages of the project, but it might not be the best form as the project moves into the future. The project could develop some kind of graduation or commencement award that would encourage people to move to the next level of instruction or to other educational activities.

Development of a variety of learning opportunities and

2

structures such as informal learning groups, groups targeted toward specific short-term and long-term goals, continuation of tuition reimbursement for college classes, working with PJC to provide classes that meet the needs of employees whose work schedule makes it difficult to attend regular classes.

Working with Clara Jennings of UWF to develop learning communities within the present group of students that will have the potential for becoming self-sustaining. This includes developing group dynamics and the student leadership referred to in the grant proposal as "literacy helpers" (pg 15).

ADHERENCE TO THE MODEL AND TIMELINE

Adherence to the model developed by Drs. Krause and Jennings has an impact on my comments in the next two sections about the Job Task Activities Test and about training needed by the teachers. This is an excellent model, but its implementation in this setting has been frustrat ; by large enrollment and lack of training.

The model adopted for use in this project contains five phases: Preliminary planning, Pre-assessment, Transition, Maintenance, and Post-assessment. The first two phases cover the planning and intake portions of the program where students are identified and tested, the second two are the instructional phases, and the third is student testing at the end of the project. It is the two instructional phases that are of current concern. Several factors have combined to make it impossible to meet the schedule laid out in the project proposal.

The first problem came with the large number of workers who expressed an interest in participating in the program. PJC was prepared for about 100 applicants, AWI anticipated about 50, and 150 people actually signed up. That figure has now grown to about 170. This overload of students forced the postponement of instruction until early September.

The second problem comes from the nature of the instruction itself. The Krause-Jennings model calls for student/teacher interaction that is much different than traditional instructional practices in either adult basic education or in public schools. Krause and Jennings and the project administrators underestimated the difficulty of adapting teaching practice and the amount and form of training that would be required for teachers to make the needed changes. The resulting lack of adequate training and support has contributed to a delay in the formation of learning groups described by Krause and Jennings in their model. The change from transition phase to maintenance phase was further complicated by the large number of students in the program and their work schedules which make the development of a sense of

3

community more difficult. These problems have contributed to pushing back the change from the transition phase to the maintenance phase.

Dr. Jennings has agreed to take over the job of working with the JET teachers to develop the group dynamics and student leadership needed to complete the change from the transition phase to the maintenance phase. She will also help them with their efforts at changing their teaching practices to more closely fit the instructional model.

JOB TASK ACTIVITIES TEST

Since work on the project began in the spring of 1991 several problems have surfaced concerning the Job Task Activities Test (JTAT). This test was to be an outgrowth of the Job Task Analysis (JTA), and it was to be used at various times during the project to measure students' progress.

1. Performing the job task analysis was more difficult than originally anticipated. The staff first recognized the need to differentiate between the skills needed to do a specific job and the quite different set of skills needed to learn that job. This difficulty was eventually resolved and the JTA was completed.

2. The second task that proved more difficult than anticipated was the development of a valid, reliable test that was not Armstrong specific but would satisfactorily test the student's ability on skills drawn from Armstrong jobs. Draft versions of two tests were developed and circulated among the project participants for their comments.

3. These two tests raised a third set of dilemmas that was, at the time of my visit, unresolved. Test A is short and contains relatively easy questions. Taking this test would have been relatively non-intimidating for the students. The reviewers generally agree, however, that entering students would be able to answer a high percentage of the questions. Test B was much longer and included questions that required the interpretation of complex graphs, reading and interpreting material written at a high level, and doing sophisticated analysis of economic trends and data. The test was well written, demanding, and clearly beyond the ability of the vast majority of entering students. There was concern among the reviewers that some sections were beyond the scope of instruction in this program.

The dilemma the project participants were attempting to resolve during my visit was how to develop a test that will challenge people completing the program without demoralizing people at early stages of the program. One of the great strengths of this instructional model is its emphasis on building

4

students' self-esteem, and most of the participant question giving students a test on which they would be expected to perform very poorly.

4. The JTAT was to be used at the end of the transition phase, at the middle of the maintenance phase, and as part of the post-assessment phase. Delays in the implementation timeline mentioned above changed the dates at which these were expected.

5. Each of the students was given the Test of Adult Basic Education (TABE) when they entered the program. This is a test of job related skills and can be used as a measure of student progress during the project.

I would suggest:
The project officer be kept informed of changes in the project timelines as they relate to administration of the JTAT.

Project participants should continue work on the JTAT in anticipation of its possible use as an exit test. Sections of the longer test could be used to determine movement between levels of instruction. This should be integrated into a plan for continuing educational opportunities as mentioned above.

It is important to use the JTAT in ways that support the company's long-term goals for continuing employee education and development.

TEACHERS AND THEIR TRAINING

PJC has added a third teacher to the program, and AWI has agreed to fund administrative and planning time for her. This added teacher seems to be helping with the student load and allows the program to provide services for students who, because of high scores on the intake tests, were not previously being served. The teaching staff continues to do well in their work with students and has been successful in putting students at ease and developing an interest in learning.

The teachers still need more training on how to reframe traditional instructional material and practices to fit the Krause-Jennings model. Earlier efforts to provide the training and support needed were not successful. As mentioned above, Clara Jennings has agreed to work with the teachers on these concerns. *Groups being handled by teachers as "all-do-it"*

I would suggest:
Regular classroom visits by Dr. Jennings to observe teaching practice and discussions with the teachers about changes that would move the classroom activities closer to the Krause-Jennings model.

5

Consultation with Dr. Jennings about how to reframe classroom activities to fit her social constructivist model. This will require that existing curricular material be used in different ways than it is currently being used.

Instruction needs to be more student centered and less teacher centered. Students need to be talking to each other and to the instructor more.

COLLABORATION AMONG THE THREE INSTITUTIONS

Collaboration among the participating institutions has always been challenging for the individuals working in this cooperative effort. On the positive, side the JET staff seems to have developed very good relations with plant personnel. This has been done through their interactions with students in the classroom and during their frequent visits to the plant floor, through their participation in company activities, and through their meetings with supervisors.

Several incidents of friction among project participants have also come up during the past few months. In some cases people moved quickly to defuse these situations, generally through the process of opening communications and explaining the different roles people had within the project. In other cases, the lack of early communication seems to have allowed problems to escalate to the point where they were much more difficult to resolve.

I would suggest:
It is important for participants to stay in touch with each other even though it may seem that there is nothing happening at the moment. Regular meetings with open discussions of views and concerns should help by providing communication channels and early identification of dissension and potential conflicts.

ADVISORY COMMITTEE

The advisory committee described in the grant proposal has met twice. This group should be a valuable source of information and advice for the project as well as providing an outlet for disseminating information about the project to other interested groups. They could also provide support for on-going activities after the end of the grant.

I would suggest:
The group meet more often in order to make better use of it in terms of both soliciting advice and disseminating information.

6

131

Developing the group as a source of continuing support and potential funding for on-going projects.

MATHEMATICS

The concerns I expressed about mathematics and mathematics instruction in the first and second reports have not diminished. I still believe it is necessary to help workers develop a conceptual understanding of the use of numbers as a form of representation.

The teacher have had at least one opportunity to work with one of Armstrong's staff members to learn more about statistical process control (SPC) which is being implemented in the plant. They reported that this session was very helpful for them because it gave them a better idea of the math skills workers would need.

I would suggest:
The teachers continue working with the SPC people at AWI. This will improve the teachers' understanding of what the workers need to know in order to learn to use SPC and other mathematical processes in the plant. It will also have the advantage of helping the SPC people better understand how to best implement this process in the plant.

Include SPC people as part of a learning community with teachers and students to provide a model of how people in different departments can work together to better understand and develop the cognitive and intellectual skills needed for various aspects of the plant operations.

The JET teachers should take the SPC training that workers get in order to better appreciate the mathematical skills needed for success in that training process.

DATA COLLECTION

The program seems to be ready to begin the change from the transition phase to the maintenance phase, and the grant proposal calls for collection of evaluation information at that time. There are several types of data that should be collected to help develop a picture of the progress to date.

I would suggest:
Student writing samples can be collected, and if those were done on the theme of how the students' attitudes have changed since during their participation in the project, they would provide useful information for an attitude survey.

TABE scores from various points during the program will

7

allow a study of change across the program in addition to their use for pre- and post-assessment.

The Job Task Activities Test will provide additional information and the participants need to complete the development as soon as possible. As discussed above, the use of this test should be based on how it fits into the company's larger vision of an on-going educational program.

Class attendance information should be collected for JET students.

Dr. Jennings and the teachers should consider the use of student journals as one of the instructional activities. These could be a source of information for the teachers and could provide insights into the development of student attitudes. This might be especially valuable as students go from the relatively teacher centered transition phase to the student- and group-centered maintenance phase.

Information from instructional staff should include reports of their activities, especially during training, and reflections on classroom activities.

This would be a good time to formally survey the supervisors about changes they have seen in employees. These should include changes in employees' attitudes, initiative, types of questions asked, suggestions offered, etc. If allowable under company policy, these questions should relate to specific employees rather than to some generalized impression of all employees participating in the program.

It would be helpful if the company could develop data on changes in the number of errors and other indications of better use of procedures beyond reduction in scrap and increases in productivity.

8

FINAL REPORT ON THE

JOB ENHANCEMENT TRAINING PROGRAM

AT ARMSTRONG WORLD INDUSTRIES,

PENSACOLA, FLORIDA

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November 27, 1992

FINAL REPORT ON THE
JOB ENHANCEMENT TRAINING PROGRAM
AT ARMSTRONG WORLD INDUSTRIES,
PENSACOLA, FLORIDA

This report is the outcome of my fourth and final visit to Pensacola and the participants in the Job Enhancement Training (JET) program: Pensacola Junior College (PJC), Armstrong World Industries (AWI), and University of West Florida (UWF). The visit took place September 23 - 25, 1992 and focused on the instructional program and on plans for the future that lies beyond the end of the current federal grant.

The report is organized around two sets of themes. The first 3 topics relate to the outcomes of the program, and the second 3 topics are larger issues that have been concerns throughout the project.

Program Outcomes
    Test Scores
    Students' Comments
    Other Outcomes

Program Issues
    Curriculum and Teaching
    Collaboration Among the Three Institutions
    Continuing Into the Future.

The program should, on balance, be considered a success in its effort to improve the reading and mathematics skills of the participants. It was, as earlier reports have noted, a program that had its share of problems, but, in the final analysis, these were overcome and the program is considered successful by the people involved.

Again, I want to thank the people at PJC, AWI, and UWF who were so generous with their hospitality during my visits and with their time and enthusiasm for this project.

TEST SCORES
Data collection has been one of the program's on-going challenges, but sufficient information has been gathered to provide some quantitative indicators of program success. The data available includes students' scores on the Job Task Analysis

1

Test (JTAT) developed at AWI for this program and the Test of Adult Basic Education (TABE), attendance in the JET program, age, and length of service at AWI.

There were a total of 142 students registered in the program which is a much higher enrollment than had been anticipated in the program design. Of these, 112 were men and 31 were women which approximately matches distribution in the factory work force. Participants' ages ranged from 32 to 62 with a mean age of 47.1 years. As is true of all the factory workers at AWI, the participants have been at AWI for a long time. The years of service ranged from 7.5 to 38.8 with a mean of 21.5 years.

When students attended classes they were released from their normal work and replaced by another worker who was usually putting in extra hours from a previous shift. Difficulties in arranging these replacement workers resulted in lower attendance for some students, but the attendance rate was an average of 77% of the total possible hours. Depending on when they entered and left the program, students had a possible attendance that ranged from 9 hours to a maximum of 81 hours with a mean of 45.6 hours. Actual attendance ranged from 4 to 57 hours with a mean of 35.1 hours.

Two tests were given students at different times during the program. The Job Task Analysis Test (JTAT) was developed by people at AWI based on an extensive analysis of the tasks done by the workers in the plant. Tests included questions and problems on measurements, computations, line graphs, pie charts, number conversions, plotting coordinates, and reading. Scores are expressed as a percentage correct. The difficulty of developing the test and scheduling its administration postponed the initial testing so that it did not serve as a true pre-test, and the problems of scheduling and administration of the second test limited the number of pre-test/post-test pairs of scores that were available. Nonetheless, the changes in students' scores did serve as an indicator of growth during the program. Sixty-six students, 46% of the total, had both pre- and post-test scores. The pretest scores ranged from 11% to 100% with a mean of 54%. Post-tests ranged from 42% to 99% with a mean of 80%. Changes in scores ranged from -23 to +70 with a mean of 26. When compared to the pretest score these changes ranged from -23% of the original score to an improvement of 377% over the original score with a mean of 67% improvement over the original score.

The second test used was the Test of Adult Basic Education (TABE). This standardized test contained sections on reading, mathematics, language, and a total score. Results on this test were expressed in grade-level equivalents. As with the JTAT, problems of scheduling and administration limited the number of pre- and post-test scores. This test was further limited by having four different forms for different levels of performance.

2

Some students were given different forms of the test during the course of the program making it difficult to compare scores across the program. There were 38 students who had pre- and post-test scores on the same form of the test, and that group of scores was analyzed. These students had a mean ages of 41 years and an average of 41 hours of instruction. Their average attendance was 80%. In each of the subtests and in the total the mean change was over one grade level of growth. Of the 114 sub-test scores in this group, only 18 (16%) showed a decline between the pre- and post- test. The mean change in reading was 1.1 grade level, mathematics was 1.2, language and the total were 1.3. Mean grade levels on the tests varied between 5.0 on the language pre-test and a high of 8.2 on the mathematics post-test.

Each of these testing programs is, in its own way, flawed. The data here was very limited, but there was still a strong indication of improvement among the students. I can find no evidence that these students were not typical of the total student population, but no one has claimed that this was a random sample. In spite of the limitations, the test scores support the conclusion that the program was effective especially in light of the fact that there was only an average of 41 hours of instruction in the program.

The amount of improvement in the test scores does not seem to be tied to the amount of instructional time. While all the test score changes were positively correlated with the amount of instructional time for each student, only the change in JTAT scores reached the .05 level of statistical significance when correlated with actual instructional time.

STUDENTS' COMMENTS

During this visit I had an opportunity to interview 19 of the program participants. They were especially pleased with the attitude of the instructors. Many of the students had not been successful in school and several commented that they were concerned about how they would be treated in this program. They said the instructors were supportive, patient, and cared about them as individuals. This attitude of support by the instructors and the small group instructional setting was credited with developing students' self-esteem and giving them the confidence they needed to overcome past learning problems.

Their comments about the program were very positive about the content of the instruction and its value to them in doing their jobs. They discussed the changing responsibilities that are coming with changes AWI is making in the organization of their workforce. They are eliminating supervisor positions and increasing the teamwork and responsibility expected of employees.

3

Most of the people I interviewed welcomed the opportunity to take more responsibility in their work and to work as a part of a production team with others. They were pleased with the changes in the nature of their work responsibilities since they began working at AWI. They also appreciated the company's commitment to give them the education they would need to be successful within the new organization.

In addition to the gains in productivity and profit the company has realized through these changes, there have been great personal changes for some of the people involved in this program that impact their lives outside the factory. Several people told of hiding their inability to read from their friends and families for many years. They told of the tricks they used and the things in their lives they had to avoid in order to protect their secret. They said this not only was a practical problem in a world full of text, but it had a significant impact on their self-respect and the aspirations they had for themselves. This program has given them the confidence to confront the problem, discuss it with others, and take action. It seems to me that this human benefit is the most important.

OTHER OUTCOMES

I discussed other indicators of success with Susan Bailey, AWI Employee and Labor Relations Manager. As mentioned before, AWI has been very active in reorganizing the production force at the Pensacola plant. They have initiated a gain sharing program that creates a financial incentive for improved productivity and profitability and they have many things to include hourly employees in decision making. They have also reorganized many of the production areas to reduce supervision and increase employee teamwork and responsibility. It is impossible to separate the effect of JET from these other initiatives when considering impact on such indicators as scrap rate, down time, lost-time injuries, and grievances. But all of these indicators and many others are improving.

Communication skills and confidence have improved for JET participants. Supervisors I talked with and who were interviewed by the PJC teachers report improved participation in decision making meetings by JET participants. The students said in our interviews that they felt more confident, that they felt they could say things to the engineers when they came into the plant, and that they were not intimidated by discussions involving measurements and math as they had been in the past. The number of grievances is down, especially those centered around miscommunication.

4

CURRICULUM and TEACHING

The curriculum and organization of instruction have always been the things that have drawn me to this project. The plan developed by Clara Jennings and Lizbeth Dixon-Krauss brought together the elements of instruction that current research indicates are essential for significant learning to take place. It realistically addressed the personal needs and attitudes of adults, especially adults who were not successful in school as attested to by the students' comments. The instructional package acknowledged, and took advantage of, the fact that people develop unique understandings through interactions with other people that are based on their personal backgrounds and experiences. This is done in a social setting where people communicate the meaning of what they have read with others. The curriculum and plan for instruction for this project are innovative but difficult to implement.

The difficulties of implementation relate to both teachers and curriculum materials. Because this program was based on a different set of assumptions about the nature of teaching and learning than traditional programs, it could not be assumed that previous work in adult education would be sufficient preparation. Instructional personnel had to learn the theoretical basis of the program and the implications for instructional activities, classroom organization, and interactions with students. Additionally, little or no curriculum exists for this form of instruction, and instructors had to modify existing materials to fit the new plan or create new material. The teachers -- Mark Fisher, Karen Gunter, and Teri Silvestri ably assisted by John Harley and Marvin Andrews -- put remarkable effort into finding, modifying, and creating material and activities for students.

The training and support teachers needed was late in coming, but the results seemed to be successful when it finally arrived. Initial training was inadequate, and the first attempt at continuing training failed for several reasons. In the closing months of the project, Dr. Clara Jennings of UWF worked regularly with the teachers and the implementation of the project began to match the original plan much more closely. One can only speculate on how much more successful the program would have been if the training had been done effectively at the outset.

COLLABORATION AMONG INSTITUTIONS

Another of the recurring themes of this project was the challenges of a collaborative effort among three institutions with very different missions, organizations structures, cultures, reward systems, and perspectives. Communications -- or lack

5

139

thereof -- often seemed to be at the heart of these challenges.
Communication was difficult because of busy schedules, distance
and driving time, and responsibilities outside the project that
often required attention at the expense of JET. The project
seemed to operate best with communication among the partners was
most frequent. Regular contact was important even when some of
the parties thought they had nothing to report.

Conversations among different groups like this are
difficult, especially during the early stages of a program. They
call for patience and understanding among all the participants.
It is especially important for individuals involved to look for
ways of defusing the conflicts that are sure to arise and to
attend to irritations before they fester and become large
problems. This project had crises that, to an outsider, looked
as though they could have been minimized or completely avoided if
individuals involved had worked to find areas of agreement and
compromise rather than escalating the conflict. This, of course,
requires early, open communications among the participants.

A component of the program that never seemed to become
effective was the Advisory Council that was to be made up of
business and community members. This group could have assisted
with dissemination of the program to other locations, and some
members might have been able to provide support for continuing
efforts at AWI. I think the difficulty of establishing this as
an effective group is another indication of the difficulty of
establishing collaborative relations among these differing
institutions.

CONTINUING INTO THE FUTURE

AWI wants to continue this program in some form as part of
their employee development program and is searching for delivery
and funding support to supplement their commitment of space,
materials and administration. Few institutions are currently
prepared to deliver the labor intensive, small-group instruction
that makes this model effective in improving student performance
and self-concept. It is expensive, and there is the question of
responsiblity for bearing the cost for these on-going programs.
Should it be the company, the individual worker, the union,
federal, state or local government, public institutions, private
foundations, or some combination of these?

In the model used in JET, the final stage of development is
a community of learners in which students become leaders and
create self-sustaining study groups. These groups would need
some support in the form of meeting space, equipment, and
materials, but that is now in place. The efforts of the groups
would be enhanced by the availability of an instructor, but the

6

amount of instruction would be lower because the students would be much more active in helping each other. The instructor becomes more a facilitator than a teacher bearing complete responsibility for instruction.

When I asked students if they though people would continue in a program on their own time, about half said they thought a portions (30% to 50%) of the students would continue some level of participation on their own time. A couple said they were already involved in informal groups who discussed the school activities at lunch and on breaks. One student had approached a friend who was a retired teacher to ask for more help with reading. There is support here for some kind of on-going program in which the participants take most of the responsibility for supporting the efforts of their peers. The learning theories Jennings and Krause used as the basis of their program say that significant learning takes place in this type of peer group.

During my visit Dr. Jennings said she and the teachers were beginning to identify the students they thought would be able to take leadership roles in peer learning groups. I hope AWI is able to find a way of continuing these efforts at establishing communities of learners among the JET participants and other workers. These groups, who are taking responsibility for their own learning, fit well with the reorganization AWI is making in other aspects of their operation.

CONCLUSION

As a part of a much larger set of changes in the organization of the Pensacola AWI plant, the JET program has made an important contribution both in raising the skill levels of the workers who participated and, perhaps more importantly, changed their attitudes about themselves. Tests show more than one grade level improvement reading, math, and language among a large portion of the student body. Interviews with students, supervisors, and managers show changes in self-confidence and improved participation in changing work life of the plant. Productivity and profit indicators are also improving during this period of change.

The program has had its share of problems. Some of these are inherent in situations that bring together such diverse institutions in collaborative efforts. Other problems could have been avoided if individuals had communicated more regularly and had worked to defuse rather than aggravate the difficult situations that are bound to arise.

The model for the program's curriculum and instruction made use of current thinking concerning the way people learn. It is

7

especially suited to the needs of the adult learner who has not
been sucessful in more traditional school settings. This plan,
however, requires special preparation and support for the
teaching staff because it is fundamentally different than
traditional adult education models.

The model, when fully implemented, leads to a community of
learners that would fit well with the directions AWI seems to be
moving. It is based on the idea of team work and cooperation as
the route to reaching the goal of personal improvement.

8

SOME QUALITATIVE MEASURES OF SUCCESS OF THE JET PROGRAM

1. The JET program at the Armstrong facility was singled out in the state of Florida by Commissioner of Education, Mrs. Betty Castor as an exemplary workplace literacy program to visit during Education Week last November, 1991. Commissioner Castor toured the ceiling tile manufacturing plant and interacted with JET students and with plant management. Local media, including television and newspapers, covered the event of her visit. Later in March of 1992, Commissioner Castor made reference to the innovative, federally funded, workplace literacy JET program being offered at the Armstrong plant when she gave the opening address at the 1992 Florida Literacy Conference in West Palm Beach, Florida.

2. At the end of the grant, both instructors were asked by the Project Director to provide their subjective evaluation of the JET program. Feedback from JET instructions in response to this request included:

   o Overall, students' attitudes toward learning became more positive as they progressed through the program.

   o After covering the basics of math, the students began to relate what they learned to their jobs. As a result, it was evident that they felt more confident in their abilities to perform their jobs satisfactorily and to adapt to the future of the industrial changes.

   o A cooperative learning approach used in classroom instruction allowed students to learn the benefits of working together in solving problems.

   o At exit interviews, an overwhelming majority of the students expressed the desire to continue JET classes or to further their education in more advanced work.

   o I feel that the instruction we provided through the JET program aroused a new interest in learning among many of our students.

   o People who actually believed they could not learn anything grew to believe that they could (learn).

   o The opportunity employees were given to sit within small groups of other employees afforded them the chance to see that they were not alone in what they did and did not know.

   o One student asked me to help her write a statement explaining why she felt she was qualified for a higher position. She did write the statement, but did not get the promotion at the time. However, she really seemed energized by the whole process!

Jobs Within The Workplace That Are Enhanced By JET Training

FABRICATION AND IMD:

1. More accuracy in production and downtime reports

2. Better able to convert decimals to fractions and vice versa

3. Averaging decimal numbers for SPC charts

4. Plotting numbers on SPC control charts

5. Reading measurement tools (scales, gauges, calipers and rulers)

6. Averaging color readings and making proper interpretations

7. Plotting coordinates on color football

8. Reading prints for standard and special items (determining dimensions and fractional and decimal tolerances)

9. Writing better work orders

10. Enhancing use of color matching equipment (IMD)

11. Understanding the meaning of upper control limits, lower control limits, ranges and baseline

YARD DEPARTMENT:

1. Increased understanding of bills of lading

2. Fewer mistakes on the unloading papers

3. More accurate math work

4. More accurate count of raw materials in stock

MECHANICAL:

1. Convert decimals to fractions and vice versa

2. Understand work orders better

3. Understand written instructions better

GENERAL:

1. Better able to understand their pay check and stub

2. Able to read and understand safety material better

3. Better able to understand any training manuals and tools

4. Better able to obtain information from graphs and charts posted around the various departments

5. Better able to obtain information from bulletins posted from within the departments

6. Participation in learning groups will make employees more likely to serve on C.A.T. and E.C.R. teams

7. Learning enhances self esteem and self worth. Will likely be a more conscientious and better worker

8. Will be more likely to participate in team meeting and serve in reporter roles (IMD)

BUSINESS PARTNER REQUESTS CONTINUATION OF JET PROGRAM
AFTER DEMONSTRATION GRANT ENDS

(Excerpt from October 12, 1992 Letter Written to Project Director by Business Partner Representative)

"The Job Enhancement Training Program has been an unqualified success, by many measures. Designed to serve a target population of 100 over the 18 month grant period, we have assessed approximately 190 of our 247 production and maintenance employees. Results in other areas of measurement are equally as impressive. We will have exited approximately 85 of the 150 current participants by the end of October, those 85 having achieved the competencies required to function adequately in the workplace."

"We are most desirous of continuing the program. As I mentioned to you in late August and again in early September, our Manager,_____, has committed the resources of the Plant to continue the program in the coming year. We would continue to make both classroom and teacher office space available. We would like to continue with sixty students, providing each with two (2) hours release time per week for classroom attendance. Of course, we would continue to offer free duplicating of materials and such standard office supplies as would be necessary for instructors and students. We are also willing to pay for up to six (6) hours per week of administrative time per instructor, and will provide the requisite clerical support from our own resources. We are seeking the services of PJC, or another educational provider within our community, to support the program with instructional hours."

"We would hope to continue use of the curriculum model, developed by two faculty members at the University of West Florida. I should also mention that,_____, one of the authors of this model, has stated that she will continue to provide staff development and curriculum development assistance on a pro bono basis if the Job Enhancement Training program is continued."

"The curriculum is different from a traditional ABE/GED program in that it concentrates on reading and math, and is specifically designed to result in functional (work-related) quantitative and reading literacy skills. Many of the materials are designed from workplace materials. By example, it does not teach Statistical Process Control, but all of the basic math concepts required for SPC are taught. Two additional unique and key model elements are the development of collaborative skills and moving the student from other-directed to self-directed learners."

"A review of our workforce indicates we would have the potential for another 70 students when this group of 60, individually, have achieved the identified workplace competencies. That would indicate the possibility of taking the program into 1994 and perhaps into 1995 as well."

"We have had two instructors who have established themselves with our employees, learned our Plant requirements, and have demonstrated their personal commitment to the Program. They are under contract to PJC only through the month of October, as their salaries have been wholly paid through the DOE grant. If at all possible, we would like to form a partnership which would allow them to continue as instructors."

"We sincerely appreciate the willingness of PJC to consider partnering with us in this workplace literacy program. Employee enthusiasm continues to be great. We consider the program to improve the literacy skills of our workforce, the foundation of our Quality Improvement Process, a key to ensuring the competitive posture of our Plant, and the job security of our employees."

"We look forward to hearing from you."

"Again, thank you."

"Sincerely,"

"_____,
Employee and Labor Relations Manager"

Armstrong

PJC

Certificate

JOB ENHANCEMENT TRAINING PROGRAM
A Federally Funded Workplace Program
U.S. Department of Education

CERTIFICATE OF ATTENDANCE

This certifies that

_____

participated in the

Job Enhancement Training (JET) Program

at Armstrong World Industries

_____   _____
Date   *Pensacola Junior College Representative*

_____   _____
Armstrong Plant Manager   *JET Instructor*

DISSEMINATION OF JET PROGRAM

One of the goals of the grant was for the JET program to be replicated at two other Armstrong facilities. To date, the program has not been replicated at another Armstrong facility. Partial funding for the development of the dissemination process and packet was to be provided by the local PLUS group. Due to the reorganization of PLUS, the group was dissolved and could not be expected to make monetary donations for the dissemination of the JET program. Other Armstrong facilities are well informed about the success of the JET program as a result of the positive publicity efforts made by the local business partner through the use of both internal and external communications media.

Because the JET program was such a success at the Pensacola facility, the business partner and educational partner have agreed upon a plan for the continuation of JET during the College's Spring Semester. Certainly, the likelihood of replicating the JET program at other Armstrong facilities is increased by the consummation of this continued partnership.

While the JET program has not been replicated at another facility to date, the educational and business partners did provide limited dissemination of the program throughout the state of Florida. The entire professional staff of the JET program presented a seminar on JET at the Florida Literacy Conference in West Palm Beach, Florida.

The Project Director made a second presentation of the JET program as an invited guest panelist at the Adult and Community Education Conference in Ft. Lauderdale, Florida, entitled: Workforce Education: Focus on Success.

The greatest testimony to the success of the JET program is the business partner's request for the continuation of JET and the social context curriculum model at the Armstrong World Industries, Inc. facility in Pensacola, Florida.

One of the instructors from the grant-funded portion of the JET program has been contracted by the educational partner to work in an adjunct capacity to teach six, two-hour JET classes per week at the Armstrong facility in Pensacola. Both partners are excited about the continuation of the JET program! We feel that the continuation agreement is a valid indication that the federal funds invested in workplace literacy demonstration projects are, indeed, worthwhile investments!

PENSACOLA JUNIOR COLLEGE
ADULT BASIC EDUCATION DEPARTMENT

presents

A JOB ENHANCEMENT TRAINING (JET) PROGRAM
LOCATED AT ARMSTRONG WORLD INDUSTRIES, INC.

A Presentation to the 1992 Annual Conference of the Florida Literacy Coalition

March 12, 1992

West Palm Beach, Florida

1. JET Program Overview
2. Getting Started
3. Grouping and Scheduling
4. Curriculum Development and Implementation
5. Adjustments to Program
6. Establishing Program in Other Workplace Facilities
7. Job Enhancement Training in the Workplace...Is It Worth It?

JET PROGRAM STAFF

Coordinator: Rita Rigby
Instructors: Karen Gunter and Mark Fisher
'ensacola Junior College
Literacy Coordinator: Iowana Whitman-Tims

Adult Basic Education Department -- (904) 484-2120

PENSACOLA JUNIOR COLLEGE

and

ARMSTRONG WORLD INDUSTRIES, INC.

JOB ENHANCEMENT TRAINING (JET) PROGRAM

o   JET Program -   federally funded, workplace literacy
                    grant program

o   JET Program - 18-month demonstration project

o   JET Program - TEAM Approach

o   JET Program -   serving more than 170 employees

o   JET Program -   partnership formed program basis

o   JET Program -   expanding and growing

FLORIDA DEPARTMENT OF EDUCATION
Betty Castor
Commissioner of Education

September 17, 1992

Ms. Iowana Whitman-Tims
Asst. Dept. Head/Literacy Coordinator
Pensacola Junior College
1000 College Boulevard
Pensacola, Florida 32504

Dear Iowana:

The purpose of this letter is to confirm your participation in the **1992 Adult and Community Education (ACE) Conference** in **Ft. Lauderdale** at the **Marina Marriott Hotel** on **September 23-25, 1992**. You are scheduled as a panelist for a program on **Workforce Education: Focus on Success** to be held on **Wednesday, September 23** from **3:15-5:00 p.m..**

As we discussed, you and your co-presenter, Susan Bailey, will have approximately 20-30 minutes to share information about "Job Enhancement Training (JET) Project." Please let me know if you will require any special equipment for your presentation. If you are planning to provide handouts to those who attend the session, please plan for about 50 people.

For your convenience, I have enclosed a copy of the "Conference at a Glance" and a copy of information on hotel registration.

Thank you for agreeing to share your information and expertise with education and business colleagues. I look forward to seeing you at the conference.

Sincerely,

Beverly P. Robinson
Program Specialist
Bureau of Adult and
Community Education

brp

Tallahassee, Florida 32399
An Affirmative Action/Equal Opportunity Employer

PENSACOLA JUNIOR COLLEGE
ABE DEPARTMENT
presents
A JOB ENHANCEMENT TRAINING
(JET) PROGRAM
in partnership with
ARMSTRONG WORLD INDUSTRIES

——————————————

Presented at the 1992

Adult and Community Education

(ACE) Conference

Ft.Lauderdale, Sept. 23, 1992

Workforce Education:

Focus on Success

——————————————

Iowana Whitman-Tims

Assist. Dept. Head/Literacy Cordinator

(904) 484-2120

Susan Bailey, Business Partner

Representative

PENSACOLA JUNIOR COLLEGE

and

ARMSTRONG WORLD INDUSTRIES, INC.

JOB ENHANCEMENT TRAINING (JET) PROGRAM
(A Federally Funded Workplace Grant Program)

****

Iowana Whitman-Tims
Assist. Dept. Head/Literacy Coordinator
(904) 484-2120

Susan K. Bailey
Business Partner Representative

****

o   JET PROGRAM - Overview

o   Getting Started

       - staff; recruitment; screening; job task analysis;
         staff development (initial and on-going);
         grouping and scheduling

o   Curriculum Development and Implementation

o   Curriculum Model: University of West Florida adult
     literacy curriculum model (a four-phase, social context
     model) (Planning, Assessment, Transition, Maintenance)

o   Number of employees participating

o   Attendance

o   Incentives

o   Results: Focus on Success

o   Job Enhancement Training in the Workplace . . . Is It
     Worth It?

155

Workforce Education:Focus on Success

September, 1992
Adult & Community Education Conference
Marina Marriott Hotel
Ft. Lauderdale, Florida

Agenda

◆ **Welcome and Introductions**

Ms. Beverly Robinson, Program Specialist

Bureau of Adult & Community Education

◆ **Panel Presentations**

❑ **Project ADVANCE**

Mr. Larry Ferguson
  Personnel Resource Management Officer
  Florida Department of Transportation
Dr. Susan Wager, Project ADVANCE Director
  Florida State University/Educational Services Program

❑ **JET (Job Enhancement Training)**

Ms. Susan Bailey
  Employee Relations Manager
  Armstrong Industries, Inc.
Ms. Iowanna Whitman-Timms
  Assistant Dept. Head/Literacy Coordinator
  Adult Basic Education
  Pensacola Junior College

JET PROGRAM INFORMATION
DISSEMINATION CENTERS
Curriculum Coordination Centers

Names, Addresses and the States they Serve

HAWAII

Dr. Lawrence Zane, Director
Western Curriculum Coord. Center
University of Hawaii
College of Education
1776 University Ave., Wist 216
Honolulu, HI 96822
(808) 948-7834

American Samoa, Arizona, California, Guam, Hawaii, Marshall
Islands, Micronesia, Nevada, Government of Northern Mariana,
Palau

ILLINOIS

Dr. Rebecca Douglass, Director
East Central Curriculum Coord. Center
Sangamon State University, F-2
Springfield, IL 62794-9243
(217) 786-6375

Delaware, District of Columbia, Indiana, Illinois, Maryland,
Michigan, Minnesota, Ohio, Pennsylvania, Virginia, West Virginia,
Wisconsin

MISSISSIPPI

Dr. Rebecca Love-Wilkes, Director
Southeast Curriculum Coord. Center
Sangamon State University
Research and Curriculum Unit
Drawer DX
Mississippi State, MS 39762
(601) 325-2510

Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina,
South Carolina, Tennessee

NEW JERSEY

Dr. Martha Posci, Director
Northeast Curriculum Coord. Center
new Jersey State Dept. of Ed.
Division of Vocatio; 1 Education
Crest Way
Aberdeen, NJ   07747
(908) 290-1900

(NJ) Connecticut, Maine, Massachusetts, New Hampshire, New
Jersey, New York, Puerto Rico, Rhode Island, Vermont, Virgin
Islands

OKLAHOMA

Dr. Richard Makin, Director
Midwest Curriculum Coord. Center
Oklahoma Department of Vocational
   and Technical Education
1500 West 7th Avenue
Stillwater, OK   74074-4364
(405) 377-2000, Ext. 252

Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, New
Mexico, Oklahoma, Texas

WASHINGTON

Mr. William Daniels, Director
Northwest Curriculum Coord. Center
St. Martin's College
Old Main
Lacey, WA   98503
(206) 438-4456

Alaska, Colorado, Idaho, Montana, North Dakota, Oregon, South
Dakota, Utah, Washington, Wyoming

ERIC

Acquisitions Coordinator
ERIC Clearinghouse on Adult,
   Career and Vocational Education
1900 Kenney Road
Columbus, Ohio   43210-1090

Division of National Programs

Office of Vocational and Adult Education
   Programs

U.S. Department of Education

Room 4512 Switzer Building

Washington, D.C.   20202-7242