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ABSTRACT

A project designed to develop valid performance based curriculum materials for selected occupational programs had the following objectives: (1) To identify a common core of basic skills for seven occupational cluster areas; (2) to prepare catalogs of performance objectives and criterion referenced measures for seven occupational cluster areas; (3) to field test the catalogs on incumbent workers in the occupational areas; (4) to conduct inservice education for curriculum developers on the utilization of performance objectives catalogs; (5) to utilize the performance objectives catalogs in designing curricular materials; and (6) to disseminate the catalogs to other States for utilization in curriculum development. The project used an adaptation of the Air Force system for task analysis and performance objectives development to design the catalogs and then translate them into curricula materials. Catalogs developed addressed the following occupations: Alterationist, auto parts clerk, bookkeeping/accounting/payroll clerk, cosmetology, licensed practical nursing, masonry, and nursery production. One result of the project was a model for an integrated approach to criterion-referenced curriculum development involving a process for literature review, task analysis of incumbent workers, performance objectives development, and curriculum field testing. The following products also resulted from the projects: (1) A state-of-the-art study of the curriculum development related to each occupation selected; (2) a list of occupational tasks required for each occupation selected; (3) a catalog of performance objectives, criterion-referenced measures and performance guides for each occupation, and (4) a variety of curriculum materials for each occupation studied. (LAS)

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DESIGNING EDUCATIONAL LEARNING FROM TASK ANALYSIS

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ALABAMA STATE DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL EDUCATION
856 STATE OFFICE BUILDING
MONTGOMERY, ALABAMA 36130

July 30, 1976

Project Number RCU-F-74-023

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FOREWORD

The concept of performance-based instruction has manifested itself in several forms during the past half century. Various educational leaders have advocated refocusing curriculum and changing instructional procedures to achieve pre-established objectives of student performance. These harbingers of curriculum reform foresaw the impending push for objective purpose in education and the growing demand for accountability from various publics. The concept of assessing student performance in relation to previously established objectives is congruent with most philosophies of vocational education. A basic concern seems to be selecting sources of educational objectives.

Effective performance-based instruction in vocational education must focus on developing the skills required in the world of work. This publication reports a project which was designed to develop valid performance-based curriculum materials for selected occupational programs. The job task and the required performance levels were validated by incumbent workers. This research based material should provide a core for developing job relevant occupational curricula.

We are indebted to the staff who implemented the project presented herein. Dr. John E. Deloney directed the overall project implementation and Mr. James Kendrick coordinated project staff activities and provided day-to-day project direction. The research associates who directed specific subprojects were: Mr. Mike Bailey, Mr. Ralph Bearse, Dr. Jo Ann Brown, Mr. Thomas Pierce, and Mr. John Smith. The project was coordinated through the Curriculum Development Unit, Division of Vocational Education, Alabama State Department of Education.

Appreciation is also expressed to Dr. James Cornell, Dr. John Roth, and Mr. Glen Spivey. These members of the Research Coordinating Unit for Vocational Education, Alabama State Department of Education provided technical assistance in implementing the project and in developing the final report.

Special recognition is due Mr. Ralph Bearse and Dr. John Roth who were the primary editors in the writing of the report. Also assisting in developing the report were: Mr. Mike Bailey, Dr. Jo Ann Brown, Dr. James Cornell, and Mr. Glen Spivey.

Douglas Patterson, Director
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PROJECT SUMMARY

A project to develop catalogs of performance objectives, criterion-referenced measures, and performance guides based on occupational analyses and to utilize the catalogs in developing curriculum materials was conducted by the Alabama Department of Education, Division of Vocational Education. The project "Designing Educational Learning From Task Analysis" was conducted from July 1974 through March 1976. The specific objectives of the project were to:

1. Identify a common core of basic skills for seven occupational cluster areas.

2. Prepare catalogs of performance objectives and criterion-referenced measures for seven occupational cluster areas.

3. Field test the seven catalogs of performance objectives on incumbent workers in the occupational areas.

4. Conduct in-service education for curriculum developers on the utilization of performance objectives catalogs.

5. Utilize the performance objective catalogs in designing curricular materials.

6. Disseminate the catalogs to other states for utilization in curriculum development.

To accomplish the objectives, the project utilized an adaptation of the Air Force system for task analysis and performance objectives development to design the catalogs of criterion-referenced performance objectives and to translate the catalogs into curricula materials to be utilized by vocational educators at the secondary, post-secondary, and adult levels. The catalogs developed during this project addressed the following occupations:

1. Alterationist
2. Auto Parts Clerk
3. Bookkeeping/Accounting/Payroll Clerk
4. Cosmetology
5. Licensed Practical Nursing
6. Masonry
7. Nursery Production

The project provided valuable results in three areas. The results included a model for curriculum development, a series of curriculum products, and in-serivce training for curriculum developers.

1. The project resulted in a model for an integrated approach to criterion-referenced curriculum development. The model involves a process for literature review, task analysis of incumbent workers, performance objectives development, and curriculum field testing.

2. The project resulted in the following products:

   a. A State-of-the-Art study of curriculum development related to each occupation selected.

   b. A list of occupational tasks required for each occupation selected.

   c. A catalog of performance objectives, criterion-referenced measures and performance guides for each occupation studied.

   d. A variety of curriculum materials for each occupation studied.

The state-of-the-art study, the list of occupational tasks, and the catalogs of performance objectives have been made available to appropriate curriculum developers in Alabama and are available to curriculum developers in other states through the Vocational-Technical Education Consortium of States (V-TECS). Curriculum materials developed in the project will be disseminated to appropriate local vocational teachers in Alabama and will be made available to regional curriculum laboratories for reproduction and distribution.

3. Curriculum developers in six areas of vocational education in Alabama have been provided in-service training. The curriculum development specialists will receive additional training in the interpretation of occupational tasks analysis and utilization of performance objectives and criterion-referenced measures in curriculum development to include learning experiences in designing curriculum materials from performance objectives, field testing curriculum materials, and revising curriculum materials.

Because the procedures used in designing the DELTA Project catalogs provide a broad base of involvement from all levels of vocational education and the utilization of incumbent workers, it was recommended that these procedures be used as a model for the development of additional catalogs of performance objectives, criterion-referenced measures and performance guides in Alabama.

I. INTRODUCTION

The concept of accountability in education has come to the forefront during the decade of the 1970's. Taxpayers are becoming increasingly concerned about the return on the tax dollar for education. Federal and state governments are requesting that educational dollars be accounted for in terms of the product the dollars are generating. This concept of accountability will continue in education for some time and the concept will require that educational programs provide the functions and products which are desired. Fortney (1975) lists the rise of the concept of accountability as an element which seems to require changes in vocational education curricula.

The idea of basing curricula development on occupational analysis has been advocated by many students of curricula development. This approach addresses the concept of accountability emphasized by Fortney (1975). Tyler (1949), Mager (1962), and Popham and Baker (1970) are examples of advocates of performance based instruction. These advocates have prepared specific approaches for designing, developing and testing performance objectives.

Performance based education is founded on the specification of what constitutes acceptable competencies in a given field. A great deal of research is considered necessary before competency levels are identified. This has been accomplished in vocational education through research based task analysis.

A system for job analysis and criterion-referenced curriculum development has been designed and refined by the U. S. Air Force (Christal, 1973). The Air Force system involves a literature search, task analysis of incumbent workers, development of objectives by curriculum specialists, field testing of criterion-referenced curricula, and systematic updating of curriculum objectives. This method can be adapted for utilization by public institutions providing vocational education.

The emergence of performance based education stimulated interest in a project within the Southern Association of Colleges and School's Commission on Occupational Education Institutions (COEI). The project began with a study of the feasibility of forming a multi-state consortium for the purpose of developing catalogs of performance objectives and criterion-referenced measures for selected occupational areas. This feasibility study was based primarily on the efforts in the State of Florida. Four projects in Florida, all of which developed catalogs of performance objectives and criterion-referenced measures in occupational education, were studied. From the review of the efforts in Florida, COEI concluded that solid research, a unified system of development, and a method of sharing materials and services might result from the formation of a multi-state consortium which would produce catalogs of performance objectives and criterion-referenced measures.

The Vocational-Technical Education Consortium of States (V-TECS) was formed by seven states on July 1, 1973. The states were Alabama, Florida, Georgia, Kentucky, Mississippi, Texas, and Virginia. Louisiana and South Carolina were added as members after the initial consortium was formed and the Community College of the Air Force and U. S. Naval Education

and Training Command were added as associate members. The fundamental purpose of V-TECS is to develop catalogs of performance objectives and criterion-referenced measures in occupational education. V-TECS is developing objectives based upon a uniform procedure consisting of: (1) development of occupational inventory by domain, (2) selection of a representative random sample of incumbent workers within the state which is developing the catalog, (3) administration of the occupational inventory to the incumbent worker sample, (4) computerized analysis of information collected from the survey in terms of time spent on tasks, difficulty of tasks, etc., (5) conversion of the task statements into performance objectives with companion criterion-referenced measures, (6) administration of a comprehensive field review of the performance objectives and criterion-referenced measures, and (7) a dissemination program.

The Division of Vocational Education, Alabama State Department of Education developed the project described in this report within the guidelines of the V-TECS consortium. The project, however, functioned beyond the scope of the consortium by providing procedures to translate the catalogs of performance objectives into curriculum materials and disseminating these curriculum materials to appropriate vocational educators. The omplete title of the project was "Designing Educational Learning from Task Analysis" (DELTA).

DELTA Project utilized an adaptation of the Air Force system for task analysis and design of catalogs of performance objectives and criterion-referenced measures.

A. Objectives

The specific objectives of DELTA Project were:

1. Identify a common core of basic skills for seven occupational cluster areas.

2. Prepare catalogs of performance objectives and criterion-referenced measures for seven occupational cluster areas.

3. Field test the seven catalogs of performance objectives on incumbent workers in the occupational areas.

4. Conduct in-service education for curricula developers on the utilization of performance objective catalogs.

5. Utilize the performance objective catalogs in designing curricula materials.

6. Disseminate the catalogs to other states for utilization in curricula development.

B. Definition of Terms

Terms used in this report were defined as follows:

Catalog. A comprehensive collection of performance objectives, criterion-referenced measures, performance guides and related data organized by a job structure or career ladder within a domain of interest.

Checklist. A listing of key elements in task performance which must be accomplished, accompanied by "check-off" blocks for instructor's initials.

Consortium. A group of state agencies, institutions, or other entities which have been legally constituted through letters of commitment, agreements, or by assignment of higher authorities to work together toward the solution of problems in education. A consortium, for the purposes of this work, must have membership from automonous agencies and institutions which cut across state boundaries as they attempt to solve problems or meet goals.

Criterion-Referenced Measure (CRM). An exercise based upon a performance objective and designed to measure attainment of that objective.

Cross-Reference Table. A table that identifies the relationship among duties and tasks found in the occupational inventory and the performance objectives in the final catalog. Also, noted are time spent indicies on all tasks by D.O.T.

Diffusion. All the change agent activities which promote, inform, demonstrate, train, help, service and nurture the acceptance and use of an improved product or process in vocational education.

Dissemination. The mass reproduction, packaging and distribution of improved products or processes being advocated for use.

Domain. A group of related job titles.

Domain Report. A document consisting of the following five items: (1) An updated and finalized version of the state-of-the-art report; (2) An annotated bibliography of germane references found during the state-of-the-art study; (3) The final version of the occupational inventory booklet including background information and letter used to communicate with the incumbent workers or other contact persons; (4) A listing of persons interviewed during the development of the Occupational Inventory booklet (incumbent workers, supervisors, technical content experts, etc.), and (5) A brief description of the design to be used for sampling incumbent workers with emphasis upon population identification and methods used to derive the sample.

Dictionary of Occupational Titles Code (D.O.T. Code). A nine-digit number used to identify a specific job within a given domain.

Duty. A major segment of work comprising related tasks.

Field Review Survey. The procedure for collecting ratings from instructional personnel, content specialists, and persons familiar with criterion-referenced measurement on the utility and format of the performance objectives, criterion measures, and performance guides to aid in refining and further developing the finished catalogs.

Instructional System Development (ISD). A deliberate orderly process for planning and developing instructional programs which ensure that personnel are taught the knowledges, skills, and attitudes essential for successful job performance. Depends on a description and analysis of the tasks necessary for performing the job, objectives, evaluation procedures to determine whether or not the objectives have been reached, and methods for revising the process based on empirical data.

Job. A group of tasks performed by a job incumbent.

Occupational Area. A group of jobs that are related on the basis of required skills and knowledge.

Occupational Inventory (Task Inventory Booklet). A survey instrument containing tasks performed by job incumbents within D.O.T.'s, complete with background information and a list of tools and equipment.

Occupational Survey. The procedure for collecting data to identify the duties and tasks that comprise one or more jobs, job types, or career field ladders, for the collection and analysis of information concerning such duties.

Performance-Based Instruction. Instruction which, when properly designed and applied, results in the learner's demonstration of certain abilities. The desired abilities are selected before the instruction is designed and are clearly defined as observable performance objectives.

Performance Guide (PG). A series of steps, arranged in a sequence ordinarily followed which when completed may result in the performance of a task. Also, called "teaching steps."

Performance Objective (PO). A statement in precise, measurable terms of a particular behavior to be exhibited by a learner under specified conditions.

Purposive Survey. The procedure for replicating a previously conducted occupational survey using a small, but, representative sample of incumbent workers selected from the previously defined population - in strict accordance with the sample design and procedures previously used - for the purpose of obtaining data to aid in making judgements about the transportability of the associated catalog.

Service Areas. A group of instructional areas related to a broad cluster of occupations. In Alabama, the vocational education service areas are: Agribusiness Education, Business and Office Education,

Distributive Education, Health Occupations Education, Home Economics Education, and Trade and Industrial Education.

State-of-the-Art (SOA) Study. Research conducted to determine the current status of performance-based instructional materials and practices in the domain area under study and to obtain other information that might be useful in catalog development.

Task. A unit of work activity which constitutes logical and necessary steps in the performance of a duty. A task has a definite beginning and ending point in its accomplishments and generally consists of two or more definite steps.

Task Analysis. The process of reviewing elements of a job for the purpose of improving training program content across program levels of vocational-technical education.

Task Criticality. A characteristic of a task statement which makes its accomplishment crucial to the acceptable performance of a worker or student. A method of analysis which identifies the critical tasks and aids in determining the consequence of poor performance or lack of performance by a worker or student.

Task Time-Spent Index. An index of relative time-spent on each task within a domain of interest and appearing on a task list. The task time-spent index is computed from scientifically selected samples of incumbent workers who respond to a task listing in an occupational inventory booklet.

Writing Team. A team of people representing instructors within subject matter expertise, persons having knowledge and experience in developing criterion-referenced measures, local or state supervisors in the domain being developed, workers, and supervisors of incumbent workers whose function is to analyze occupational data and develop performance objectives and criterion-referenced measures for specific D.O.T. areas.

II. DEVELOPMENTAL PROCEDURES

The execution of DELTA Project involved six major phases. These phases are listed in the appropriate order in which they were addressed by the project staff. It should not be assumed, however, that any one of the phases was necessarily completed before the next one was initiated. The six major phases of DELTA Project were:

A. Procured and trained project staff.

B. Conducted meetings to familiarize state staff with project procedures and to solicit their support.

C. Selected occupational areas for catalog development.

D. Secured curriculum specialists from each service area to work with research associates in an advisory capacity.

E. Developed catalogs of performance objectives, criterion-referenced measures and performance guides.

F. Developed plan for diffusion of catalogs to vocational educators in Alabama.

Although the six phases are somewhat self-explanatory, a more detailed description of each phase emphasizes the scope and depth of the project. Following is an explanation of the activities conducted during each individual phase.

A. Procured and Trained Project Staff

The professional staff of DELTA Project consisted of a project director, a technical coordinator, and five research associates. The technical coordinator was trained through a series of workshops designed to inculcate competencies in all aspects of the development of catalogs of performance objectives, criterion-referenced measures and performance guides. Written materials were provided in these workshops for the technical coordinator to utilize in orienting and training the research associates procured for DELTA Project.

Major consideration was given to the selection of research associates capable of developing performance objectives, criterion-referenced measures and performance guides for one or more occupations. By nature, DELTA Project required a close working relationship between the research associate and the occupational service area represented. The six service areas include: Agribusiness Education, Business and Office Education, Distributive Education, Health Occupations Education, Home Economics Education, and Trade and Industrial Education.

Inherent in the qualifications requirement was the need for subject matter expertise relative to the occupation selected for study by the service area. Consequently, research associates were chosen on the basis of their educational background and/or experience. An additional qualification considered in their selection was training and/or experience of the individual in performance based education.

Written materials and in-service education relative to catalog development and DELTA Project were provided to the research associates. Following this initial orientation each research associate attended one or more product development workshops and received training in the same competencies as the technical coordinator. The research associates were hired over a period of several months, allowing the personnel with tenure to aid in the orientation and training of new research associates.

The training of DELTA staff is an example of continuing education. This is particularly true regarding procedures which were continually revised and updated. Throughout the various developmental phases the research associates were able to evaluate their procedures and make modifications for more effective production. Since products were completed at varying rates, staff members were able to profit from the experiences of their associates.

B. Conducted Meetings to Familarize State Staff with Project Procedures and to Solicit Their Support

An initial meeting conducted by DELTA staff was for selected top level vocational leaders in Alabama, including the State Director of Vocational Education, the three branch directors, and the state supervisors of the six service areas.

The two major objectives of this meeting were: 1) to familiarize the leaders with the purpose, goals, and developmental procedures of DELTA Project, and 2) to solicit their recommendations for involving the six service areas in the project. The meeting resulted in a recommendation that other units of the Division of Vocational Education and the total staff of each service area be given an orientation to DELTA Project.

This recommendation was accepted by DELTA staff, and a meeting was planned for the Research Coordinating Unit, Occupational Research Development Unit, Education Professional Development Unit, Technical Colleges Unit, Area Vocational School Unit, and staffs of the six service areas. The purpose of the meeting was to provide an overview of DELTA Project and to solicit the support of these participants.

Growing out of this gathering was the establishment of a cooperative relationship between DELTA staff and the units and service areas of the Division of Vocational Education. Following is a brief description of the major support pledged by selected units and the service areas.

Research Coordinating Unit--Assistance in the identification of occupational populations for the surveys.

Occupational Research Development Unit--Computer searches for state-of-the-art reports.

Education Professional Development Unit--Professional development workshops on performance-based instruction utilizing DELTA procedures and products.

Technical College and Area Vocational School Unit--Personnel support for selected aspects of DELTA project. For example: (a) to assist with follow-up contacts to obtain survey returns, (b) to serve on writing teams, and (c) to participate in field review of catalogs.

Service Area Staffs--Personnel support for selected aspects of the project relevant to the service area. For example: (a) to assist in development of the occupational inventories, (b) to assist with follow-up of surveys, and (c) to serve on writing teams.

Throughout the duration of DELTA Project, meetings were held with the state staff for the purpose of presenting progress reports and obtaining suggestions for implementing the project objectives. The ongoing working relationships established with the service areas will be discussed in other portions of this report.

C. Selected Occupational Areas for Catalog Development

The decision was made by top level vocational leaders that an occupational area representative of each service area would be designated to participate in DELTA Project. Close working relationships established with the service areas provided the basis for their participation in the selection of an occupation for catalog development. Representatives from DELTA staff contacted the leadership of each service area to arrange meetings for identifying the occupations to be investigated utilizing DELTA procedures.

An occupational area is defined in the glossary of terms as a group of jobs that are related on the basis of required skills and knowledge. Service area representatives were asked to select a job or job type from a domain (See Glossary of Terms) pertinent to their service area. Several factors were involved in the selection of an occupational area. Among these factors were: the lack of available subject matter on the occupation; the need for validating and/or updating existing materials; the desire to keep abreast of current changes in occupational demands and trends.

The meetings with the six service areas ranged from informal discussions between a state supervisor and the DELTA staff member assigned to that service area to formal meetings involving entire service area staffs and several DELTA Project representatives.

Once selected, the occupations were presented to the board representing cooperating states to eliminate the duplication of projects among states.

Table I identifies the service areas, occupations, job titles and D.O.T.'s (from the Dictionary of Occupational Titles) selected by the individual service areas.

TABLE I

Identification of Service Areas, Occupations, Job Titles and D.O.T.'s

Service Area	Occupation	Job Title	D.O.T.
Agribusiness Education	Nursery Production	Nurseryman	406.168-010
		Laborer, Nursery	406.884-010
		Nursery Worker	406.887-030
Business & Office Education	Bookkeeping/ Accounting	Bookkeeping/ Accounting Clerk	210.388-088
	Payroll Clerk	Payroll Clerk	215.488-010
Distributive Education	Auto Parts Clerk	Salesperson, Parts	289.358-046
		Counterman, Auto Parts	289.358-068
Health Occupations Education	Licensed Practical Nursing	Licensed Practical Nurse	079.378-026
Home Economics Education	Alterationist	Alteration Tailor	785.281-010
		Seamstress, Alterationist	785.381-026
Trade & Industrial Education	Cosmetology	Cosmetologist	332.271-010
		Managing Cosmetologist	332.271-038
Trade & Industrial Education	Masonry	Bricklayer, Construction	861.381-010

D. Secured Curriculum Specialists From Each Service Area to Work With Research Associates in an Advisory Capacity

Although DELTA Project research associates had experience and/or educational backgrounds related to their service area assignments, it was decided that specific subject expertise could best be provided by service area representatives. The six service areas were contacted and each agreed to assign a curriculum specialist to work with the DELTA Project research associates. The degree of involvement of curriculum specialists with DELTA varied greatly from one service area to another.

E. Developed Catalogs of Performance Objectives, Criterion-Referenced Measures and Performance Guides

The development of catalogs of performance objectives, criterion-referenced measures, and performance guides consisted of the following major steps:

1. Developed occupational inventory.
2. Conducted occupational survey.
3. Identified tasks for which objectives would be written.
4. Developed catalogs for field review.
5. Conducted field review of catalogs.
6. Compiled final catalogs.

A more detailed description of each of the steps is provided below.

1. Developed Occupational Inventory

A state-of-the-art study was conducted for each of the seven occupations comprising DELTA Project. The purpose of the study was to identify task lists, equipment lists and other relevant materials previously developed. Each state-of-the-art study included the following research activities:

a. a search of the ERIC system for germane information.
b. a search of the journal index of ERIC for germane articles.
c. inquiries to the U. S. Office of Education, National Center for Curriculum Development in Occupational Education.
d. inquiries to industry and private training institutions.
e. review of the Dissertation Abstract International Index.
f. inquiries to local education agencies identified as working on germane projects.

Based upon data compiled during the state-of-the-art study, lists of duties, tasks, and job specifications were identified and combined under appropriate duty headings into a preliminary task list.

The preliminary task and equipment lists were then reviewed by incumbent workers, managers, owners, instructors, and industry representatives until it appeared that little or no additional information would be obtained through further inter-

views. The preliminary lists were then refined, incorporating changes suggested by the interviewees and resulting in the final occupational inventory.

Each occupational inventory contained three sections. In section 1, BACKGROUND INFORMATION, respondents were asked to provide the following: name; address; sex; educational background; years of experience at present job; years of experience in career field; job title; number of employees supervised; name of employer. In section 2, EQUIPMENT LIST, respondents were asked to place a check mark beside the equipment and/or tools they used in the performance of their current job. In section 3, JOB INVENTORY, respondents were asked to place a check mark opposite those tasks that they actually performed and to indicate, using the following scale, the amount of time spent in performing these tasks:

1 - very much below average
2 - below average
3 - slightly below average
4 - about average
5 - slightly above average
6 - above average
7 - very much above average

2. Conducted Occupational Survey

After development of the occupational inventory, the population of incumbent workers for the occupation investigated was identified. Specific procedures used to identify the incumbent worker population for each occupation is presented in Appendix B. Once the population was identified, the sample sizes were determined using the following formula:

$$P_c\{|\hat{p}-p| \leq \delta\} = P_c\left\{\delta < Z_{\frac{\alpha}{2}} \sqrt{\frac{.25}{n}\left(\frac{N-n}{N}\right)}\right\} = 1 - \alpha$$

Where n represents the sample size, N represents the population size, δ represents the required precision, $1 - \alpha$ represents the desired confidence, and $Z_{\frac{\alpha}{2}}$ corresponds to the usual standard normal deviate for the two-tailed confidence interval.

In calculating the sample size for each population the values for precision and desired confidence were held constant. A value of 0.100 was used for precision and a value of 0.950 was used for the desired confidence.

The occupation, population size, sample size, and percent of occupational inventories returned are presented in Table II.

TABLE II

Occupation, Population Size, Sample Size,
% of Occupational Inventories Returned

Occupation	Population Size*	Sample** Size	Percent of Occupational Inventories Returned
Alterationist	664	138	87.7
Auto Parts Clerk	450	140	90.7
Bookkeeping/ Accounting/ Payroll Clerk	31,000	269	Occupational Inventory in Progress
Cosmetology	4,800	166	86.8
Licensed Practical Nursing***	8,533	769	65.8
Masonry	414	136	80.0
Nursery Production	389	162	74.0

*Figures indicate total businesses except in the Licensed Practical Nursing occupation. That figure represents the number of Licensed Practical Nurses actively employed in Alabama in 1974. (See Appendix B).

**Figures indicate number of individuals in sample.

***The formula for determining sample size stated in the preceeding paragraphs was modified in determining sample size for the LPN survey to provide data for an agency external to the project.

Survey participants were randomly selected by computer from the total population. A preliminary letter was mailed to the sample participants to inform them that an occupational inventory would be forthcoming and to explain it's purpose. The occupational inventory, a cover letter, and stamped, self-addressed envelope were then mailed to sample members. Follow-up letters and/or telephone calls were used at varying intervals to expedite return of the occuaptional inventories. Excerpts from an occupational inventory are presented in Appendix C.

3. Identified Tasks for Which Objectives Would Be Written

Survey data for each task were analyzed in terms of time spent, percent of respondents performing, and task criticality. These indices provided the basis for deciding which tasks to include in the catalogs of performance objectives. Time spent refers to the cumulative total of average time spent by the respondents performing a task. Percentage of respondents performing is determined by dividing the number of respondents performing a task by the total number responding to the survey.

Objectives were written for all tasks which had a time-spent index of at least 90% and/or were performed by 30% of the respondents. Each task which did not meet these criteria was analyzed in terms of criticality to the occupation. If determined critical to the occupation by members of the writing team, these tasks were also included.

4. Developed Catalogs for Field Review

a. Selection of Writing Team - The research associate and the technical coordinator screened possible writing team candidates and selected those personnel which were determined to have the potential and interest to develop performance objectives and criterion-referenced measures. The writing team consisted of incumbent workers, instructors, technical writers having ability and experience in developing performance objective, and persons having either local or supervisory responsibility over the domain being developed.

b. Preparation of Writing Team - Each research associate had primary responsibility for training writing team members. The research associate presented an overview of DELTA Project, the results of the state-of-the-art study and the task analysis system. Incumbent workers provided the steps in performing each task, minimum standards of performance, and the references for those standards. After in-service training, the writing team members used the data provided by the incumbent workers to develop performance objectives and criterion-referenced measures. The steps in performing the tasks became the performance guides accompanying each objective.

c. Preparation of the Field Review Catalogs - The job-related performance objectives, criterion-referenced measures, and performance guides developed cooperatively by the writing team members and research associates became the foundation for the Field Review Catalog. In addition, each Field Review Catalog contained three appendices:

(1) An equipment and tool listing showing the numbers and percentages of incumbent workers using each tool or piece of equipment.

(2) A list of references used to document the sources of the standards for the performance objectives.

(3) A list of tasks by duty area for which a performance objective was written and correlation of each task to a performance objective number.

5. Conducted Field Review of Catalogs

Involved in the field review of each catalog were representatives of the following groups: teachers, instructional supervisors, school administrators, and curriculum developers. Field review participants were also representative of post-secondary, secondary, and adult level education. Approximately thirty field reviewers participated in the development of each catalog.

Each participant was asked to carefully review the introduction, definitions, performance objectives, criterion-referenced measures and the performance guides. Participants checked "yes" or "no" regarding the acceptability of each item and comments were invited concerning each item.

The field review of the catalog contents was necessary to gather data from content, curriculum, and test experts in the field regarding the specific components of each item. The data were used as a basis for improving those items which the reviewers felt should be changed before final compilation and distribution of the catalog. Therefore, the field review process made it possible to gather and utilize input from a large number of experts, in addition to the team of writers who prepared the catalog.

The field review was designed to determine the instructional acceptability of the performance objectives, criterion-referenced measures, and performance guides. Content validity was determined by analysis of responses with primary emphasis placed upon utility and appropriateness of catalogs to instruction

6. Compiled Final Catalogs

Catalogs were then revised in accordance with suggestions made by field reviewers. The final determination regarding which field review comments to incorporate into the final catalog was made by representatives of the writing team. Appropriate changes were made and the catalog was updated or revised as necessary. The final version of the catalog was printed for distribution to appropriate agencies. Each final catalog contains the following:

I. Introduction
II. Definition of Terms
III. Purpose of Catalog

IV. Development of Catalog
Preliminary Research
Description of Sample and Survey
Analysis of Data
Writing Team
Field Review
V. Elements of the Catalog
VI. Performance Objectives, Criterion-Referenced Measures, and Performance Guides

Appendix A - Equipment by Percentage Rating
Appendix B - References for Standards
Appendix C - State-of-the-Art Literature
Appendix D - Cross-Reference Table of Tasks and Performance Objectives
Appendix E - Index of Tasks

F. Developed Plan for Diffusion of Catalogs to Vocational Educators in Alabama

As in all other phases of DELTA Project, input was solicited from each service area to determine the most efficient and effective plan for utilizing the catalogs. To accomplish this goal, a workshop was conducted for each service area with a broad spectrum of representatives including the total state staff, selected teacher educators, curriculum developers, and selected teachers from both secondary and post-secondary levels participating.

The topics covered in the workshops were:

.Overview of Catalog Development
.General Uses of Catalogs
.Identification of specific Uses of Selected Catalogs
.Identification of Procedures for Implementing Identified Uses of Catalogs

The workshops resulted in six written documents listing the uses and implementation procedures identified by workshop participants. A review of the six documents resulted in the identification of uses which were unique to service areas, and those common to several service areas the review provided data to structure a utilization plan.

Of major concern to all service areas was the use of the catalogs as a research based foundation for the development of performance-based instructional materials. Each service area requested in-service workshops to address this concept. The DELTA Staff developed the following terminal objectives to provide the framework for such utilization workshops:

After attending the workshop(s) participants will:

1. Give a 3 to 5 minute oral presentation to a small group. The presentation must include:

a. meaning of the acronym DELTA
b. purpose and 3 goals of DELTA
c. properly sequenced key steps in the production of performance-based catalogs

All criterion checklist items must be rated acceptable.

2. Provided a catalog from your subject area, list at least five specific uses of the catalog in your program(s). Review the list with your instructor.

3. Provided a catalog from your subject area, list the steps essential to the accomplishment of one selected performance objective. The list must be rated acceptable according to the criterion checklist.

4. Using the approved list of essential steps, write enabling objectives for each of the steps. Each enabling objective must contain a condition, behavior and standard.

5. Using the previously constructed enabling objective, construct a criterion-referenced measure for each. Criterion-referenced measures must test the behavior specified in the enabling objective for which it was constructed.

6. Using the worksheets provided, develop a plan of instruction, leading to the accomplishment of identified objectives. The plan must include the following as a minimum.

   a. Performance Objective
   b. Enabling Objective(s)
   c. Teaching Points
   d. Tentative Methods and Media Selection
   e. Participant Activities

7. Following the approved plan of instruction develop an instructional unit leading to the accomplishment of identified objectives and meeting the instructor's approval.

8. Using the instructional unit, conduct tryouts and revise materials until 90% of the students obtain the objectives.

Each service area has planned the manner in which the utilization workshops will be presented to teachers. One service area requested that the instructional materials specialist and the district supervisors be trained to competency levels in the workshop. This staff in turn will train their teachers to competency levels in subsequent workshops. Several service areas requested that the DELTA staff provide the workshops for the teachers, while other service areas requested that the workshop be given as a team effort between their staff and DELTA staff.

The first utilization workshops are scheduled to begin in early fall 1976 with the understanding that selected modification will be made as the need arises.

III. RESULTS AND ACCOMPLISHMENTS

This section describes results and accomplishments as they relate to each DELTA Project objective. In addition, other accomplishments resulting from DELTA Project are presented.

A. Objective 1 - Identify a common core of basic skills for seven occupational cluster areas.

A set of tasks common to several job titles or D.O.T.s within an occupation were identified after computer analysis of the occupation inventory survey data. These commonalities were determined after analyzing the following statistical reports:

1. Number of persons performing each task.
2. Percentage of persons performing each task.
3. Average percent time spent by persons performing.
4. Average percent time spent by all persons.
5. Cumulative sum of average percent time spent performing each task by all persons.
6. Percentage of persons performing each task by D.O.T.
7. Cumulative time spent performing each task by D.O.T.
8. D.O.T. Differential.

The task commonalities were determined for the following occupations and D.O.T.'s comprising DELTA Project.

OCCUPATION	D.O.T.(S)	TITLE
Alterationist	785.281-010	Alteration Tailor
	785.381.026	Seamstress, Alterationist
Auto Parts Clerk	289.358-046	Salesperson, Parts
	289.358-068	Counterman, Auto Parts
Bookkeeping/Accounting/ Payroll Clerk	210.388-088	Bookkeeping/Accounting Clerk
	215.488-010	Payroll Clerk
Cosmetology	332.271-010	Cosmetologist
	332.271-038	Managing Cosmetologist
Licensed Practical Nursing	079.378-026	Licensed Practical Nurse
Masonry	861.381-010	Bricklayer, Construction
Nursery Production	406.168-010	Nurseryman
	406.884-010	Laborer, Nursery
	406.887-030	Nursery Worker

See Section III F. for related information.

B. Objective 2 - Prepare catalogs of performance objectives and criterion-referenced measures for seven occupational cluster areas.

Final catalogs of performance objectives, criterion-referenced measures and performance guides have been completed for the following occupations:

1. Alterationist
2. Auto Parts Clerk
3. Cosmetologist
4. Nursery Production

Final catalogs for those occupations listed below are in the final stage of preparation and are expected to be finalized by dates indicated:

1.	Bookkeeping/Accounting/Payroll Clerk	December 1976
2.	Licensed Practical Nursing	August 1976
3.	Masonry	October 1976

See Section III F. for related products and their availability.

C. Objective 3 - Field test the seven catalogs of performance objectives on incumbent workers in the occupational areas.

A true "field test" of the catalogs cannot be accomplished until curricula and instructional materials have been designed, developed and implemented using the catalogs as a foundation for their development. Then, through the validation process, the effectiveness of these products may be assessed. However, a "field review" has been conducted on each catalog. This review is designed to evaluate the instructional acceptability of the performance objectives, criterion-referenced measures and performance guides and insure content validity. Table III identified those occupations for which a field review has been accomplished and indicates the composite membership of the field review participants.

TABLE III

COMPOSITE MEMBERSHIP OF FIELD REVIEW PARTICIPANTS

OCCUPATIONS	ADMINISTRATORS	TEACHER EDUCATORS	STATE SUPERVISORS	CURRICULUM DEVELOPERS	INSTRUCTIONAL SUPERVISORS	INSTRUCTORS	INCUMBENT WORKERS
ALTERATIONIST	3	4	1	2	2	13	6
AUTO PARTS CLERK	1	2	1	2	3	19	2
BOOKKEEPING/ACCOUNTING/ PAYROLL CLERK *							
COSMETOLOGY	4	-	1	2	2	21	-
LICENSED PRACTICAL NURSE	1	2	1	2	10	15	1
MASONRY *							
NURSERY PRODUCTION	1	3	1	2	1	9	2

*The field review has not been completed for these occupations as of July, 1976.

D. Objective 4 - Conduct in-service education for curriculum developers on the utilization of performance objective catalogs.

and

Objective 5 - Utilize the performance catalogs in designing curricula materials.

Achievement of Objective 4 and Objective 5 are presented together.

An intensive in-service education program has been designed by the DELTA Project staff for all potential users of the catalogs of performance objectives, criterion-referenced measures and performance guides. The objectives listed below provide the framework for utilization of these catalogs to develop instructional materials.

Participation in the in-service education workshop(s) is prerequisite to catalog dissemination within Alabama.

After attending the workshop(s) participants will:

1. Give a 3 to 5 minute oral presentation to a small group. The presentation must include:

    a. meaning of the acronym DELTA
    b. purpose and 3 goals of DELTA
    c. properly sequenced key steps in the production DELTA performance-based catalogs

    All criterion checklist items must be rated acceptable.

2. Provided a catalog from your subject area, list at least five (5) specific uses of the catalog in your program(s). Review the list with your instructor.

3. Provided a catalog from your subject area, list the steps essential to the accomplishment of one selected performance objective. The list must be rated acceptable according to the criterion checklist.

4. Using the approved list of essential steps, write enabling objectives for each of the steps. Each enabling objective must contain a condition, behavior and standard.

5. Using the previously constructed enabling objectives, construct a criterion-referenced measure for each. Criterion-referenced measures must test the behavior specified in the enabling objective for which it was constructed.

6. Using the worksheets provided, develop a plan of instruction, leading to the accomplishment of identified objectives. The plan must include the following as a minimum.

    a. Performance Objective
    b. Enabling Objective(s)
    c. Teaching Points
    d. Tentative Methods and Media Selection
    e. Participant's Activities

7. Following the approved plan of instruction develop an instructional unit leading to the accomplishment of identified objectives and meeting the instructor's approval.

8. Using the instructional unit, conduct tryouts and revise materials until 90% of the students obtain the objectives.

See Section III, F. for related information.

E. Objective 6 - Disseminate the catalogs to other states for utilization in curricula development.

Catalogs for the four occupations listed below have been disseminated to the Vocational-Technical Education Consortium of States, U.S.A.F. Air Training Command and the U.S. Naval Education and Training Command. Access to these catalogs is also available through ERIC.

Alterationist
Auto Parts Clerk
Cosmetology
Nursery Production

Catalogs for the following three occupations will be disseminated to the same agencies upon completion.

Bookkeeping/Accounting/Payroll Clerk
Licensed Practical Nursing
Masonry

F. Other Accomplishments

1. Product availability - Major emphasis throughout this report has been placed on the final catalogs of performance objectives, criterion-referenced measures and performance guides. It should also be noted that other documents or reports were generated throughout the developmental process which have significant implications for administrators, supervisors, curriculum developers and instructors. These documents or reports, by occupation, are shown in Table IV followed by a brief description of each and are available through:

VOCATIONAL-TECHNICAL EDUCATION CONSORTIUM OF STATES
Southern Association of Colleges and Schools
Commission on Occupational Education Institutes
795 Peachtree Street, N.E.
Atlanta, Georgia 30308

TABLE IV

PRODUCT AVAILABILITY

DOCUMENT	ALTERATIONIST	AUTO PARTS CLERK	BOOKKEEPING/ACCOUNTING/PAYROLL CLERK	COSMETOLOGY	LICENSED PRACTICAL NURSING	MASONRY	NURSERY PRODUCTION
STATE OF THE ART REPORT	x	x	x	x	x	x	x
OCCUPATIONAL INVENTORY	x	x	x	x	x	x	x
DOMAIN REPORT	x	x	x	x	x	x	x
WRITING TEAM REPORT	x	x		x	x	x	x

xIndicates availability of document or report

State-of-the-Art Report — Contains State-of-the-Art of the discipline, listing of all related materials (curriculum packages, course outlines, curriculum guides, audio-visual aids, objectives, test items, task inventories, etc.), and annotation of each citing.

Occupational Inventory — Contains preliminary tool and equipment and task listings developed through research and interview. The document is in the form of the survey instrument used for the occupational survey of the random sample of job incumbents.

Domain Report — Contains an update of the state-of-the-art report, copy of final occupational inventory, and report of the sample for the survey.

Writing Team Report — Information from incumbent workers is analyzed and combined with knowledge of selected instructors, curriculum specialists, performance objective and criterion-referenced measure designers and educational researchers into meaningful performance objectives, criterion-referenced measures and

performance guides. Collectively, the people that perform this function are called the "writing team". The process of selection and preparation of the writing team for each occupation in DELTA Project is explained in the "Writing Team Report".

2. Commonality of tasks among occupations - To facilitate articulation between and among educational programs, computerized data can be generated to identify those tasks common to several occupations for curriculum design in comprehensive career education programs. These data are in an automated base and lists of common tasks can be generated by the source of the above documents.

3. Planning for catalog utilization workshops - Additional accomplishments resulted from the cooperative relationships described in part II, Conducting Meetings to Familiarize State Staff with Project Procedures and to Solicit Their Support of this report. Several workshops were conducted in which personnel from all levels of vocational education were represented. These workshops provided the necessary input for planning the most effective diffusion of the DELTA catalogs and became the foundation for the in-service education prerequisite to their dissemination.

May 6 and 13, 1975 - Utilization of Curriculum Materials Workshops. There were seventy-five (75) State Department of Education and Teacher Educator participants attending the two workshops conducted by EPDA and DELTA staff members. Each workshop was comprised of presentations concerning: occupational competence; instructional competence; writing performance objectives, criterion-referenced measures, and performance guides; writing behavioral objectives for related cognitive and affective learnings; writing teaching guides; the procedures followed in developing DELTA materials; and the process involved in utilizing the DELTA materials in performance-based instruction. As part of the workshop evaluation each participant was asked to list the areas in which further assistance in the utilization of the DELTA materials for curriculum development was needed. Tabulation revealed further assistance was needed in the following areas:

1. Writing performance objectives and criterion-referenced measures for the psychomotor, cognitive and affective domains.

2. Utilization of the principles of learning.

May and June 1976 - Framework Meetings with Occupational Service Areas Meetings were held with each of the

occupational service areas to identify specific uses of selected catalogs and recommended procedures for implementing those uses. Participants included the total state staff of each occupational service area, selected teacher educators and instructors. The workshops resulted in six written documents listing the implications applicable to students, teachers, administrators and counselors, state staff, and teacher educators in each occupational service area. These implications are presented in section IV of this report.

The accomplishments of the above mentioned workshops and framework meetings provided the foundation necessary to enable the vocational education leadership and the DELTA staff to design the most efficient and effective plan for catalog utilization. The impact is discussed in section V.

IV. IMPLICATIONS AND RECOMMENDATIONS

A. IMPLICATIONS

The major strength of DELTA Project appears to be its provision for a broad base of involvement for all levels of vocational education in performance-based instruction, thus providing a foundation for the development of a system of educational accountability. The project documents and their utilization appear to hold the following implications for students, teachers, administrators and counselors, state staff, teacher educators, and handicapped learners.

1. Implications for Students:

   a. Provides a resource for career decision making and exploring representative skills of occupations.

   b. Provides clear-cut route to desired goal.

   c. Enhances student-employer communication of work evaluation based on skills rather than alphabetical grades.

   d. Provides for student self-evaluation during programs.

   e. Allows for the development of non-threatening, student evaluation.

   f. Promotes student motivation by relating instructional content to job requirements.

   g. Provides framework for designing individualized instruction to meet individual needs.

   h. Promote the implementation of performance-based instruction allowing open entry-open exit policy for students.

   i. Increases student efficiency thru close identification and definition of major requirements for occupational performance.

2. Implications for Teachers:

   a. Saves research time.

   b. Promotes objective evaluation of student achievement.

   c. Assists beginning teachers to incorporate skill training into the educational process.

   d. Provides a guide for planning learning activities related to specific job requirements.

e. Provides a guide for designing new instructional programs.

f. Allows for selection of job relevant objectives based on available resources and student and community needs.

g. Provides a guide for local occupational analysis.

h. Assists teachers in planning individualized instruction for disadvantaged students.

i. Assists teachers in communicating their programs to the public.

j. Provides data base for occupational requirements.

k. Assists teachers in identifying tools and equipment required for selected occupations.

3. Implications for Administrators and Counselors:

a. Provides a rationale for developing new instructional programs.

b. Provides a rationale for discontinuing programs.

c. Provides a rationale for planning for facilities, equipment and personnel.

d. Provides basis for student placement.

e. Provides basis for counseling services.

f. Provides for articulation within and between secondary and post-secondary programs.

4. Implications for State Staff:

a. Assists in planning inservice programs.

b. Assists in evaluating programs.

c. Provides a guide for updating curriculum.

d. Allows articulation between and among programs.

e. Provides a guide for improving instruction.

f. Provides assistance in determining certification requirement, i.e. guidance in setting standards.

g. Assists in facilities and equipment planning.

h. Helps orient new teachers to programs.

5. Implications for Teacher Educators:

   a. Assists in planning pre-service programs in methods, curriculum development, occupational analysis, etc.

   b. Provides a basis for research projects.

   c. Provides a guide in selecting student teaching assignments and locations.

6. Implications to Handicapped Learners:

A foremost challenge facing vocational education is serving handicapped learners. Responding to this challenge, Alabama joined with V-TECS and five other states in undertaking a project to study the feasibility of adapting the catalogs for use in training handicapped persons and to design a system for coding the performance objectives determined to be applicable for the handicapped. The following summary is cited in part from the Final Report on A Project to Computerize Performance Objectives and Criterion Referenced Measures in Occupational Education for Research and Determination of Applicability to Handicapped Learners, U.S.O.E. Project No. V0249VZ Grant No. OEG.-074-8[illegible].

Feasibility studies for determining those performance objectives that are appropriate for and attainable by various target groups of handicapped learners were conducted in six V-TECS member states. Special committees, were established in each state composed of a handicapped worker where possible, a supervisor where possible, persons knowledgeable of the limitations and capabilities of handicapped learners, and persons knowledgeable of the occupation under study.

Standarized rating instructions and response forms were developed and provided. Each committee member was charged with the responsibility of rating each task in the selected V-TECS occupational inventory for attainability and difficulty and each performance objective in the associated V-TECS catalog for attainability by the selected handicapped target group. The usable returns, as well as informal feedback provided by the committee members, were analyzed and used to develop a recommended procedure for conducting future studies and for coding performance objectives relative to applicability for various handicapped target groups.

These procedures were determined to be both practical and feasible. Application of these procedures to DELTA Project catalogs has implications for handicapped learners.

B. RECOMMENDATIONS

Based on DELTA Project's results and accomplishment, the following recommendations were made for the Alabama Department of Education, Division of Vocational Education and for other states and agencies.

1. Recommendations for Alabama Department of Education, Division of Vocational Education.

   a. It is recommended that the project design and procedures serve as the model for developing additional catalogs of performance objectives, criterion-referenced measures and performance guides.

   b. It is recommended that major emphasis be placed on in-service education for the utilization of the catalogs in the development of performance-based instructional materials.

   c. It is recommended that the DELTA Project staff be incorporated into a permanent Curriculum Unit in the Alabama Division of Vocational Education.

2. Recommendations for Other States and Agencies.

   a. It is recommended that the project design and procedures serve as a common format to be utilized in developing curriculum materials in various states to allow transportability among states.

   b. It is recommended that task analysis of incumbent workers be utilized to insure content validity of performance objectives, criterion-referenced measures and performance guides, thus increasing the usefulness of materials to other agencies.

   c. It is recommended that state staff be involved in the design and development of vocational curriculum materials.

   d. It is recommended that DELTA procedures be used as a catalyst for the adaptation of other curriculum materials (i.e. Interstate Distributive Education Curriculum Consortium).

V. IMPACT OF DELTA PROJECT ON VOCATIONAL EDUCATION

DELTA Project made significant impact on vocational education in Alabama. It provided the research base for planning job-relevant curricula based on task analyses therefore assuring content validity in vocational-technical programs. Such curricula bridge the gap between classroom instruction and job performance requirements thus improving the overall accountability of vocational education. Other major accomplishments attributed directly to DELTA Project are discussed below.

A. Permanent Curriculum Staff

DELTA Project procedures and resulting products gained widespread acceptance among Alabama's vocational education leaders as a foundation for performance-based instruction. Because of the economical feasibility of joining with other states, through V-TECS, to reduce duplication of curriculum efforts, the DELTA Project staff has been incorporated into a permanent Curriculum Unit in the Alabama Division of Vocational Education.

B. EPDA Involvement

For fiscal year 1977, EPDA has a proposal funded to provide training to a minimum of 600 vocational leaders in principles of performance-based instruction. The DELTA catalogs of performance objectives will provide the content and procedure base for this training. In addition, EPDA's proposal has outlined plans for establishing teacher training centers throughout the state to facilitate implementation of performance-based instruction.

C. Interstate Distributive Education Curriculum Consortium (IDECC)

For the past three years the Distributive Education service area of the Alabama State Department of Education has been committed to the implementation and utilization of materials developed through the Interstate Distributive Education Curriculum Consortium (IDECC). All Distributive Education teacher-coordinators in Alabama have undergone a series of intensive workshops on the use and management of the Learning Activity Packets (LAPS) from IDECC, thus, a major function of the DELTA staff has been coordinating the products of IDECC and DELTA.

A series of meetings with Distributive Education instructors, teacher educators and state staff indicated that the DELTA material could be used in conjunction with the LAPS. A recent utilization workshop illustrated that DELTA products compliment as well as supplement the IDECC LAPS. Selected Distributive Education educators cross-referenced the objectives from a catalog in the Distributive Education domain with the IDECC LAPS. The format developed by the instructors verified the fact that the DELTA products can successfully be used to manage and simplify the use of the extensive IDECC system. All Distributive Education personnel involved reacted very favorably to the DELTA products and requested immediate access to said materials.

D. Performance-based Adult Vocational Education (PAVE) Project

An eighteen months federally funded project, "Performance-based Adult Vocational Education" has been designed to provide a model for teaching adult vocational instructors the process of developing performance-based instructional programs utilizing DELTA catalogs of performance objectives.

A study of three instructional delivery systems will be conducted to assess their effectiveness in developing student competencies and in enhancing instructor attitudes concerning the instructional program. The study will involve a three group experimental design with replication.. Student competencies will be assessed on entry and exit providing pre-test and post-test data. Attitudes of instructors and adult learners will be assessed at the end of the instructional program.

The experience and results derived from this project and the end products generated will serve as the foundation from which a performance-based instructional system will be developed for Alabama's adult vocational education program. End products will be packaged to facilitate transportability to adult programs within Alabama and to other states.

E. Teacher Corps Project

The Teacher Corps Project funded at the Cullman County Area Vocational Center will utilize the curriculum materials developed by DELTA to implement performance-based instruction in an exemplary, demonstration program at a local vocational center.

As the utilization of the curriculum materials are validated through teacher competencies and pupil achievement, plans are projected to disseminate these processes and products throughout all vocational programs in the State of Alabama.

F. Summary

The grant period for project DELTA was originally eighteen months. A three month no-cost extension of time was obtained to allow further completion of certain aspects of the project. Although all objectives of the project were not fully achieved within the grant period, each objective will be fully achieved before project activities are terminated. Failure to achieve all objectives within the scheduled time can be attributed to: (1) under-estimation of time required to collect field data, and (2) under-estimation of time required to involve an entire state vocational education staff in each step of project development.

The project has been considered a tremendous success by vocational educators within the State of Alabama and by vocational educators in other states affiliated with the project through the V-TECS consortium. The project has made considerable improvement in all program development functions within the state. Basic processes of the project will be utilized in further curriculum development and curriculum revision activities.

Associated with the implementation of project DELTA has been the coordinated utilization of vocational research funds, EPDA funds, and other resources to impact on the total state vocational education program at all levels. The products and processes developed in this project will serve as standards for future curriculum development activities within the state.

APPENDIX A

BIBLIOGRAPHY

BIBLIOGRAPHY

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APPENDIX B

PROCEDURES USED TO IDENTIFY INCUMBENT WORKER POPULATIONS

The procedures used to identify the incumbent worker population are listed below for each occupation comprising DELTA Project.

A. ALTERATIONIST

The population for the occupational survey of alterationist was identified from the current Standard Industrial Classification (SIC) listing provided by the Alabama State Department of Industrial Relations. Industries included:

1. Department Stores
2. Men and Boys Clothing and Furnishings
3. Women's Ready-to-Wear Stores

The final population consisted of 664 businesses. From the total population, 138 alterationists were sampled.

B. AUTO PARTS CLERK

A Dunn and Bradstreet computer listing of all automotive parts dealers within the state was secured from the Automotive Wholesalers' Association of Alabama. The original listing contained 919 firms.

Businesses not dealing primarily in the automotive parts service were struck from the list. These consisted of concerns such as service stations, junk yards, car dealers, wrecking companies and glass companies.

The number of automotive parts businesses remaining in the target population was 450. A random sampling of these businesses revealed that the average number of countermen at each business was slightly over two. Two Occupational Inventory booklets were sent to each of 70 businesses to sample 140 incumbents. It was necessary to select 20 replacement businesses in order to attain the desired sample size.

C. BOOKKEEPING/ACCOUNTING/PAYROLL CLERK

The U. S. Census data for Alabama identified 11,500 persons employed as accounting or payroll clerks. A random sample of 269 firms was drawn from the total number of firms identified by the Alabama Department of Industrial Relations.

The firms were surveyed to determine whether or not they employed accounting or payroll clerks. Two Occupational Inventory booklets were mailed to each firm responding affirmatively. For each negative reply, a replacement firm was randomly selected until a total of 269 accounting or payroll clerks were identified and sampled. A total of 76 replacement firms were selected before the desired sample size was attained.

D. COSMETOLOGY

A listing of 4800 licensed cosmetology businesses was provided by the Alabama Board of Cosmetology and The Board of Cosmetological Examiners of Jefferson County. A random sampling of these businesses revealed an average of 2.36 cosmetologists per business. Two Occupational Inventory booklets were sent to each of 83 businesses to sample 166 incumbents. Inventory returns and follow-up telephone calls indicated that 43 of the selected businesses had only one cosmetologist and that nine businesses were no longer operating. This information resulted in the need for 61 replacements.

E. LICENSED PRACTICAL NURSING

The population for the occupational survey of Licensed Practical Nurses was identified from a March 1974 computer listing of all Licensed Practical Nurses in the State of Alabama Board of Nursing. There were 11,028 LPN's listed. The list was purged as indicated below to arrive at the 8,533 Licensed Practical Nurses actively employed in Alabama in 1974.

Total Licensed Practical Nurses	11,028
Minus Licensed Practical Nurses out of State	- 891
Total Licensed Practical Nurses in State	10,137
Minus Licensed Practical Nurses not actively employed	-1,604
Total Licensed Practical Nurses actively employed	8,533

Sample size by employment distribution and population is shown in Table V. The employment category INSTITUTIONS contained a population of 6733 in all four sub-categories and the sample size of 93 per sub-category was combined into a single sample of 372 since delimiting between sub-categories was impossible until survey responses were received. In the sub-categories of PUBLIC HEALTH, SCHOOL AND ARMED SERVICES the entire population was surveyed.

F. MASONRY

The State of Alabama Department of Industrial Relations supplied a listing of 414 masonry contractors. Two Occupational Inventory booklets were sent to each of 68 businesses to sample 136 incumbent workers. It was necessary to select 10 replacement businesses to attain the desired sample.

G. NURSERY PRODUCTION

A total of 389 certified nurseries were identified from a January, 1975 listing provided by the State of Alabama Department of Agriculture and Industries, Division of Plant Industry. Two Occupational Inventory booklets were sent to each of 81 businesses to sample 162 incumbent nursery workers. It was necessary to select 11 replacement businesses to attain the desired sample.

TABLE V

SAMPLE SIZE BY EMPLOYMENT DISTRIBUTION AND POPULATION
FOR LICENSED PRACTICAL NURSING

EMPLOYMENT CATEGORY	POPULATION	0.95/0.10 SUB-STRATA SAMPLE
INSTITUTIONS	6733	
a. 0-50 Beds		93
b. 51-100 Beds		93
c. 101-200 Beds	372	93
d. Over 200 Beds		93
OFFICE	627	105
OTHER	584	103
PRIVATE DUTY	475	99
INDUSTRY	68	44
PUBLIC HEALTH	35	35
SCHOOL	7	7
ARMED SERVICES	4	4

APPENDIX C

EXCERPTS FROM AN OCCUPATIONAL INVENTORY

BACKGROUND INFORMATION

FOR OFFICE USE ONLY

PROJECT IDENTIFIER	(01-04)	01
BOOKLET NUMBER	(05-08)	
O. E. CODE	(09-14)	
D. O. T. CODE	(15-23)	

PLEASE PRINT ALL REQUESTED INFORMATION

NAME	(24-55)	
ADDRESS	(56-75)	
SEX M ☐ F ☐	(01)	02
TOTAL TIME ON PRESENT JOB: YRS MONTHS	(02-04)	
TOTAL TIME IN CAREER FIELD: YRS MONTHS	(05-07)	
PRESENT POSITION OR JOB TITLE:	(08-29)	
NUMBER EMPLOYEES SUPERVISED	(30-31)	
NAME OF EMPLOYER	(32-55)	
EMPLOYER'S ADDRESS	(56-75)	

PLEASE CIRCLE YEARS OF EDUCATION COMPLETED

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 (76-77)

EQUIPMENT LIST

PLACE A CHECK ( ) BEFORE EACH PIECE OR EQUIPMENT YOU USE IN YOUR CURRENT JOB.

1. _____	Apparell Steamer, Hand	(1:14)
2. _____	Automatic Hem Gauge	(15)
3. _____	Bobbin Repair Kit	(16)
4. _____	Bodkin	(17)
5. _____	Buttonhole Attachment	(18)
6. _____	Clothes Brush	(19)
7. _____	Clothes Hangers	(20)
8. _____	Clothes Hanging Racks	(21)
9. _____	Clothes Steamer, Hand	(22)
10. _____	Conveyor and Pressboard	(23)
11. _____	Crochet Hook	(24)
12. _____	Cuff Marker	(25)
13. _____	Cuff Rule	(26)
14. _____	Curved Rule	(27)
15. _____	Cutting Board	(28)
16. _____	Dressmaker's Dummy	(29)
17. _____	Dressmaker's Ruler, Transparent	(30)
18. _____	Dry Iron	(31)
19. _____	Dry-Steam Iron	(32)
20. _____	Embroidery Hoop	(33)
21. _____	Eyelet Puncher and Setter	(34)
22. _____	Hand Needles	(35)
23. _____	Hem Marker	(36)

JOB INVENTORY (DUTY-TASK LIST)		Page of Pages

1. Check tasks you perform now (✓).
2. Add any tasks you do now which are not listed.
3. In the "Time Spent" column, write the number beside each checked (✓) task using the scale below.

Time Spent Scale

1 – VERY MUCH BELOW AVERAGE
2 – BELOW AVERAGE
3 – SLIGHTLY BELOW AVERAGE
4 – ABOUT AVERAGE
5 – SLIGHTLY ABOVE AVERAGE
6 – ABOVE AVERAGE
7 – VERY MUCH ABOVE AVERAGE

E. ALTERING BODICES		CHECK IF DONE IN PRESENT JOB	TIME SPENT DOING THESE TASKS IN PRESENT JOB	OFFICE USE ONLY
1. Add gusset	57.			(1:70)
2. Enlarge armscye	58.			(71)
3. Decrease armscye	59.			(72)
4. Raise neckline	60.			(73)
5. Lower neckline	61.			(74)
6. Shorten bodice	62.			(75)
7. Lengthen bodice	63.			(76)
8. Decrease bust	64.			(77)
9. Increase bust	65.			(78)
10. Lengthen shoulder line	66.			(79)
11. Narrow shoulder	67.			(80)
12. Raise shoulder line	68.			(2:1)
13. Insert waistline stay	69.			(2)
14. Remove boning	70.			(3)
15. Add boning	71.			(4)
NOTE: If any task you perform under this duty is not listed, write it in the blank space below.				