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ABSTRACT

The report describes a project conducted from 1972 to 1975 for vertically articulating curricula in Minnesota's secondary and post-secondary vocational-technical institutions. Central to the project was the construction of valid task inventories for the various vocational programs which would help to ensure that vocational curricula provided the maximum usefulness and minimum cost to the students. During the project's first two years task listings for the hospitality and graphic arts industries were developed and a Handbook for vocational-technical instructors and coordinators was published. During the last two project years a procedure for articulating vocational programs in auto mechanics and clerical-secretarial occupations based on the identification and validation of minimum task based curriculum content was developed. The final accomplishment during the last year was the collection of task inventories, competency lists, and skill profiles. The articulation procedure appears to be reasonable in cost and efficient in terms of time required to complete the procedure. The document contains a five-page bibliography and two appendixes: Guide for Articulating Vocational Technical Curriculum in Minnesota, and Task List for an Occupational Program--format example. (JR)

THE MINNESOTA RESEARCH COORDINATING UNIT FOR VOCATIONAL EDUCATION performs the following four functions in behalf of the State and National systems of vocational education:

1. Stimulate, facilitate, and coordinate innovative research and development efforts.

2. Disseminate research-related information to assist research and development efforts and to speed the implementation of worthy educational innovations.

3. Increase the number and improve the competence of producers and consumers of vocational research-related materials.

4. Create knowledge and useful products that have potential for making long-range and general qualitative improvements in vocational education.

DEVELOPING ARTICULATED HIGH SCHOOL AND POST HIGH SCHOOL VOCATIONAL TECHNICAL CURRICULA IN MINNESOTA

A Final Report

Project Number: 6-D-75

Conducted Using Grant Awarded By

Division of Vocational - Technical Education
Minnesota Department of Education
Under Part C/D of Public Law 90-576

DR. LAURA J. BURGER, PROJECT DIRECTOR 1974-75

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June 30, 1975

Final Report

Project Number: 6 - D - 75

DEVELOPING ARTICULATED HIGH SCHOOL AND POST HIGH SCHOOL VOCATIONAL TECHNICAL CURRICULA IN MINNESOTA

Research and Development Project
in Career Education

Conducted Using Grant Awarded by
Division of Vocational-Technical Education
Minnesota Department of Education
Under Part C/D of Public Law 90-576

Laura J. Burger, Project Director 1974-75
Ron McKeever, Project Director 1972-74

Preface

Over the past years, the state of Minnesota has demonstrated a strong commitment to vocational education. There are now 33 post secondary vocational education institutions. Approximately 10 years ago, provisions were made to support the growth and development of vocational programs at the secondary level. A priority was placed on assisting groups of districts that wish to share dollars and students to offer a greater variety of vocational programs to secondary students. Fifty seven cooperative centers offer vocational training to secondary school students at the present time. It is anticipated that others will be developed until 75 centers serve all districts in Minnesota. Secondary vocational programs are also offered at 400 high schools in Minnesota.

Forseeing the problems that could result from the lack of vertical curriculum articulation between secondary and post secondary educational offerings there emerged a need for this research project. Vertically articulated programs, when achieved, allow students to progress from secondary to post secondary programs, from secondary programs to the world of work, and from the world of work to post secondary institutions without gap or overlap in vocational instruction. It is anticipated that the findings from this study will be useful for adult vocational programs as well. The problem of "how do we, in Minnesota, achieve vertically articulated curricula", is the basis of this research.

Robert P. Van Tries, Assistant Commissioner
DIVISION OF VOCATIONAL-TECHNICAL EDUCATION

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SUMMARY OF THE REPORT

Time Covered by the Report

August, 1972 through June 30, 1975

Goal of the Project

The goal of this project was to develop and try out a procedure to vertically articulate curricula in the secondary - post-secondary vocational technical institutions in Minnesota.

Procedures Followed

During the first two years of operation, project activities were directed toward determining a means of generating valid task inventories. Although the action was consistent with the rationale initially developed for the project, neither methodology tried was satisfactory in view of the cost of data collection. A third methodology for generating the needed task inventories, developed during the final year of the project, seems to have the greatest potential for replication. It involved the conversion of existing inventories, profiles, and competency lists to lists of tasks which could be critiqued by special advisory committees for the purpose of constructing and validating task lists for specific occupational programs in the State of Minnesota.

This past year, the project has had two major thrusts:

1. Development of a task-based system (task inventories and competency records) of establishing minimal occupational content to be taught to students who are at the specialization stage of career education (grades 11-adult).

2. Publication of a handbook designed to assist instructors in organizing and delivering task-based occupational instruction to students.

Results and Accomplishments

Curriculum that is successfully articulated (vertically) allows a student to proceed smoothly through educational experiences at the lowest possible cost to the student and taxpayers in terms of time, energy, and/or money spent in achieving his/her occupational goal.

1972-1974

The results and accomplishments for the first two years (1972-74) of the project's operation were (1) development of a task listing for selected occupations within the hospitality industry and (2) development of task listings for selected occupations within the graphic arts industry.

1974-75

During the third and last year of the project's operation, it was considered essential that the procedure developed to vertically articulate curriculum be (1) low in cost to the state and (2) efficient in terms of time required to complete the articulation procedure. It was also considered essential that products designed to assist in the implementation of the articulation procedure be useable by instructors and coordinators at the local and state levels.

Results and accomplishments during the last year of the project's operation are summarized briefly below. The appendices contain some of the products which were developed.

During 1974-75, a procedure was developed to vertically articulate vocational technical curriculum in Minnesota. The procedure involved the

identification and validation of minimum task-based content for occupational programs. The articulation procedure was applied/further developed through action in auto mechanics occupations and clerical secretarial occupations.

A Handbook for vocational-technical instructors and coordinators was published. The Handbook explains to instructors how they can deliver recommended task-based content to students. Competency based, personalized instruction is advocated in the Handbook.

The project was managed so that activities coordinated with: (a) the State Articulation Committee of Vocational-Technical Directors and LPDs, (b) the Operations staff at the State Department of Education, (c) Curriculum Directors in local schools, (d) vocational administrators and instructors at secondary and post-secondary levels, (e) the Minnesota Instructional Materials Center, and (f) interested teacher educators.

The final accomplishment during this past year was the collection of task inventories, competency lists, and skill profiles. This activity was undertaken so that a bank of resources would be available for further articulation efforts using the procedures developed this past year.

Evaluation

The articulation procedure appears to be reasonable in cost and efficient in terms of time required to complete the procedure. Formative evaluation was an important part of this research effort because the effort was aimed at developing a workable articulation procedure for Minnesota. More than 550 copies of the Handbook have been given to instructors, coordinators, teacher educators, and administrators. The demand for this book exceeds the supply.

Conclusions and Recommendations

A procedure for vertically articulating curricula in Minnesota has been identified/implemented/further developed. Recommendations are directed toward (1) continued evaluation of the procedure and (2) utilization of existing resources (agencies and institutions) to achieve vertical articulation in additional vocational technical program areas (e.g. food service) in Minnesota.

CHAPTER I

THE ORIGINAL PROPOSAL

INTRODUCTION

Beginning in August, 1972, the University of Minnesota Research Coordinating Unit for Vocational-Technical Education launched an effort to provide leadership in developing curricula for Minnesota's expanding program for vocational-technical education. The project was planned to afford exploratory probes into various steps in the curriculum development processes as suggested by present levels of educational technology. This project was planned in keeping with earlier work developed by the Minnesota RCU. Particularly, An Overview of Some Concepts of a Rationale for Education for Work[1] was used as a basis for the curriculum project.

BACKGROUND

The task of selecting the organizing learning experiences that would most efficiently achieve the ends of career education has become more complex in recent years for at least four major reasons. First, with increasing occupational mobility and technological change, the need to prescribe learning experiences that result in maximum usefulness and minimum retrain-

[1] Moss, Jerome; Smith, Brandon; Copa, George. An Overview of Some Concepts of a Rationale for Education for Work. Minneapolis: University of Minnesota Research Coordinating Unit for Vocational Education. Unpublished manuscript, 1972.

ing costs during each individual's career has become evident, but the means to accomplish these ends are not as evident. Second, growing recognition that satisfactions from work are an important aspect of individual self-fulfillment have focused attention on the significance of developing appropriate worker values and facilitating occupational choice; yet educators know very little about establishing those values and improving the realism of vocational decisions. Third, the number of publicly operated delivery mechanisms (K-8, junior high, senior high, skill centers, AVTI, etc.) that provide some kind of occupationally-relevant experiences has multiplied, requiring that attention be given to curriculum coordination and articulation. And fourth, general increases in expenditures for career education have been matched by an increased general public concern for the efficiency of the educational processes.

The problem of curriculum development (selecting and organizing learning experiences) has become particularly acute at the high school and post-high levels in this State. Quantitatively, a very rapid growth of vocational programs at these levels is expected. Qualitatively, the curriculums must provide a suitable bridge between the occupational orientation and exploration goals of curriculum at earlier grade levels and the competency requirements of the job market.

PROJECT MISSION AND SCOPE

This project was proposed to develop and tryout a method of selecting and organizing content for effective vocational curriculum at the high school and post-high school levels which could provide an integral link in the total chain of career education experiences. It was specifically

designed to identify program content in a systematic fashion which could serve as a model for use across the range of vocational offerings in the state.

The scope of the first phase of the curriculum development project was planned to accomplish steps A & B of the following four step curriculum process.

MAJOR STEPS IN CURRICULUM DEVELOPMENT METHOD

A. Develop the Theory
   1. Formulate Rationale (including objectives)
   2. Describe Curriculum Characteristics

B. Select and Order Content
   1. Specify work roles to be included in curriculum
   2. Identify "tasks" within specified roles
   3. Select "tasks" to be taught
   4. Stipulate "task" instructional sequence (within work roles)
   5. Organize resources for instruction (across work roles)

C. Develop Instructional Materials
   1. Convert "tasks" to competencies to be learned
   2. State and order performance objectives
   3. Identify conditions of learning
   4. Design instructional strategy
   5. Develop instructional events (including learning packages)

D. Create Evaluation Procedures and Devices
   1. Develop student evaluation instruments and measures
   2. Create curriculum evaluation devices and procedures

CURRICULUM CHARACTERISTICS

In order to guide the efforts of the project, a description of the primary features of the curriculum characteristics was prepared. Some

Characteristics of a School Based Education for Work Program: Grade Levels 10 - Adult was prepared for such a purpose. These concepts were aired befor Minnesota State staff members and a group of selected vocational educators representing nearly all segments and interest areas of the field. Necessary revisions and clarifications were made and are embodied in the following fourteen statements concerning the assumptions of the model and rationale.

1. Having had an opportunity to develop through the awareness, orientation, and exploration stages of career development, most individuals are ready to enter the specialization stage by the tenth grade. (Some persons may be ready to enter this stage earlier and should be permitted to do so. Other individuals may require additional time for exploration.)

2. The principal goal of the career specialization stage is to develop specialized behaviors that will prepare individuals to enter and make progress in particular work role(s) (occupations) so as to enhance the mutual satisfactions of the individual and society throughout his/her career. To attain this goal, the curriculum should contain components that will, as needed: (a) develop appropriate aspects of the individual's career personality (abilities and motivational structure), (b) familiarize him/her with the environment of the selected work role(s) (occupational requirements and motivational satisfiers), and (c) assist the individual in making realistic decisions about relevant work roles.

3. The potential scope of a comprehensive program for the career specialization stage includes opportunities for preparing persons for entry into the advancement in all the work roles which are required by society and which can be taught most efficiently by the school. Exceptions to the criterion of instructional efficiency may occur in the interests of providing equality of educational opportunity.

4. The program of the career specialization stage should be coordinated with the school's other efforts to prepare students for their non-work roles.

5. All individuals who wish to prepare for the work roles included in the school's career specialization stage, and who can benefit from the instruction, should be admitted to the program.

6. The diversity among individuals in (a) their readiness to make career decisions upon entry to the career specialization stage, (b) their abilities and learning styles, (c) their occupational goals, and (d) the time they are able to devote to study requires that the education for work program permit as much individualization of learning experiences (content and method) as is economically feasible. A sufficient variety of instructional materials and resources, within the scope of each school's education for work program, should be readily available to each student so that he/she can select the content and manner of his/her own curriculum.

7. To develop the program of the career specialization stage: (a) all the work roles for which students are to be prepared by the school must be defined, (b) the competencies required to play the idealized version(s) of each of these roles (and the competencies common to two or more roles) need to be identified, (c) individualized learning experiences to develop the required competencies as efficiently as possible must be designed, and (d) administrative arrangements that best facilitate the provision of the desired learning experiences need to be created.

8. As a practical necessity, priorities must be set, and/or practical responsibilities assigned to various groups of educators, for developing the education for work program at the career specialization stage. Because of their unique qualifications and current responsibilities, and in light of the present organization of the school, vocational educators should give their immediate attention to the preparation of curriculums for the work roles which do not require a baccalaureate degree for entry. (It is recognized, however, that final judgements about the most efficient manner of organizing the program at the career specialization should be made only after <u>all</u> roles have been examined for their curricular implications.)

9. Whenever possible, senior high schools and two-year post-secondary institutions should both provide comprehensive (and, therefore, identical) programs to prepare individuals for the work roles which do not require a baccalaureate degree. Each school would then have access to the same instructional materials and resources, and students would have maximum opportunity to prepare for the work roles of their choice at both educational levels. Under these conditions, the problem of articulating the program of the two levels of schools does not exist. Instead, each student's curriculum may be articulated by utilizing the instructional materials and resources that are available in the post-secondary institutions.

10. Early school leavers as well as persons in the continuing career education stage, who wish to train or retrain for new work roles or update or upgrade existing work role competencies (for roles which do not require a baccalaureate degree), may utilize the same instructional materials and resources available in high schools or in post-secondary schools. Each individual's curriculum may, in fact, be personalized and articulated with prior training throughout his/her career.

11. When the financial resources available to a particular school requires that the scope of the program be limited, such factors as degree of societal and individual demand and the accessibility of other training opportunities should be considered. Program restrictions in any school reduce training opportunities, and when they occur at post-secondary level institutions they also are apt to introduce articulation problems for entering adults or high school graduates.

12. The available materials and resources for instruction at the career development stage may be divided into clusters, but the clusters (or groups) serve primarily as an administrative device to improve the management of instruction; the number and kind of clusters would vary from school to school depending upon local circumstances, e.g. numbers of students, financial resources, etc. Students, however, would be free, regardless of the groupings used, to build personalized curriculum utilizing the total range of materials and resources at the school's disposal.

13. Individualization of instruction will permit the school to adopt a policy of continuous student entry (and exit); it will encourage team teaching and the use of educational resources beyond the walls of the school; and it will sharpen the focus upon the school's accountability for student learning.

14. Among the critical problems that arise in implementing an indidivualized curriculum with the foregoing characteristics is the need to develop an appropriate instructional management system and the cost of creating (and maintaining) the necessary array of instructional materials. Unless the state is willing to assume responsibility for, and the cost (at least the lion's share) of, the developmental process, the suggested program characteristics is probably impractical.

SUGGESTED SPECIFICATIONS FOR THE PROJECT

As guidelines in determining the procedure to be used, the following specifications were determined as criteria for both the processes used and the products developed by the project.

1. The method must reflect the "rationale for education for work."
2. The method must meet conditions imposed by the stated "characteristics of the curriculum."
3. The method must be replicable for reuse.
4. The method must be applicable across a wide range of occupational activity and various levels.

CHAPTER II

THE PROJECT GOAL AND PROCEDURES

INTRODUCTION

This chapter identifies the goal of the project and presents the activities undertaken during its three years of operation. The activities of each year are described in a separate section.

THE GOAL OF THE PROJECT

The goal of this project was to develop and tryout a procedure for vertically articulating curriculum in the secondary and post-secondary vocational institutions in Minnesota.

PROJECT PROCEDURES

1972-74

During the first two years of operation, project activities were directed primarily toward determining methods of generating valid task inventories. This action was consistent with the rationale developed for the project, in that task inventories were considered essential to achieving the goal of the project. Two methodologies for generating task inventories were tried during the years of 1972-73 and 1973-74. Neither methodology however, proved satisfactory enough to warrant replication in all vocational program areas. Those two methodologies were described in detail in the

Interium Project Report. They are reviewed in the following two sections of this chapter.

1974-75

This past year the project has had two major thrusts. One, the development of a task-based system for establishing and recommending minimal occupational content to be taught to students who are at the specialization stage of career education (grades 11-adult). The second major thrust was the publication of a Handbook designed to assist instructors in organizing and delivering task-based occupational instruction.

A summary of the activities undertaken this past year to propose, implement, and further develop the procedure for vertically articulating vocational technical curriculum in Minnesota is described in the last section of this chapter.

SUMMARY OF CURRICULUM PROJECT ACTIVITIES 1972-73
(Hotel-Motel Occupations)

I. An "ad hoc" advisory committee was established for Hotel-Motel occupational clusters.

   A. The Minnesota Hospitality Association support and cooperation was obtained which helped to identify various industrial leaders and firms to participate in the study (the Association solicited cooperation from their membership for the study).

   B. The support of Minnesota Hotel Association was obtained.

   C. The support of Minneapolis Hotel and Restaurant Union was obtained.

II. Managers of various size firms in various geographical locations throughout the state were contacted and interviewed.

A. The sample of firms were divided into three regions: (1) North (Economic Regions 1-5), (2) South (Economic Regions 6-10), and (3) Metro (Region 11).

B. Samples were stratified by size: Large (150+ rooms), medium (50-149 rooms), and small (1-49 rooms). [Size cut offs were recommended by advisory groups.]

C. Staffing patterns of various size firms were obtained.
   1. Organizational patterns of various size firms were identified.
   2. Normal advancement and transfer possibilities within and among firms were determined.
   3. Appropriate levels of schooling and experience were identified for each occupation, title or job description.
   4. Job descriptions were collected where available or were generated by interviewing personnel managers and job incumbents.

III. An initial task inventory for each occupation identified were generated from the Dictionary of Occupational Titles and Job Descriptions.

A. Initial inventories were prepared by the members of the staff of the Minnesota RCU.

B. Members of the Minnesota RCU staff contacted Hotel managers and department supervisors to review inventories for completeness, accuracy and understandability.

C. Individuals who were classified as "good" workers were identified and later interviewed for an "incumbent worker validation" of tasks for each occupation or job description identified.

IV. Final task inventories were prepared.

A. Inventories were recast into "departmental inventories" within the firm as a result of discussions with managerial and supervisory personnel. (This created a type of functional alignment within the industry, i.e. housekeeping, maintenance, front office, etc.). Departmental inventories permitted job incumbents to select their tasks from among a more universal set. (This was aimed at discovering how much overlap of tasks there were between occupations.)

B. Interviews with personnel managers and supervisors assisted in producing a valid listing of tasks performed by workers within each firm for each job title or description.

V. Occupational inventories were prepared.

A. All tasks obtained by interviewers were reported.

B. Task listings were checked for consistency of responses according to job incumbent versus supervisor ratings, interviewer ratings, and size and location of firm.

C. Tasks were listed in decending order of frequency performed.

D. Tasks were listed in terms of their importance or value to new workers in that occupation.

E. Tasks were listed according to mean ($\bar{X}$) average level of performance on a four step scale.

F. A mathematical index showing degree of similarity of tasks between and among occupations were computed.

G. Suggestions were made for interpreting and using the mathematical index for making decisions about task organizations and sequence.

SUMMARY OF CURRICULUM PROJECT ACTIVITIES 1973-74
(Graphic Arts Occupations)

I. Graphic Communications were selected (Graphic Arts, Printing) as an area in which to do curriculum development.

A. Graphic Arts is a commonly identified offering at the secondary, post-secondary, and adult levels of vocational education for which specialized job entry or advancement preparation is available.

B. Minnesota, and the Twin Cities in particular, represents one of the major printing capitols of the United States.

C. There was evidence that Graphic Communications represented an area of interest to students and employers as indicated by programs at thirteen Secondary Vocational Centers, eleven Post-Secondary Area Vocational Institutes, and an unknown number of special offerings at the adult level. Each program being supported by an advisory committee and a State Advisory Committee at the post-secondary level indicated strong employer interest.

II. Approval and support of State Supervisory Staff were received.

A. Support of State Advisory Committee at the post-secondary level was sought and received. They were greatly interested in questions of where students were finding employment (types of shops and in what occupations) as well as raising an interest in the program of graphic arts at the secondary levels. The committee members all expressed willingness to grant individuals interview time on these and other questions.

B. Follow-up interviews were conducted with a majority of committee members and other recommended resource persons.

III. A preliminary search of the literature to determine potential occupational titles prevalent in the industry was conducted.

A. Dictionary of Occupational Titles

B. Occupational Outlook Handbook

C. U.S. Census Classification Manual

D. Vocational Education and Occupations

E. Careers in Graphic Arts

F. Graphic Arts Management

G. Career in Typography

H. Job Descriptions in the Printing Industry

I. Interviewer obtained job descriptions and organization charts

J. Other miscellaneous resources

IV. Information to determine job relationships and detail was sought. (Identified entry level, common promotion routes and organization hierarchies.)

A. Union classifications

B. Industrial organization charts

C. Interview with personnel managers of industries

V. Attempted telephone survey of graphic communication firms to identify and collect occupational titles and/or job descriptions for entry level employment.

A. A random sample of firms from Yellow Pages of Minneapolis Phone Directory (lithographers and printers) was select to obtain job titles and descriptions.

B. Forty-five firms were contacted in an effort to determine hiring practices (last two years) and employment outlook (next year).

C. Information on source of employees and desired background was sought from about forty-five firms.

VI. Personal interviews with personnel managers of the following firms were conducted.

A. In-plant printing departments:
Honeywell Corporation
Minnesota Mining and Manufacturing Company (3M)
Cargill Corporation
Control Data Corporation
Northwestern Life Insurance Company
Ramsey County Civil Service
Hennepin County Civil Service
University of Minnesota Graphic Arts
Munsingwear Company

B. Commercial printers and publishers:
West Publishing Company
Van Wold Stevens Company
McGill Graphic Arts
Colour Graphics Corporation
Insty Prints Corporation

C. Other organizations:
In-plant Printing Managers Association
Graphic Arts Institute
Printing Industry of Twin Cities (PIA affiliate)
Graphic Arts International Union (GAIU)

VII. Literature for task identification procedures was reviewed.

A. A bibliography of task analysis research was developed.

B. Definitions of task and deleted terms were prepared.

C. Criteria for identification of tasks were proposed.

D. Guidelines for writing task statements were developed.

VIII. Existing task inventories for graphic communication occupations were collected nationally.

A. Nebraska study (graphic arts only)

B. Several branches of the military were contacted for the purpose of obtaining task inventories.

C. Obtained industrial job descriptions (generally not specific enough although they serve as organizational guides).

D. Assistance from industrial personnel were sought.

IX. The current state of task/competency development in Minnesota's Vocational Education Institutions was assessed.

A. Personal interviews with program representatives of eleven AVTIs were conducted.

B. Personal interviews with program representatives of thirteen secondary centers were conducted.

C. Post-secondary follow-up information on job placement was studied to identify entry level jobs obtained by graduates.

D. Task/competencies information currently available nationally were obtained.

E. Information on occupational goals of Graphic Communication Program were developed.

F. Information on the structure and sequence of graphic arts programs was obtained.

G. Existing inventories of tasks and course outlines were collected from vocational graphic arts instructors in the state.

X. An initial list of tasks for the graphic arts industry was prepared.

A. Data from all existing inventories were synthesized.

B. Inventories were presented to and reviewed by industrial managers, supervisors, workers, and by selected vocational teachers and administrators.

XI. Information obtained through interviews with industrial personnel was summarized.

A. A bibliography of industrial information resources was prepared for the graphic arts area.

B. A functional job title flow chart was made for the graphic arts industry together with the task listings for each job title.

This concludes the summary of activities for the first two years of the project's operation. Neither of these two methodologies proved satisfactory in terms of the time and cost required to produce the needed task lists.

This past year the project was re-directed in an attempt to develop an articulation procedure that would be feasible for the State of Minnesota. Time, cost, and probability that the articulation procedure would be adopted were seen as critical to this research. The procedures followed are described in this next section of the report.

CURRICULUM ARTICULATION PROCEDURES 1974-75
(Auto Mechanics Occupations and Clerical-Secretarial Occupations)

I. Project goals were coordinated with the state-wide articulation committee.

A. Defined vertical articulation.

B. Clarified goals of the project at the state-wide articulation committee via oral and written presentations.

C. Received advice and support from the committee.

II. The Program Planning Section of the Vocational Division was consulted to obtain the results of their survey of secondary and post-secondary vocational directors. The survey was conducted to determine vocational program areas most in need of immediate curriculum articulation efforts.

A. The program areas of Auto Mechanics, Clerical-Secretarial occupations, Health occupations, Food Service, Electricity-Electronics, and General Merchandising were identified as the six priority areas in need of articulation.

III. A tentative methodology was prepared for establishing valid task-based content for two occupational programs. The methodology proposed was designed to be reasonable in terms of both time and cost. Attention was given to the probability that instructors would adopt task lists developed via this method.

IV. Auto mechanics and clerical-secretarial occupations were chosen to serve as appropriate areas for pilot activity/research needed to develop a procedure for vertically articulating curriculum.

V. The procedure for vertically articulating curriculum was implemented/ further developed by first developing the following methodology for generalizing task inventories.

A. Resources were collected (task inventories, competency lists, skill profiles) from all possible sources both in Minnesota and out-of-state.

B. State Department supervisors for the program area (i.e. auto mechanics, clerical-secretarial programs) were consulted to identify person(s) who were capable of synthesizing the gathered resources to produce a single, comprehensive listing of tasks for the entire program area. (This may be done by a team of instructors or by a single instructor.)

C. The project director worked with the individual (or team) to put the synthesized listing of tasks into a prescribed format. This was an important step because task language and format is a common ground on which industry and education can communicate. (See the example task list in Appendix B.)

D. The entire task listing for each program area was submitted for review and revision by an advisory group of representatives from industries throughout Minnesota.

E. The advise of industrial representatives was obtained regarding segments of the entire program that would prepare students for entry level jobs. These segments were subsequently identified as "occupational programs" (e.g. Counterperson - Auto, Ag., Truck, within the entire program area of auto mechanics).

F. A task list for each occupational program was constructed. Each task list was then submitted to industrial representatives to validate the tasks which entry level workers should be able to perform. (This task list per occupational program then became the recommended minimum task-based content for occupational programs bearing specified titles in Minnesota. However, individual instructors may add tasks to the list to meet local needs. Also, instructors decide how students are to be taught the specified tasks.)

VI. The task lists were shared with all the vocational instructors (e.g. all auto mechanics instructors) at a state-wide meeting (e.g. the T & I Spring Clinic or MVA, etc.). The instructor(s) who orginally worked on the task list (from B above) and one or two of the industrial representatives (from D above) were involved in the session which shared the task list with all instructors throughout Minnesota.

VII. Instructors who are teaching courses within the program area (e.g. auto mechanics) were encouraged to offer occupational instruction based on task lists which best correspond to the facilities in their schools and the occupational needs of their students.

VIII. A Student Competency Record Form was constructed from the task listings. Both the task listings and the Competency Record for each recommended occupational program were available to instructors. The Student Competency Record Form is a useful articulation tool because it allows a student to transfer competencies from one institution to another and to demonstrate the competencies he or she already has.

IX. Workshops were provided to instructors to assist them in developing instructional materials. This approach was taken to encourage instructors to teach those tasks which appeared on the task list. The Handbook was published for use by those persons interested in implementing a competency-based, personalized instruction program.

X. (a) The sharing of instructional materials and (b) The dissemination and diffusion of task lists through the Minnesota Instructional Materials Center was promoted.

XI. Ways in which task listings could be updated and revalidated were suggested.

CHAPTER III

RESULTS AND ACCOMPLISHMENTS OF THE PROJECT

INTRODUCTION

A description of the results and accomplishments of the project is offered in this chapter. It begins by setting forth a definition of vertically articulated curriculum. Four accomplishments are cited which are directly linked to the achievement of the stated goal of the project.

RESULTS AND ACCOMPLISHMENTS

A curriculum that is successfully articulated (vertically) allows a student to proceed smoothly through educational experiences at the lowest possible cost to him or her in terms of time, energy, and/or money spent in achieving his/her occupational goal.

The results and accomplishments for the first two years of the project's operation were cited in the interim report. The methodologies used to generate products (task inventories) needed for accomplishing the goal of the project had to be re-considered after the project had completed a second year of operation.

This past year (1974-75), the project was directed so that two criteria were met. First, the articulation procedure developed was (a) low in cost to the state and (b) efficient in terms of the length of time required to complete the procedure; and second, the products (task lists and the Handbook) designed to assist in the implementation of the articulation procedure

were useable by persons at the local level where changes must ultimately occur.

Guided by the above criteria, the project has demonstrated the following four major accomplishments this past year.

I. A procedure for vertically articulating vocational-technical curricula in Minnesota has been developed. The procedure involves the identification and validation of minimum task-based content for occupational programs. (See Appendix A: A Guide For Articulating Vocational Technical Curriculum in Minnesota and Appendix B: Task List - example.)

II. The procedure for vertically articulating curricula in the program areas for auto mechanics and clerical-secretarial occupations is in operation. Work in additional program areas is anticipated. A handbook was published for vocational technical instructors and coordinators. The Handbook explains how to organize and deliver to students the task-based content recommended on the occupational task list. Competency based personalized instruction is advocated in the handbook. (See Appendix C: A Handbook for Vocational Instructors Interested in Competency-Based Education.)

III. Task inventories, competency lists, and skill profiles were collected nation-wide to build up a bank of resources for further use in articulating vocational programs in Minnesota.

IV. The project was managed to coordinate articulation efforts with : (a) the State Articulation Committee of Vocational-Technical Directors and LPDs, (b) the Operations Staff at the State Department of Education, (c) Curriculum Directors in local schools, (d) administrators and instructors, (e) the Minnesota Instructional Materials Center, and (f) interested teacher educators.

CHAPTER IV

EVALUATION OF THE PROJECT GOAL

INTRODUCTION

This chapter evaluates the extent to which the goal of the project (the development of a procedure to vertically articulate vocational-technical curriculum in Minnesota) was attained. Formative evaluation was an important part of this developmental research effort in that many pieces of data were informally gathered, used, and re-evaluated as the developmental process continued.

EVALUATION

A procedure to vertically articulate curriculum has been proposed, implemented, and further developed through developmental research activity in the two vocational program areas of auto mechanics occupations and clerical-secretarial occupations (1974-75). Formative evaluation, consisting of verbal and written feedback, was continually sought from industrial representatives, vocational instructors, coordinators, and additional vocational education personnel. Data gathered were utilized in the development of the procedure to vertically articulate curriculum in Minnesota.

The articulation procedure described in the body of this report appears to be reasonable in cost and efficient in terms of the length of time required to complete the procedure.

The same methodology was used to generate task lists for several occupational programs within two vocational program areas: auto mechanics and

clerical-secretarial occupations. Verbal feedback from instructors, coordinators, and directors has been positive with further commitment to the process demonstrated by their voluntary participation in work sessions. Requests for workshops have been made by instructors and local school personnel. Workshops will be conducted in four geographic pilot sites in two program areas this next year (1975-76).

The Handbook for vocational technical instructors and coordinators was published in December, 1974. More than 550 copies have been given to instructors, coordinators, teacher educators, and administrators. The demand exceeds the supply and only a few multiple copy requests have been honored in selected locations of Minnesota and Wisconsin. A third printing of the Handbook will be budgeted for, so instructors may use them in workshops this next year in Minnesota.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

As a result of project activities, several conclusions and recommendations can be made. The recommendations set forth in this chapter refer to (1) continued evaluation of the procedure for vertically articulating curriculum and (2) the utilization of existing resources (agencies and institutions) to achieve articulation in other vocational technical program areas in Minnesota.

CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that a procedure for vertically articulating secondary post-secondary curricula in Minnesota has been identified/implemented/further developed. Two pilot areas: Auto mechanics occupations and clerical-secretarial occupations were involved in this developmental research project.

It is recommended that the procedure used for vertically articulating curricula be carefully evaluated during this next year. Decisions will need to be made at the state level as to whether or not other vocational programs can and should be articulated using the same procedure. If continued success is demonstrated in the two pilot areas then the option to articulate other vocational programs in the same manner warrants consideration. However, it is recommended that attention be given to how articulation can

best be accomplished in many program areas simultaneously. Prior to organizing a state wide effort to articulate secondary and post-secondary vocational-technical curricula, in-service training will need to be provided for program supervisors at the State Department of Education, LPDs, and teacher educators. Systematic planning will be required for successful implementation of these articulation procedures on a state-wide basis.

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APPENDICES

APPENDIX A

GUIDE FOR ARTICULATING VOCATIONAL TECHNICAL CURRICULUM IN MINNESOTA

(A SEPARATE PUBLICATION)

GUIDE FOR

ARTICULATING

VOCATIONAL TECHNICAL

CURRICULUM

in

Minnesota

This Guide was written by Laura Burger, Director of the Curriculum Articulation Project. It is designed to be used with another book which is entitled Handbook for Vocational Instructors Interested in Competency-Based Education. A limited number of Handbooks have been printed. If you need a copy, write a letter to the address shown below.

Minnesota Research Coordinating Unit for
Vocational Education
145 Peik Hall
University of Minnesota
Minneapolis, Minnesota 55455

1

OBTAIN A MASTER CHART OF TASKS FOR YOUR PROGRAM AREA (E.G. CLERICAL SECRETARIAL OCCUPATIONS, AUTO MECHANICS, ETC.) AND/OR THE LISTS OF TASKS FOR EACH OF THE OCCUPATIONS WITHIN YOUR PROGRAM AREA. THE MASTER CHART OF TASKS (IF IT IS AVAILABLE FOR YOUR PROGRAM AREA) SHOWS SEVERAL OCCUPATIONS AND HOW SOME OF THE SAME TASKS ARE NEEDED FOR TWO OR MORE OF THE OCCUPATIONS. THE LISTS OF TASKS FOR EACH OCCUPATION HAVE BEEN TYPED OFF FROM THIS MASTER CHART WHEN IT EXISTS. FOR THOSE OCCUPATIONS HAVING TASKS WHICH ARE NOT COMMON TO SEVERAL OTHER OCCUPATIONS(E.G. AUTO PARTS PERSON) ONLY A LIST OF TASKS IS AVAILABLE.

Using the form provided request these materials from

Minnesota Instructional Materials Center
916 Vocational Technical Institute
White Bear Lake, Minnesota 55110

THE LIST OF TASKS FOR EACH OCCUPATION WITHIN A PROGRAM AREA SHOWS THOSE TASKS WHICH "SHOULD BE TAUGHT" TO STUDENTS WHO SELECT THAT OCCUPATION.

SECONDARY AND POST SECONDARY INSTRUCTORS WHO WISH TO ARTICULATE THEIR PROGRAMS NEED TO SIT DOWN TOGETHER AND REVIEW THE LISTS OF TASKS FOR THE VARIOUS OCCUPATIONS. DECIDE TOGETHER WHICH OCCUPATIONS "CAN BE" AND "WILL BE" OFFERED[1] IN YOUR LOCAL PROGRAM (THAT IS COLLECTIVELY AT ALL SCHOOLS INVOLVED IN THE ARTICULATION EFFORT). SAVE THOSE TASK LISTS FOR THE OCCUPATIONS THAT YOU AS A GROUP DECIDE TO OFFER.

[1] refer to pages 17-20 in the Handbook

3

OBTAIN A LIST OF DOT/VEO OCCUPATIONAL TITLES FOR YOUR PROGRAM AREA.

Using the form provided request this list from:

Minnesota Instructional Materials Center
916 Vocational Technical Institute
White Bear Lake, Minnesota 55110

4

RETURN TO THE TASK LISTS WHICH YOU SAVED.[2] ON THE BOTTOM OF EACH LIST, YOU WILL NOTICE SOME BLANKS. IN THOSE BLANKS WRITE-IN THE DOT/VEO TITLES THAT DESCRIBE THE JOBS WHICH YOUR STUDENTS MAY HAVE UPON GRADUATING FROM EACH OCCUPATION YOU HAVE SELECTED TO OFFER.

[2]Refer to pages 30 and 31 in the Handbook and adjust the task inventory to your local situation. Please don't make major changes - it should be 80% the same at least!

5

USING THE OCCUPATIONS OFFERED IN YOUR LOCAL PROGRAM AND THE DOT/VEO TITLES WHICH YOU HAVE WRITTEN-IN, DRAW A WORKER MOBILITY CHART[3] WHICH WILL SHOW ENTRY LEVEL OCCUPATIONS. ADD SOME MIDDLE AND UPPER LEVEL OCCUPATIONS SO THAT STUDENTS WILL HAVE AN IDEA OF WHAT OTHER OCCUPATIONS THEY MIGHT ASPIRE TO.

[3]refer to page 21 of the Handbook.

6

ORGANIZE THE CURRICULUM BY CONSTRUCTING AN OUTLINE[4] OF THE MODULES. (NOTE THAT EACH MODULE OR "LESSON" CONSISTS OF ONE OR MORE TASKS SHOWN ON THE TASK LIST YOU HAVE FOR EACH OCCUPATION.)

[4] Refer to pages 28-47 of the Handbook. You may wish to have a consultant work with your group as you do this.

WRITE THE MODULES. EACH MODULE SHOULD HAVE THESE PARTS:

- A MESSAGE TO THE STUDENT WHICH TELLS HIM/HER WHY IT IS NECESSARY TO BE ABLE TO PERFORM THE TASKS INCLUDED IN THAT MODULE
- A STATEMENT OF THE TERMINAL PERFORMANCE (OBJECTIVE) EXPECTED OF THE STUDENT
- A PRE-TEST SO A STUDENT WHO WISHES TO SEE IF HE/SHE CAN ALREADY PERFORM CERTAIN TASKS CAN CHECK HIS/HER PERFORMANCE AND THEN SKIP THE LEARNING EXPERIENCES AND TEST OUT BY PASSING THE POST-TEST
- SOME LEARNING EXPERIENCES WHICH HELP A STUDENT LEARN WHAT TO DO AND TO PRACTICE PERFORMING
- A POST-TEST WHICH ALLOWS A STUDENT TO DEMONSTRATE SATISFACTORY PERFORMANCE

8

CONSTRUCT A COMPETENCY CHECKSHEET ON WHICH TEACHERS CAN RECORD THE UNITS AND/OR MODULES WHICH STUDENTS HAVE SUCCESSFULLY COMPLETED.[5]

[5] A competency is larger than a single task. Generally speaking, it is a cluster of several related tasks and will often be the terminal performance expected of the student after he/she has completed a unit, or at times a module . The competency statement is large enough to have meaning to an employer. A competency statement is observable and measurable.

OFFER INSTRUCTION FOR EACH OCCUPATION AT THOSE INSTITUTIONS WHERE STUDENTS HAVE TIME TO ACQUIRE THE NEEDED COMPETENCIES[6].

[6]See page 19, item 3, in Handbook.

APPENDIX B

TASK LIST FOR AN OCCUPATIONAL PROGRAM

- A FORMAT EXAMPLE

April 28, 1975

TASK LIST FOR COUNTER PERSON
(Auto, Truck, Ag.)

I. SALES

A. Sells auto parts to customers in person
   1. relates to customer in a professional manner
   2. uses salesmanship skills
   3. handles customer complaints
   4. serves as public relations representatives
   5. demonstrates customer service skills

B. Sells related items to customers

C. Sells by telephone
   1. uses the telephone in a businesslike manner
   2. handles the calling party courteously

D. Uses proper cash handling procedure for credit cards and check cashing

E. Uses proper procedures for making change

F. Uses the cash register
   1. for receiving on accounts
   2. for refunds

II. INSTORE MERCHANDISING (*VERY IMPORTANT*)

A. Creates displays

B. Sets up displays to sell products, services
   1. seasonal floor displays
   2. seasonal window displays
   3. informational floor displays
   4. informational window displays

C. Incorporates security measures in creation and setting up of displays

III. OUTSTORE ADVERTISING

A. Prepares advertisements to promote the purchase of auto parts and related items at a given shop
   1. radio
   2. newspaper
   3. T.V.

B. Selects packaging that allows customer to inspect the product

C. Uses technical information to promote sales to customers

IV. COMMUNICATIONS

A. Communicates by phone
   1. takes telephone messages
   2. transfers incoming telephone calls

V. STORE LAYOUT

A. Utilizes available space and shelving to arrange stock

B. Plans store layout based on for the items
   1. convenience
   2. popularity
   3. space required

VI. TRADE MAGAZINES

A. Reads various trade magazines to keep current with the industry
   1. Automotive Retailing
   2. Home and Auto Retailer
   3. Automotive Chainstore
   4. Jobber Topic
   5. Jobber and Warehouse Executive
   6. Warehouse

VII. SECURITY

A. Uses cash handling procedures which guard against company loss
   1. refunds
   2. credit slips
   3. discounts

B. Handles individuals who cause the business to loose money through
   1. dishonest exhanges and/or service requests
   2. pilfering

C. Shows honesty and loyalty to the business

VIII. ORDERS, TICKETS, AND FORMS

A. Fills out and distributes counter tickets

B. Voids counter tickets

C. Writes credits on counter tickets (*very important*)

D. Computes sales tax
   1. long-hand method
   2. tax chart

E. Operates credit card program

F. Uses adding machine(s) to add, subtract, and multiply

G. Fills out and distributes repair orders

H. Interprets repair orders

I. Fills out and distributes miscellaneous forms
   1. requisitions
   2. purchase orders
   3. return goods notices
   4. sublet tags
   5. lost sales slips
   6. petty cash vouchers
   7. warranties

IX. PARTS AND EQUIPMENT IDENTIFICATION

A. Uses the Weatherly Index System

B. Uses alphabetical indexing

C. Refers to dealer catalogs for information and part numbers
   1. Ford
   2. Chrysler
   3. General Motors

D. Reads *Aftermarket Parts Catalog* and/or supplements and revisions to
   1. select part numbers
   2. select parts in over and under size
   3. perform cross referencing and interchanging (*very important*)
   4. refer to footnotes
   5. refer to abbreviations
   6. use numerical listings

E. Operates microfiche reader

F. Identifies assemblies and components by name, function, and/or location as described by customer

G. Describes operations involved in parts replacement

H. Operates flaring tools to flare copper or steel tubing
   1. performs single flare
   2. performs double flare

I. Identifies and selects brass fittings

J. Identifies and selects nuts and bolts
   1. selects by grades (*very important*)
   2. selects by size

K. Measures with special instruments
   1. 12 inch ruler
   2. micrometer (inside and outside)
   3. hand caliper
   4. dial indicator
   5. depth gauge
   6. fan belt gauge
   7. nut and bolt gauge

L. Identifies cores

X. SERVICE

A. Operates battery tester

B. Operates Graco Modular Fluid Commander (*very important*)

C. Mixes paint using paint codes and formulas (*very important*)

D. Labels mixed paint

E. Sublets repairs

F. Prepares schedule and route plan for pick up and delivery service (*optional*)

G. Picks up and delivers goods to customers following route plan (*optional*)

H. Machines brake drums on
   1. Ammco lathe
   2. Star lathe (*optional*)
   3. John Beane lathe

I. Measure brake drums with micrometer *(optional)*

J. Grinds brake shoes on
   1. Ammco lathe
   2. Star lathe (*optional*)
   3. John Beane lathe

K. Machines disc rotors on
   1. Ammco lathe
   2. Star lathe (*optional*)
   3. John Beane lathe

L. Measure rotors with micrometer *(optional)*

M. Operates hydraulic press
   1. axle bearings
   2. piston pins (*optional*)
   3. specialty jobs

XI. INVENTORY AND STOCK

A. Receives and stocks parts
   1. checks in stock
   2. reports stock shortages and overages
   3. fills out special orders
   4. stocks shelves

B. Handles cores
   1. identifies cores
   2. checks cores to identify defects
   3. handles exchange transactions
   4. returns core to vendors
   5. assigns dollar worth to cores
   6. tags cores (for warranty purposes)
   7. stores cores properly
   8. sorts cores carefully

C. Takes physical inventory

D. Operates inventory control card desk
   1. turnover
   2. obsolescence

E. Operates inventory control, automated system
   1. turnover
   2. obsolescence

XII. MISCELLANEOUS

A. Cooperates with other employees to promote the business

B. Maintains orderly store appearance

C. Maintains neat personal appearance

D. Demonstrates proper attitude

E. Writes legibly

APPENDIX C

HANDBOOK FOR VOCATIONAL INSTRUCTORS INTERESTED IN COMPETENCY BASED INSTRUCTION

(A SEPARATE PUBLICATION)