DOCUMENT RESUME

ED 132 295 95 CE 008 576

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TITLE Activities, Problems, and Needs of Curriculum Developers: A National Survey. Interim Report. Research and Development Series No. 115.
INSTITUTION Ohio State Univ., Columbus. Center for Vocational Education.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE May 76
CONTRACT NE-C-00-3-0078
NOTE 69p.

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS Curriculum; Curriculum Design; *Curriculum Development; Curriculum Evaluation; Curriculum Problems; *Designers; Educational Administration; Educational Research; *Educational Researchers; Industrial Personnel; *Job Analysis; National Surveys; Occupational Information; School Personnel; Specialists; Task Analysis; *Vocational Education
IDENTIFIERS United States

ABSTRACT

A study was conducted to enhance basic knowledge concerning the activities and needs of curriculum developers with emphasis on those relating to vocational education. More than 300 persons actively involved in curriculum development in public education, business and industry, and government responded to a questionnaire based upon a list of 68 curriculum development activities in five categories: (1) Curriculum management and administration, (2) selection and organization of content, (3) selection and organization of materials, (4) design of instructional plan and alternative strategies, and (5) evaluation of curriculum. Ratings were given for the degree of problem/need encountered in the performance of each activity, and the relative importance of each to the respondent's job. In addition, background data were obtained from each respondent. In analyzing the data, the importance and problem/need ratings provided by respondents were combined to produce a summary "criticality" score for each activity. For the respondent group taken as a whole, the most critical activities were found to be in the categories of curriculum management and administration, content selection and organization, and evaluation. Eight groups of related activities were also identified, with differing criticalities for curriculum developers in local, state, and national R & D lab situations. (Author/HD)

Research and Development Series No. 115

ACTIVITIES, PROBLEMS, AND NEEDS OF CURRICULUM DEVELOPERS: A NATIONAL SURVEY

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May 1976

An Interim Report
On a Project Conducted Under
Contract No. NE-C-00-3-0078

The material in this publication was prepared pursuant to a contract with the National Institute of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to freely express their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official National Institute of Education position or policy.

U.S. DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE

National Institute
of Education

FOREWORD

The Center for Vocational Education is continuing its programmatic R&D efforts to develop more effective procedures for curriculum planning and design. The survey reported here represents one component of this long-range and multi-faceted approach. It is believed that findings of the study will facilitate continuing efforts of the profession to optimize curriculum development--hopefully, in new and more promising directions.

We are indebted to the many respondents who gave of their time to provide invaluable data for this survey. Their cooperation and patience in rating an extensive list of activities were essential to the success of the effort.

A number of Center staff members contributed over a period of time to various aspects of the work reported here. Earl B. Russell and Michael R. White had the major responsibility for developing the questionnaire and for planning and conducting the survey. Saturnino M. Ocampo, Jr., assisted in the data collection and in the initial drafting of results. Allen A. Wiant and Keith F. Widaman collaborated in the analysis of the data and in the preparation of this report. The project was carried out under the direction of Frank C. Pratzner.

We also express our thanks to Ronald C. Havelock and John R. Sanders for their reviews of the plans for the study, to Coit R. Butler for his critique of the data collection instrument, and to Nevin R. Frantz, Jr. for his review of this final report.

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ABSTRACT

This study was conducted to enhance basic knowledge concerning the activities and needs of curriculum developers, with emphasis on those relating to vocational education, to enable research to be more responsive to their concerns. More than 300 persons actively involved in curriculum development in public education, business and industry, and government responded to a questionnaire based upon a list of sixty-eight curriculum development activities in five categories: (a) curriculum management and administration, (b) selection and organization of content, (c) selection and organization of materials, (d) design of instructional plan and alternative strategies, and (e) evaluation of curriculum. Ratings were given for the degree of problem/need encountered in the performance of each activity, and the relative importance of each to the respondent's job. In addition, background data were obtained from each respondent.

In analyzing the data, the importance and problem/need ratings provided by respondents were combined to produce a summary "criticality" score for each activity. For the respondent group taken as a whole, the most critical activities were found to be in the categories of curriculum management and administration, content selection and organization, and evaluation. Eight groups of related activities were also identified, with differing criticalities for curriculum developers in local, state, and national R&D lab situations. Those working at the local level were most critically concerned about the selection and organization of content, the exchange of information to facilitate curriculum improvement, and curriculum evaluation. The use of job analysis in curriculum content derivation, and the integration and adaptation of curriculum accomplishments elsewhere, were more critical to those in state agency contexts. Those in national R&D labs were more concerned than all others with problems associated with the design of learning experiences and instructional strategies.

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PROBLEM AND OBJECTIVES

Curriculum developers are a diverse group, engaging in activities on college campuses, in state departments of education, research coordinating units, local schools, private agencies, industry, and in government agencies such as military technical training schools. However, basic knowledge about the activities and needs of curriculum developers is grossly incomplete (Coney et al., 1968). Without this basic knowledge, individual researchers and agencies that serve curriculum developers cannot focus their effort to provide the most needed curriculum development tools. Therefore, a systematic effort was undertaken to identify more clearly the population of curriculum developers and to determine their problems and needs. In keeping with The Center's overall mission, the emphasis of the study was upon problems and needs germane to vocational education.

The study had two objectives:

1. To identify curriculum developers in the three general areas of public education, business/industry, and government, and to obtain data on general characteristics of these groups, including types of employing institution, target population(s) for which curricula are developed, and the proportion of time devoted by curriculum developers to curriculum development activities.

2. To identify curriculum developers' activities, problems, and needs associated with (a) curriculum management and administration, (b) selection and organization of content, (c) selection and organization of materials, (d) design of instructional plan and alternative teaching strategies, and (e) evaluation of curriculum. For the purposes of this study, curriculum development was defined as a total process incorporating these five categories of activity.

DESIGN AND METHODOLOGY

Population and Sample

The target population of the study was vocational curriculum developers in public education, business/industry, and government. These three sectors of the population were divided into various strata and further sub-categorized as shown in Table 1.

Due to the size and diversity of the population, several sampling procedures were needed. To obtain a sample as nearly representative of the entire population as possible, a stratified sampling procedure was used, based upon institutions engaged in curriculum development. Within each stratum, a sample of institutions was selected by simple random sampling, purposive sampling, or a combination of random and purposive sampling. The criteria utilized in purposive selections were:

1. Knowledge on the part of the project staff that the activities of the institution to be represented were reasonably comprehensive of all curriculum development activities, or that the institution to be represented (manufacturer, trade union, etc.) was involved with occupational activities related to those taught in public school vocational programs.

2. A knowledge of individual respondents within institutions, often considered in conjunction with the preceding criterion. Individuals were sought with whom project staff members had prior communication, or who were known through their work in the curriculum field and their publications in the field of curriculum development.

3. Geographical distribution. Representation from all states having technical institutes and area vocational centers was sought. Institutions were selected from those providing comprehensive program offerings. In general, these were selected in proportion to the size of the population served.

4. Size of institution being represented, indexed by size of staff. Larger institutions were selected in several instances on the assumption that they had greater staff specialization and more resources available to engage in systematic curriculum development activity.

In cases where the comprehensiveness of the activities of the institutions in a sampling category was not known, a probability sampling technique was used, giving each institution an equal chance of being included in the study. Although a probability sampling technique is usually considered the best way to ensure a representative sample, purposive sampling was used in many sampling categories to guarantee the inclusion of those institutions engaged in comprehensive curriculum development activity.

Lists of curriculum developers were taken from computerized mailing lists of The Center for Vocational Education; National Business Lists, Inc.; *Directory of Accredited Private Trade and Technical Schools* (1974); and directories of the U.S. Department of Health, Education and Welfare, U.S. Department of Labor, U.S. Department of Transportation, and the Civil Service Commission.

Table 1

Taxonomy of Curriculum Developers, Sample Sizes, and Questionnaire Return Rates

Population		Agencies/Institutions	Sample Size		Usable Returns		
Sector	Strata	(Sampling Unit)	Design	Actual	No.	Percent of Sample	Percent of Total
Public Education (n = 370; 53% of Sample)	National	R&D Laboratories and Centers (50% purposive sample, criteria 1 and 2)	10	20	8	40	2
	State	Post-Secondary					
		a. Community-Junior Colleges	60	59	37	63	11
		b. Technical Institutes	22	22	13	59	4
		c. Area Vocational Schools	86	86	57	66	17
		d. Vocational Departments in Colleges & Universities (purposive & proportional sampling, criterion 3)	32	39	29	74	9
		State Divisions of Vocational Education in State Departments of Education (50% purposive sample, criteria 1 and 4)	25	68[a]	38	56	12
		State Instructional Materials Laboratories (50% purposive sample, criteria 1 and 4)	10	10	9	90	3
		Research Coordinating Units in Vocational Education (50% purposive sample, criteria 1 and 4)	26	22	9	41	3
	Local	Local School Districts (2% random sample of school districts with secondary enrollments of 2,000 students or more)	100	102	60	59	18
Business/ Industry (n = 201; 29% of Sample)	Pre-Job	Private Trade and Technical Schools (20% purposive sample, criterion 1)	100	99	28	28	9
	Pre/On-Job	Large Manufacturing Firms—Pre/on Job Training with 1,000 or More Employees (5% random sample)	66	66	13	20	4
	On-Job	Trade Organizations/Associations (purposive sample, criterion 1)	25	25	0	0	0
	Other	Private, Non-Profit, Behavioral R&D Agencies (purposive sample, criteria 1 and 2)	10	[b]			
Government (n = 100; 15% of Sample)	National	Military Agencies, i.e., Technical Schools, Training Commands, Personnel Labs of the USAF, Navy, and the Army (purposive sample, criterion 1)	25	26	13	50	4
		Intra-Agency Training Programs Dept. of Labor, Dept. of Transportation, Civil Service Commission, HEW, etc. (purposive sample, criteria 1 and 4)	25	35	14	40	4
		Other Manpower Programs (purposive sample, criterion 1)	50	[c]			
Miscellaneous (n = 22; 3% of Sample)		Specific Referrals Obtained in Progress of the Study	22	14[d]			
		Totals	693	693	328	47	100

a – Includes manpower programs
b – Included with R&D Labs and Centers
c – Distributed in other categories
d – Unused; remainder distributed

Questionnaires were sent to a total sample of 693 curriculum developers. Respondents who had not returned questionnaires within one month of the initial mailing were sent a second copy of the questionnaire along with a letter stressing the importance of the study and the information they could provide. One week later, a telephone follow-up was conducted of a random sample of the non-respondents to obtain more returns and identify reasons for their failure to return the questionnaires. As a result of follow-up efforts, the total number of returned questionnaires was 373, or 54 percent of the total sample. Data collection was conducted during October and November, 1974.

The returned questionnaires were reviewed for completeness, legibility, and appropriateness of response. A questionnaire was considered usable if no more then seven of the 136 requested ratings (5 percent) were missing. Using this criterion, 328 questionnaires were classified as usable, or 47 percent of the total sample. The distribution of usable responses is shown in Table 1.

Table 1 also contains both "Design" and "Actual" sample sizes. These sample sizes correspond to the designed number of respondents in each category and the number classifiable as belonging in each category after returns were received, respectively. Respondents who did not return questionnaires were assumed to have been in the assigned sample category. Respondents who did return questionnaires were assigned to the category to which they indicated they belonged, and this resulted in an alteration of the actual sample sizes per sampling unit.

Instrument

The survey questionnaire contained two sections. The first section was designed to obtain background information on each respondent and institution represented. Included were such things as the primary audiences of their efforts, number of years of training, and the number of years spent in curriculum development.

The second section of the questionnaire contained sixty-eight curriculum development activities in the areas of (a) curriculum management and administration, (b) selection and organization of content, (c) selection and organization of materials, (d) design of instructional plan and alternative teaching strategies, and (e) evaluation of curriculum. Each of the sixty-eight activity statements was rated on two scales. The first was a 0-to-3 scale which yielded responses indicating whether the respondent performed the task and, if so, the degree of problem encountered in performing the task. The second scale was a 1-to-5 scale to indicate the importance of the activity to the respondent's job. Definitions of the scale intervals are given in Appendix A.

A review panel made up of nine curriculum developers in the Columbus, Ohio, area in the education, business/industry, and government sectors critically reviewed the survey instrument to ensure that the task statements were understandable and adequately comprehensive of all curriculum development activity. This effort was an explicit attempt to ensure the content validity of the instrument. The questionnaire was revised on the basis of the panel's recommendations.

Data Analysis

Background data were separately summarized and analyzed. Differences in the background characteristics among the three primary groups of curriculum developers were assessed using the chi-square statistic.

Summary statistics (e.g., means and variances) were computed for each activity from ratings given by all respondents. Statistics were computed separately for the Problem/Need and Importance scales. Missing data were estimated based upon the mean of the ratings obtained from other respondents. An alternative way to have analyzed the data from the Problem/Need scale would have been to compute all summary statistics on data supplied by performers of each task rather than across all respondents. The "performers only" method would have resulted in statistics which accurately reflected the data for those who performed each activity, but would not have represented the ratings of the "average" curriculum developer. The "performers only" method would also have resulted in statistics which would not have been comparable across activities, would have precluded the formulation of criticality rating scores, and would have precluded a separate factor analysis of the Problem/Need ratings. For these reasons, the "performers only" method of analysis was not followed. However, the mean ratings for performers only in the three major groups of curriculum developers may be calculated from the data provided in Appendix A.

Factor analysis was the method chosen to reduce the activity performance data. In addition, the desire of the project staff for the identification of critical activities of curriculum developers led to the formulation of a single "criticality" rating which consolidated the Problem/Need and Importance ratings. Accordingly, activities highest on this criticality index were those which were rated as being both very important and involving great difficulty. Activities which were very important but routinely performed, or which presented a great problem but were relatively unimportant, acquired moderate criticality ratings. Finally, those activities which were viewed as neither important nor a problem to perform earned low criticality ratings. The criticality ratings thus provided an index of the need for focusing future attention and effort on certain of the activities performed by curriculum developers.

The factor analysis was conducted in two stages, employing the criticality scores for the sixty-eight tasks to produce eight rather clearly defined primary factors and one general factor. Factor scores were then computed for each respondent on each factor by the least-squares method (Tucker, 1971). Separate one-way analyses of variance were performed on the factor scores for each factor, with group membership serving as the levels of the factor in the analyses of variance. Table 1 lists thirteen categories of curriculum developers with usable returns, and these thirteen categories served as the levels for group membership. Where a significant analysis of variance was found, post-hoc comparisons, using Dunn's test, were made between the three major groups of respondents--education, business/industry, and government--and between various subgroups within the education group (Kirk, 1968).

More detailed explanations of the reasons for the calculation of Problem/Need values as stated, of the method used to formulate criticality listings, and of the factor analysis procedure, are given in Appendix C.

DISCUSSION OF RESULTS

As shown in Table 1, response rates varied considerably for the various subsamples, those for business/industry and government in particular being lower than desired. Consequently, caution should be observed in generalizing the findings for these groups.

Data on Respondents

Background information obtained from respondents showed them to possess an average experience of fifteen years in teaching or training and nine years in the development of curriculum and instruction; however, the data did not provide for determining whether these types of experience were obtained consecutively or concurrently. Also, the lengths of the experience of individuals within the sample varied greatly.

Respondent groups also differed with regard to audiences being served, based upon their selections from a list of eleven audiences provided in the questionnaire. Table 2 summarizes the responses of those in public education, business, and government, (totalling 100 percent for each respondent group) with regard to their respective audiences. Audiences are shown arranged into four broad groupings (vocational/technical education, general education, industry training, and government training) for which sub-totals are also given. Thus, as may be noted, clients in vocational/technical and general education together comprised 90.9 percent of the audiences of the curriculum developers in public education. Their largest single group of audiences was the vocational/technical group (52 percent), and their largest single audience within this group was post-secondary vocational/technical education (21 percent).

Curriculum developers in industry serve a wide range of clients, and in common with those in public education, their largest audience was in vocational/technical education (44 percent), followed by those concerned with industry training (26 percent). The primary audience of curriculum developers in both public education and in business/industry was post-secondary vocational/technical education. However, the indication was that post-secondary vocational/technical education was more important to curriculum developers in business and industry than to those in public education; one of three respondents from industry selected this as a primary audience, whereas only one of five from public education so indicated.

Government training programs, although clearly the primary audiences of the curriculum developers in the government sector, were closely followed by audiences in general education. In fact, audiences in general education were indicated to be nearly as important to curriculum developers in government as to their counterparts in the public education sector. Government respondents were less involved with audiences in vocational/technical education, but college and university audiences were indicated to be of greater importance to them than to respondents in either the public education or industry groups.

Those addressed in the survey were also asked to provide an estimate of their involvement in curriculum development, expressed as a percentage of their total work schedule, where curriculum development was defined as being inclusive of the five broad categories of activities previously noted. Their estimates averaged as follows:

Table 2

Audiences of Curriculum Developers in
Public Education, Business, and Government

Audiences	Public Education (%)	Business/ Industry (%)	Government (%)
Vocational/technical education			
Post high school (vocational/technical)	20.7	32.9	12.0
High school (vocational)	19.4	7.1	4.0
All levels of vocational education	12.0	4.3	4.0
Sub-total	52.1	44.3	20.0
General education			
College/university	6.4	5.7	12.0
Post high school (general)	3.2	7.1	4.0
High school (general)	9.2	2.9	10.0
Middle, or junior high school	8.3	1.4	6.0
K-6 elementary	6.4	-	4.0
All levels	5.3	1.4	-
Sub-total	38.8	18.5	36.0
Industry training programs	4.1	25.8	2.0
Government training programs	5.1	11.4	42.0

Respondent Group	Percent of Time in Curriculum Development
Public Education	48.0
Business/Industry	30.1
Government	48.1

A majority of the respondents in business/industry reported devoting 25 percent or less of their time to curriculum development; none were so engaged on a full-time basis. This finding was in contrast to the other two groups. A substantial number from both the public education and government groups reported devoting at least 75 percent of their time to curriculum development activity.

An estimated categorical distribution of each respondent's curriculum development effort was also requested. Estimates were to total 100 percent for each respondent, regardless of total time spent in curriculum development. The estimates for the total sample are summarized in Table 3.

Table 3

Distribution of Curriculum Development Effort

Activity Category	Average Percent of Time Spent
Curriculum management and administration	42.7
Selection and organization of content	15.3
Selection and organization of materials	13.7
Design of instructional plan/alternative teaching strategies	12.3
Curriculum evaluation	16.0
Total curriculum development effort	100.0

Although the overall average time spent in curriculum development differed for the three groups of respondents, their respective distributions of that time were found to be very similar and adequately represented for each group by the data in Table 3. Chi-square tests of significance were performed on the distributions of the three groups, and none of the differences between them were found significant at the .05 level.

Activity Ratings

Ratings provided a large base of data reflective of the Importance and Problem/Need of each of the sixty-eight activities listed in the questionnaire. In addition, these ratings gave support to the

content validity of the list of activities used to describe curriculum development. Sixty-five of the sixty-eight activities in the inventory were reported as being performed by more than half of all the respondents. Thus, the inventory itself comprises a useful resource for a competency based approach to preparing curriculum developers. Appendix A contains the list of activities, percentages of respondents performing each activity, and summary ratings of Importance and Problem/Need.

Activities rated high on both Importance and Problem/Need by all respondent groups tended to lie in the areas of curriculum management and administration, content selection and organization, and evaluation (apriori categories of activities utilized in the questionnaire). Conversely, activities involving curriculum materials selection and organization, and the design of instructional plans and strategies (the remaining categories) were given lower ratings on both dimensions. Within the more highly rated activity categories, however, activity rankings differed from group to group; and respondent subgroups indicated by their Importance and Problem/Need ratings performance concerns which did not follow those of the respondent group as a whole. The highly rated activities of various respondent subgroups are compared in Appendix B. However, because of the two dimensions rated and the complexity of the sample, such comparisons were difficult because they involved piecemeal consideration of the data. Systematic and comprehensive analysis required more powerful data reduction methods, as discussed in the following paragraphs.

Most Critical Activities

The criticality score for each activity, derived from the Problem/Need and Importance ratings, provides a composite index of importance and the need for further research, development, and training or in-service effort. Although the criticality scores do not identify the type of assistance needed, many of the activity statements themselves provide this indication.

Criticality scores were highest for those activities rated highest with respect to both Problem/Need and Importance. Activities of considerable importance but routine in performance, as well as those characterized as highly problematic but of limited importance to curriculum developers' jobs, had lower criticality scores. The twenty "most critical" activities, as defined for the respondent group as a whole, are listed in Table 4 in rank order of their mean criticality scores (actual scores are given in Appendix D). The table also indicates the criticality rank of each of the twenty activities for the public education, business, and government respondent groups respectively. Numerals in parentheses following each activity statement give the activity's numerical identification, which permits reference to the activity data in Appendix A.

Although the most critical activities of each major respondent group tended to be among those listed in Table 4, there were some notable exceptions. The fourth most critical activity of the business/industry group, for example, was not found among the twenty most critical activities of the overall group. For this reason, and to give separate rank ordered lists for respondents in public education, business, industry, and government, Table 5, 6, and 7 are provided. Table 4, in particular, assisted in making comparisons between the groups. For example, ten of the twenty activities listed were among the twenty most critical for each group (identified by asterisks). Further, it was observed (by comparing their activity numbers with the activity list in Appendix A) that these ten activities were distributed with respect to the apriori categories employed in the questionnaire as follows:

Curriculum management and administration	3
Content selection and organization	4
Materials selection and organization	0

Table 4

Twenty Most Critical Activities for All Respondent Groups

Activity	Rankings			
	Overall	Public Education	Business/Industry	Government
* Determine the knowledge/concepts to be includes in a curriculum (No. 35)	1	3	2	1
* Evaluate the appropriateness of existing curriculum content for the intended purpose of learning (No. 64)	2	2	1	4
* Determine the performance objectives to be included in a curriculum (No. 34)	3	8	3	2
Prepare a long range plan for curriculum/instructional program development (No. 24)	4	1	-	15
* Define curriculum development goals or objectives in operational terms (No. 17)	5	5	13	6
* Identify new methods and procedures for developing curriculum and instructional materials (No. 21)	6	6	14	5
*State the ultimate performance objectives (No. 39)	7	12	6	3
* Determine which curriculum will be developed (No. 5)	8	9	8	8
* Compare actual learning outcomes with intended learning outcomes (No. 67)	9	10	5	11
Determine the attitudes to be developed in a curriculum (No. 6)	10	11	11	-
Determine how new curricula are going to require instructors to change or be retrained (No. 60)	11	4	-	-
* Revise curriculum and instructional materials based on field test data (No. 68)	12	14	9	19
Formulate policies and priorities for curriculum planning and development (No. 23)	13	16	-	7
Conduct staff in-service training for curriculum revision efforts (No. 1)	14	7	-	-
Determine where the same curriculum problems are being worked on elsewhere (No. 16)	15	13	-	-
* State the requisite enabling objectives (behavioral requirements: skills, knowledge, attitudes) (No. 40)	16	19	17	10
Utilize experienced instructors to identify curriculum content and to write instructional materials (No. 28)	17	18	7	-
Recommend instructional techniques and learning experiences as part of a curriculum plan (No. 54)	18	-	10	14
Evaluate the utility of student performance and enabling objectives (No. 62)	19	-	12	-
Identify alternative methods of instruction (including major resources and types of instructional aids) (No. 61)	20	20	-	17

*Ranked among the twenty most critical by each group.

Table 5

Ten Most Critical Activities for the Public Education Group

Rank	Activity	Activity Number
1	Prepare a long range plan for curriculum/instructional program development	24
2	Evaluate the appropriateness of existing curriculum content for the intended purpose of learning	64
3	Determine the knowledges/concepts to be included in a curriculum	35
4	Determine how new curricula are going to require instructors to change or be retrained	60
5	Define curriculum development goals or objectives in operational terms	17
6	Identify new methods and procedures for developing curriculum and instructional materials	21
7	Conduct staff in-service training for curriculum revision efforts	1
8	Determine the performance objectives to be included in a curriculum	34
9	Determine which curriculum will be developed	5
10	Compare actual learning outcomes with intended learning outcomes	67

Table 6

Ten Most Critical Activities for the Business/Industry Group

Rank	Activity	Activity Number
1	Evaluate the appropriateness of existing curriculum content for the intended purpose of learning	64
2	Determine the knowledges/concepts to be included in a curriculum	35
3	Determine the performance objectives to be included in a curriculum	34
4	Survey former students to assess curriculum effectiveness	65
5	Compare actual learning outcomes with intended learning outcomes	67
6	State the ultimate performance objectives	39
7	Utilize experienced instructors to identify curriculum content and write instructional materials	28
8	Determine which curriculum will be developed	5
9	Revise curriculum and instructional materials based on field test data	68
10	Recommend instructional techniques and learning experiences as part of a curriculum plan	54

Table 7

Ten Most Critical Activities for the Government Group

Rank	Activity	Activity Number
1	Determine the knowledges/concepts to be included in a curriculum	35
2	Determine the performance objectives to be included in a curriculum	34
3	State the ultimate performance objectives	39
4	Evaluate the appropriateness of existing curriculum content for the intended purpose of learning	64
5	Identify new methods and procedures for developing curriculum and instructional materials	21
6	Define curriculum development goals or objectives in operational terms	17
7	Formulate policies and priorities for curriculum planning and development	23
8	Determine which curriculum will be developed	5
9	Assess the adequacy of existing curriculum and instructional materials for use in local curriculum development	52
10	State the requisite enabling objectives (behavioral requirements: knowledge, skills, attitudes)	40

Design of instructional plan/strategies	0
Curriculum evaluation	3

Activities of unique concern to any one group of respondents were also readily identifiable. For example, the most critical activity of the public education group involved the preparation of long range plans for curriculum development, which was an activity of much less concern to the other two groups. As discussed in the following section, all activities tended to be seen as moderately critical. Hence, these tables serve to highlight the unique needs of each group in terms of their most critical activities.

Factor Analysis of Criticality Scores

Factor analysis was performed to further reduce the large quantity of data obtained to more manageable and interpretable dimensions. This involved the empirical grouping or clustering of critical activities, and enabled comparisons to be made between respondent subgroups on the basis of these clusters (factors). The factor analysis resulted in the identification of nine factors, one general and eight primary factors.[1] The primary factor loadings (loadings $\geq .245$) are listed in Table 8; factor loadings for the general factor are given in Table 15 (Appendix E).[2] Inspection of the activities contained in each of the primary factors (Table 8) showed the tendency for each factor to be dominated by activities which were originally grouped together in a single category, indicating a strong relationship between the apriori categories and the results of the factor analysis.

The nine one-way analyses of variance performed on the factor scores[3] revealed seven significant overall differences. The analysis of the general factor was significant ($p < .01$), while analyses of Primary Factors 1, 2, 3, 4, 5, and 8 were highly significant ($p < .0001$). The analyses of Primary Factors 6 and 7 revealed no significant overall effects.

The group means on the factors were plotted and visually inspected to identify major trends. The two subgroups in business were treated as one combined group for the post hoc analyses since they tended to score in a similar manner on all factors; the same was true of the two government subgroups. Among subgroups in education, four subgroups—including curriculum developers in

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[1]Both the scree test and interpretability indicated the presence of eight factors in the final first-order factor analytic solution. The eight factors explained 86 percent of the estimated common variance and 55 percent of the total variance. The binormamin rotation yielded the solution with the best simple structure.

The second-order factor analysis indicated the presence of only one factor. This factor accounted for 98 percent of the second-order estimated common variance and 45 percent of the second-order total variance. The primary factor pattern matrix, after the Schmid-Leiman transformation, is given in Appendix E. Activities there are listed in numerical order; they may be identified from their numerical designation using Appendix A.

[2]The factor reliability of the general factor was .97; the reliabilities of the eight primary factors ranged from .60 to .39, with a median of .48. These reliability estimates are lower bound estimates, and test-retest reliabilities would tend to be higher because of the lack of overlap of the variables.

[3]See "Data Analysis."

Table 8

Criticality Primary Factors

	Activity	Activity[a] Category	Factor Loading
	Factor 1. Identify Content Objectives		
39	State the ultimate performance objectives	B	.595
35	Determine the knowledges/concepts to be included in a curriculum	B	.590
34	Determine the performance objectives to be included in a curriculum	B	.575
37	Select curriculum content as intended learning outcomes	B	.522
40	State the requisite enabling objectives (behavioral requirements: knowledge, skills, attitudes)	B	.506
36	Identify prerequisite and enabling skills and knowledges for each curriculum or instructional unit	B	.504
38	Sequence the series of intended learning outcomes	B	.455
41	Identify potential units of instruction	B	.379
17	Define curriculum development goals or objectives in operational terms	A	.337
13	Describe and promote curriculum activities and products at local, state, regional, or national professional meetings	A	-.301
42	Prepare statements of student performance objectives from occupational task performance data	B	.248
	Factor 2. Design Learning Experiences		
58	Determine new role relationships between instructors and pupils required by new curricula	D	.531
59	Determine how demanding new curricula will be of students	D	.479
57	Create situations by which students can exhibit intended learning outcomes	D	.440
56	Design alternative instructional treatments (i.e., materials and experiences) for variously defined subgroups of students	D	.430
60	Determine how new curricula are going to require instructors to change or be retrained	D	.418
61	Identify alternative methods of instruction (including major resources and types of instructional aids)	D	.399
53	Derive instructional strategies and learning experiences to support specific learning outcomes	D	.317
68	Revise curriculum and instructional materials based on field test data	E	.284
43	Determine the extent that proposed curricula have gone through experimentation or validation	B	.281
62	Evaluate the utility of student performance and enabling objectives	E	.267
50	Survey students to identify individual and group characteristics	D	.254

Factor 3. Communicate and Gather Information

10	Provide information to the community about the nature and content of curriculum	A	.487
1	Conduct staff in-service training for curriculum revision efforts	A	.413
4	Survey employers to identify skills and knowledge needed by students for entering employment	A	.366
3	Survey instructors formally to identify their needs for curriculum/instructional materials	A	.356
5	Determine which curriculum will be developed	A	.326
9	Obtain and analyze survey data (e.g., census, community needs, company needs) to help establish curriculum policy and development priorities	A	.310
7	Consult with employers to identify near-future trends and developments in occupations as they relate to curricula	A	.304
2	Write proposals to obtain funds for curriculum development projects	A	.263
68	Revise curriculum and instructional materials based on field test data	E	-.256
28	Utilize experienced instructors to identify curriculum content and to write instructional materials	B	.245

Factor 4. Use Systematic Means for Identifying Job Content

29	Prepare occupational task inventories for use in curriculum development	B	.490
27	Survey employees in business/industry about their job tasks	B	.480
30	Employ trained job analysts to obtain information on worker performance for use in curriculum development	B	.461
7	Consult with employers to identify near-future trends and developments in occupations as they relate to curricula	A	.429
32	Visit job sites to record observations of worker performance for use in curriculum development	B	.417
4	Survey employers to identify skills and knowledge needed by students for entering employment	A	.386
63	Field test and revise instructional materials prior to publication	E	.350
44	Prepare statements of student performance objectives from occupational task performance data	B	.319
68	Revise curriculum and instructional materials based on field test data	E	.247

Factor 5. Evaluate Curriculum Effectiveness

66	Survey employers of former students to assess curriculum effectiveness	E	.649
65	Survey former students to assess curriculum effectiveness	E	.614
67	Compare actual learning outcomes with intended learning outcomes	E	.432
64	Evaluate the appropriateness of existing curriculum content for the intended purpose of learning	E	.384
51	Use standard tests to identify individual and group characteristics	D	.258
50	Survey students to identify individual and group characteristics	D	.253

(continued)

Table 8 Continued

	Activity	Activity[a] Category	Factor Loading
	Factor 6. Select and Organize Materials		
47	Prepare teaching-learning materials (e.g., transparencies, information sheets, models, slides)	C	.516
49	Develop total instructional delivery systems (e.g., instructional packages, audiovisual materials, etc.)	C	.411
48	Describe the physical facilities and list necessary equipment, tools, and/or materials as part of a curriculum plan	C	.410
46	Prepare specifications for development of necessary curriculum materials and instructional aids	C	.362
12	Write materials (e.g., brochures, journal articles) to promote developed curriculum and instructional materials	A	.313
11	Supervise design of exhibits and displays to promote developed curriculum and instructional materials	A	.294
31	Search published textbooks as a primary source of content for curriculum	B	.284
45	Adapt available curriculum and instructional materials to meet local curriculum development needs	C	.266
	Factor 7. Formulate Curriculum Policy and Plans		
24	Prepare a long-range plan for curriculum/instructional program development	A	.611
25	Prepare an annual plan for curriculum/instructional program development	A	.573
23	Formulate policies and priorities for curriculum planning and development	A	.510
15	Determine the developmental and operational costs of new curricula/instructional programs	A	.305
20	Use computerized information systems to obtain data for decision-making	A	.272
5	Determine which curriculum will be developed	A	.271
26	Supervise curriculum and instructional materials development work	A	.264
	Factor 8. Maintain Awareness of Relevant Developments Elsewhere		
16	Determine where the same curriculum problems are being worked on elsewhere	A	.473
19	Relate curriculum information derived elsewhere to a local problem	A	.414
14	Work with local personnel to modify and develop support materials for local use of curriculum and instructional materials	A	.359
42	Determine the content and success of new curriculum developed elsewhere	B	.346
22	Cooperate with other agencies to jointly develop curriculum and instructional materials	A	.311
21	Identify new methods and procedures for developing curriculum and instructional materials	A	.309
43	Determine the extent that proposed curricula have gone through experimentation or validation	B	.281
33	Utilize advisory committees to assist in curriculum formulation	B	.248

[a] A: Curriculum Management and Administration
B: Selection and Organization of Content
C: Selection and Organization of Materials
D: Design of Instructional Plan and Alternative Strategies
E: Evaluation of Curriculum

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community and junior colleges, technical institutes, area vocational schools, and local school districts—tended to score in similar fashion on all factors; these four subgroups were combined for post hoc analyses and, reflecting their places of employment, were labelled the Local Education Agency (LEA) group. Four other subgroups in education—state departments of vocational education, state instructional materials labs, research coordinating units, and vocational education departments in colleges and universities—showed similar score profiles across all factors; these groups were combined for post hoc analyses and labelled the State Education Agency (SEA) group. The one remaining education subgroup was the national R&D labs (NRD); this subgroup was combined with the SEA group for some comparisons, although differences between SEA and NRD were carefully noted. The summary of post hoc comparisons among groups is given in Table 9.

General Factor I: General Rated Criticality.

All items loaded moderately or highly on Factor I, indicating that curriculum developers tended to judge all activities on the instrument as critical to their jobs in much the same way. That is, if a curriculum developer judged one activity as critical to his/her job, then he/she tended to regard the sixty-seven other activities as critical also.

The content interpretation of this general factor was that it indicated a general criticality of all the curriculum development activities. However, the appearance of the general factor could have been due to response bias, some respondents rating all tasks generally higher and others rating tasks generally lower. At present there is no way to decide between the two interpretations, and both may be partially correct. Only further research using independent criterion measures could begin to establish the correct meaning of the general factor.

As shown in Table 9, the only significant differences among the groups occurred when the curriculum developers in education, considered as a single group, were compared to those in business and government. The education group regarded all activities, as a whole, as more critical to their jobs than did the business and government groups; the business and government groups did not differ significantly in their rated criticality of all the activities to their jobs.

Primary Factor 1: Identify Content Objectives

Primary Factor 1 was found to contain items which together describe a curriculum content selection process. The process thus described includes the identification of prerequisite and enabling skills and knowledges, and the knowledges and performance objectives to be included in the curriculum. It also includes the statement of the above outlined skills and knowledges, especially in terms of performance objectives where appropriate. Finally, it deals with the formulation of larger units of instruction and the sequencing of those larger units into a meaningful series of learning outcomes. Overall, the process as described by activities in the factor involves the determination and statement of prerequisite and to-be-learned content.

Since this factor dealt with the identification of curriculum content for use in an instructional program, it was expected that curriculum developers closest to the scene of instruction would regard these tasks as more critical to their jobs, and thus would score higher on the factor. In line with this expectation, curriculum developers in business and in government did score significantly higher than their counterparts in education, taken as a whole. However, within the education group, the LEA group exhibited higher scores than both the SEA and the combined SEA-NRD groups. The overall outcome was that the local agency groups scored uniformly higher than the state-level groups on this factor.

Table 9

Post-Hoc Comparisons Between Groups of Curriculum Developers on Criticality Factors

Factor	Comparison[a]						
	Ed vs Bus & Gov	Ed vs Bus	Ed vs Gov	Bus vs Gov	LEA vs SEA	LEA vs SEA + NRD	SEA vs NRD
General Factor:							
I: General Rated Criticality	Ed>(Bus+Gov)**	Ed>Bus**	Ed>Gov**	... ...			
Primary Factor:							
1: Identify Content Objectives	Ed<(Bus+Gov)**	Ed<Bus**	Ed<Gov**	... ...	LEA>SEA**	LEA>(SEA+NRD)*	
2: Design Learning Experiences	... ...	... ...	... ...	... ...	... ...	LEA<(SEA+NRD)**	SEA<NRD**
3: Communicate and Gather Information	Ed>(Bus+Gov)**	Ed>Bus**	Ed>Gov**	... ...	LEA>SEA**	LEA>(SEA+NRD)**	
4: Use Systematic Means for Identifying Job Content	Ed>(Bus+Gov)*	... ...	Ed>Gov*	... ...	LEA<SEA**	LEA<(SEA+NRD)**	SEA>NRD*
5: Evaluate Curriculum Effectiveness	... ...	... ...	... ...	... ...	LEA>SEA**	LEA>(SEA+NRD)**	... ...
8: Maintain Awareness of Relevant Developments Elsewhere	... ...	... ...	... ...	... ...	LEA<SEA**	LEA<(SEA+NRD)*	... ...

NOTE: Comparisons performed only on factors exhibiting significant one-way analysis of variance. The general factor was significant at level $p<.01$; all primary factors listed were significant at level $p<.0001$. Comparisons performed using Dunn's test (Kirk, 1968). Double ellipses (... ...) represent nonsignificant comparison; blank space indicates comparison not performed.

[a] Abbreviations Ed, Bus, and Gov stand for education, business/industry, and government, respectively; LEA stands for local education agencies, SEA for state education agencies, and NRD for national R&D labs, education groups whose composition is discussed in the text.

* $p<.05$.

** $p<.01$.

Primary Factor 2: Design Learning Experiences.

Primary Factor 2 was found to deal with the teaching-learning interface and with systematic attempts to facilitate student learning. The emphasis appears to be on matching students, teachers, and situation characteristics to ensure optimal learning and information/skill transferral. Thus, one of the foci is upon students; the curriculum developer should design curriculum appropriate to the general level of student capabilities and determine appropriate situations for them to exhibit acquired skills and knowledges. Another focus is upon instructors; the curriculum developer should have knowledge of instructor capabilities so that instructors can be assigned appropriately to types of teaching situations, or in-service training of instructors can be provided where necessary. A third focus is on the teacher-learner interface itself. This focus encompasses teacher-student role relationships and the design of alternative teaching strategies for different groups of students.

There were no significant differences among the three primary sampling units—education, business, and government—on this factor. However, within the education group, it was clear that the national R&D lab subgroup scored significantly higher than the remaining eight subgroups. In fact, the national R&D lab group scored significantly higher on this factor than the state education agency group. The difference between the local education agency and the state education agency groups was not significant; thus, the major difference on this factor was between the national R&D lab group and all other curriculum developers.

In general one might expect the national R&D lab group to generate knowledge about optimal teaching-learning outcomes, and those in the other groups primarily to utilize such knowledge in the design of curricula. The national R&D lab group might therefore be expected to score higher on this factor since the activities which constitute the factor may form the greater part of their research efforts. Accordingly, these activities would be less critical (present less of a problem) to the other groups of curriculum developers, as they would rely on the expert judgment and experimental results of the national R&D lab group.

Primary Factor 3: Communicate and Gather Information.

Primary Factor 3 appears to isolate tasks which involve exchange of information for the improvement of curriculum. According to this factor, a part of the information exchange consists of information outflow to the community, to instructors in terms of in-service training, and to funding agencies to obtain funds for curriculum development. Another part of the information exchange involves the gathering of information, accomplished by surveying employers to identify needed skills and knowledges and possible near-future trends, and surveying instructors to identify their needs for curriculum materials. The overriding concern expressed by the activities in this factor is the improvement of curriculum through the exchange of information.

Since the activities contained in this factor appeared to relate more to applied settings, i.e., to involve the sorts of activities which persons working with actual curricula might perform, it was expected that the local agency subgroups would score higher than others on this factor. The LEA group did, in fact, score significantly higher on this factor than both the SEA and SEA-NRD groups. The business and government groups, which appeared to have a more applied orientation than the education group as a whole, scored significantly lower on this factor than the education group. Explanations for this could include the following: First, the organizations in which curriculum developers in business and government are employed may employ other persons to perform the communication functions constituting this factor. Second, since curriculum developers in business and government are more in contact with the world of work (i.e., employers, employment situations, etc.), the activities making up this factor may present less of a problem to them. Third, curriculum developers in business include both those involved in company training programs and those developing programs

for public use (e.g., proprietary schools). The former would not be expected to be as concerned as the latter with the activities contained in this factor; thus, the business group as a whole would score lower. Support is given to the first and third explanations by the data showing that lower percentages of curriculum developers from business and government than from public education reported performing these activities.

Primary Factor 4: Use Systematic Means for Identifying Job Content.

Various strategies of job analysis appear to constitute Primary Factor 4. The major focus of the factor is upon obtaining worker performance information. One method of obtaining such information is through the use of task inventories to survey employees about their job tasks. Alternatively, job analysts may be employed to visit job sites to record information on worker performance and to survey employers about needed job skills and knowledges. In either case, the information is used to formulate student performance objectives. The major theme of the items which loaded on this factor is the empirical determination of curriculum content through the use of various job analysis techniques.

The education group scored significantly higher on this factor than the government group, but the differences between the education and business groups, and between the business and government groups, were small and nonsignificant. The overall picture was one of relative similarity among the three large groups. However, within the education group, there were marked differences among the subgroups. The education subgroup which scored higher on this factor was the SEA group. The national R&D lab group scored much below the SEA group; their score more nearly approximated that of the LEA group, indicating a relatively lower level of rated criticality on the factor. This suggested that the SEA group was more concerned with job analysis and, as with Primary Factor 2, the local agency subgroups may have seen such activities as less critical, relying instead on the results generated by the state-level groups.

Primary Factor 5: Evaluate Curriculum Effectiveness.

Primary Factor 5 appears to consist mainly of curriculum evaluation activities. One method of evaluation contained in the factor is the surveying of both former students and employers of former students in an attempt to assess the effectiveness of curriculum. Other curriculum evaluation issues deal with the comparison of actual versus intended learning outcomes, and the evaluation of existing curriculum content for the intended purpose of learning. A small part of this factor consists of the use of standard tests and other survey methods to identify individual student and group characteristics. Evaluation, using various methods to assess various outcomes, is the central feature of the factor.

The assessment of group differences on this factor revealed a small but significant difference between the education and business groups, with the business group scoring higher. The differences between the education and government groups and between the business and government groups were not significant. Once again, there were great differences among the education subgroups. The LEA group scored significantly higher on this factor than the remaining, state-level subgroups (both the SEA and SEA-NRD groups). The factor appeared to be of an applied nature, being more important to those directly responsible for demonstrating curriculum effectiveness.

Primary Factor 6: Select and Organize Materials.

Primary Factor 6 includes all of the activities in the questionnaire under the categorical label of the "Selection and Organization of Materials." Included in the process of selecting and organizing materials are such activities as the adaptation of existing materials for local use and the preparation of specifications for development of materials where no existing materials suffice. Also included are the preparation of teaching-learning materials and the development of instructional delivery systems.

A small part of this factor has to do with the organization of materials designed to promote a curriculum already developed. This factor then deals primarily with the organization of materials for use in the curriculum.

There were no significant differences between any of the groups on this factor. The state instructional materials labs subgroup had the highest score, but the difference between their score and the scores of the remaining education subgroups was not significant. One reason for the lack of significant differences may have been that all groups considered selection and organization of materials to be less critical to their jobs than other activities, thus erasing group differences. This interpretation is supported by noting (Table 8) that the activities loading highest on this factor belong to category C (selection and organization of materials), and that none of the activities in this category was found to be among the most critical activities for a respondent group (see discussion of "Most Critical Activities" and associated tables). The reason for this is suggested by separate consideration of the Importance and Problem/Need ratings given to activities in this category (i.e., activities No. 45 to No. 49). As shown in Table 13, a few activities were rated highly on one scale, but no activities were rated highly on both scales. These differences resulted in lowered criticality scores for all groups. Returning to the analysis of variance, however, the high score of the state instructional materials lab subgroup reflected a meaningful trend, although the small sample size prevented confirmation of a significant difference in the statistical testing of group differences.

Primary Factor 7: Formulate Curriculum Policy and Plans.

Primary Factor 7 contains activities which describe the long-term management of curriculum development efforts. Among these, the preparation of long-range and annual plans for curriculum development are key tasks. Also of major importance is the formulation of policies and priorities for curriculum planning and development. Determining which curricula will be developed and the developmental and operational costs of new curricular programs are other important tasks. Finally, the factor includes the use of computerized information systems to aid in the decision-making process. The factor is concerned overall with planning, guiding, and overseeing development of curriculum.

This factor appears to be associated with applied work in curriculum development, and in fact, the local subgroups in education did tend to have higher scores. However, none of the comparisons among groups turned up significant differences. Again, there may have been a number of reasons for this, but the trend of local subgroups to score higher was consistent with the factor's general interpretation.

Primary Factor 8: Maintain Awareness of Relevant Developments Elsewhere.

Primary Factor 8 appears to consist of a somewhat mixed set of activities. However, concern for the integration and adaptation of the research and support of other groups is evident. One aspect of the factor involves the determination of where and with what success the same curriculum problems are being worked on elsewhere. Another aspect is the relation of curriculum information and materials developed elsewhere to the local curriculum. A final aspect of the factor includes cooperation with other agencies and the use of advisory panels to assist in curriculum formulation. This factor then involves the integration of curriculum information from other agencies, research organizations, and advisory panels in order to benefit from existing knowledge and research in the field, and the adaptation of this knowledge and materials to the local curriculum and to local problems.

There were no significant differences between the three major groups of curriculum developers, but there were marked differences among the education subgroups. The SEA group scored significantly higher than the LEA group on this factor; the SEA-NRD group was also significantly higher on this factor than the LEA group, but at a lower level of significance. In general, the subgroups constituting the SEA group rated the activities on this factor as more critical to their present jobs than the LEA group, again suggesting that the local agency subgroups may have been relying on the state-level subgroups for state-of-the-art guidelines for developing actual curricula.

CONCLUSIONS AND IMPLICATIONS

Background data on respondents showed that those in public education and government resembled each other with regard to a somewhat lower level of involvement with general education than with vocational education audiences. Concerning the extent of their involvement in curriculum development activity, the latter two groups were also similar, devoting approximately one-half of their time to curriculum development. Those in business averaged one-third of their time in curriculum development. However, all three groups reported a very similar division of their curriculum development efforts among the several categories of activity defined in the questionnaire.

The content of the curriculum development activity list was validated by respondent ratings which reported performance of all the activities by substantial percentages of the respondents. Thus, the inventory of activities can serve as a valuable resource for a competency based approach to the preparation of curriculum developers.

Criticality scores computed for each of the curriculum development activities contained in the questionnaire provided a summary indication of each activity's importance and the degree of problem encountered in performance. The more critical activities overall tended to be in the areas of curriculum management and administration, curriculum content selection and organization, and curriculum evaluation. An appreciable number of specific activities in these areas were found to be highly critical. Conversely, activities involving curriculum materials selection and organization and the design of instructional plans and strategies were found to be generally less critical.

Factor analysis of the curriculum development activities yielded eight primary factors and one general factor. Each of the eight primary factors was characterized by activities from a single apriori category, thus enhancing the validity of the initial hypothesis that the total list of activities represented a number of interpretable clusters. A summary of the results of the factor analysis would have to focus on the different patterns of critical activities for some subgroups of curriculum developers and the relative lack of differences between other subgroups.

Considering first the similarities or lack of differences in the data, the two composite groups identified as business and government did not differ significantly on any of the factors. Curriculum developers in business and government tended to hold similar views of the activities in the inventory, and performed somewhat similar jobs. Thus, if procedures were developed and made available to aid performance of any of the activities, curriculum developers in business and government would tend to benefit equally.

Another similarity evident in the data was the absence of differences among the three major respondent groups—education, business, and government—on four of the primary factors. Thus, improvement of procedures to perform activities in Factors 2, 6, 7, and 8 would also tend to benefit all curriculum developers to about the same extent.

As to differences between the three major groups, clear group differences were evident on three factors. The general curriculum development factor (I) and Primary Factor 3, dealing with information exchange for curriculum improvement, showed significantly higher scores for the curriculum

developers in education. Primary Factor 1, dealing with selection and organization of content, revealed higher scores for the business and government groups.

A final set of differences evident in the data were those between education subgroups. The nine education subgroups separated rather clearly into two major subgroups termed the local education agency and state education agency subgroups, respectively. The subgroups central to the local agency category were the curriculum developers in technical institutes, area vocational schools, local school districts, and community and junior colleges. The subgroups making up the state agency group were those employed in Vocational Education departments in colleges and universities, State Divisions of Vocational Education, state instructional materials labs, and RCU's. The national R&D lab subgroup had a profile of scores on the factors which did not clearly resemble the profiles of either the local or the state groups.

The local agency subgroups scored higher than the state subgroups on three primary factors, Factors 1, 3, and 5. These factors, dealing with the selection and organization of content, information exchange for curriculum improvement, and evaluation, appear to encompass tasks which were more applicable at the school level, tasks which face curriculum developers in their attempts to set up meaningful curricula and to make sure their curricula are accomplishing their purposes.

On the other hand, the state education agency subgroups scored higher than the local education agency subgroups on Primary Factors 2, 4, and 8. These factors concerned the design of teaching and learning strategies, the use of job analysis in the derivation of curriculum content, and the integration and adaptation of other curriculum development efforts. These factors represented activities which appeared to be more appropriate for agencies whose accomplishments would have wider dissemination than those of local agencies. Thus, state level institutions might be expected to disseminate the results of the above activities to the local level for use in development of actual curricula. The national R&D lab subgroup, while scoring below average on eight factors, scored extremely high on Primary Factor 2, the design of teaching and learning strategies. This result implied that the sample constituting the national R&D lab respondents had a rather special focus, teaching and learning strategies, and were less similar to other non-local subgroups than may at first have been expected.

In summary, developments in the areas of curriculum content selection, curriculum improvement through information exchange, and curriculum evaluation (Primary Factors 1, 3, and 5) would benefit curriculum developers working in the local agency context to a greater extent than other groups. On the other hand, advances in teaching and learning strategies, job analysis, and the integration and adaptation of other efforts (Primary Factors 2, 4, and 8) would directly benefit those in the state agencies more than any others; however, the resultant information generated by the state level groups should be of great benefit to all local agency curriculum developers. Thus, different groups had different priorities, and saw different types of activities as more important to their jobs. Although the state and local subgroups would benefit most from different types of aid, each group appeared to have considered all tasks as relatively critical. Therefore, significant advances in any of these areas would be valuable to all persons identified as curriculum developers.

REFERENCES

Cattell, R. B. The scree test for the number of factors. *Multivariate Behavioral Research*, 1966, 1, 245-276.

Coney, R., Blaskett, V., Roggenbuck, R., & Hood, P. *Educational R&D information system requirements: A task force report.* Berkeley: Far West Laboratory of Education Research and Development, 1968.

Gorsuch, R. L. *Factor analysis.* Philadelphia: Saunder, 1974.

Harris, C. W., & Kaiser, H. R. Oblique factor analytic solutions by orthogonal transformation. *Psychometrika*, 1964, 29, 347-362.

Kerlinger, F. N. *Foundations of behavioral research.* (2nd ed.) New York: Holt, Rinehart and Winston, Inc., 1973.

Kirk, R. E. *Experimental design: Procedures for the behavioral sciences.* Belmont, CA: Brooks/Cole, 1968.

Magnusson, D. *Test theory.* Reading, MA: Addison-Wesley, 1966.

Rummel, R. J. *Applied factor analysis.* Evanston: Northwestern University Press, 1970.

Schmid, J., & Leiman, J. M. The development of hierarchical factor solutions. *Psychometrika*, 1957, 22, 53-61.

Van Dalen, D. B. *Understanding educational research: An introduction.* (3rd ed.) New York: McGraw-Hill Book Company, Inc., 1973.

APPENDIX A

Respondent Ratings of Curriculum Activities

Respondent Ratings of Curriculum Activities

Survey respondents were asked to provide ratings of curriculum activities in two dimensions.

The first was to provide a measure of the problem or need involved with respect to guidebooks, manuals, training, etc. The rating scale used was as follows:

0 = I do not do this activity.

1 = Little if any problem; no help needed.

2 = A moderate problem; help would be useful.

3 = A major problem; need all the help I can get.

In addition to providing answers to the question of Problem/Need, zero and non-zero responses obtained distinguished non-performers from performers.

The second question concerned the perceived importance of each activity to the respondent's job. Here the scale used was:

1 = Not important

2 = Slightly important

3 = Moderately important

4 = Very important

5 = Most important

Summary ratings given to each activity, for both Problem/Need and Importance, are presented in Table 10. In addition, percentages performing each of the activities is shown. Activities are arranged in accordance with the activity categories employed in the survey questionnaire. Summary responses are shown separately for the three major respondent groups, keyed to column headings as follows:

a: Respondents in public education (n = 260)

b: Respondents in business/industry (n = 41)

c: Respondents in government (n = 27)

Table 10

Respondent Ratings of Curriculum Activities

Activity Number	Activity	Percent Performing			Importance			Problem/Need		
		a	b	c	a	b	c	a	b	c
	CATEGORY A: CURRICULUM MANAGEMENT AND ADMINISTRATION									
1	Conduct staff in-service training for curriculum revision efforts	83.0	68.3	59.3	4.06	3.36	3.22	1.58	0.98	0.96
2	Write proposals to obtain funds for curriculum development projects	73.1	48.8	38.5	3.54	2.65	3.16	1.40	0.78	0.46
3	Survey instructors formally to identify their needs for curriculum/instructional materials	80.4	78.0	55.6	3.73	3.50	3.23	1.27	1.10	0.93
4	Survey employers to identify skills and knowledge needed by students for entering employment	68.9	57.5	51.9	4.09	3.65	3.41	1.34	1.00	0.74
5	Determine which curriculum will be developed	87.3	85.4	81.5	4.03	3.76	3.65	1.57	1.39	1.26
6	Determine the attitudes to be developed in a curriculum	82.6	87.5	74.1	3.90	3.54	3.15	1.64	1.53	1.37
7	Consult with employers to identify near-future trends and developments in occupations as they relate to curricula	69.9	68.3	61.5	4.04	3.85	3.12	1.37	1.24	1.08
8	Survey local education agencies to identify their needs for curriculum and instructional materials	61.4	29.3	19.2	3.31	2.21	1.96	1.02	0.39	0.23
9	Obtain and analyze survey data (e.g., census, community needs, company needs) to help establish curriculum policy and development priorities	75.4	62.5	64.0	3.94	3.08	3.44	1.44	1.00	1.04
10.	Provide information to the community about the nature and content of curriculum	82.2	60.0	40.7	3.78	2.97	2.65	1.42	1.00	0.67
11	Supervise design of exhibits and displays to promote developed curriculum and instructional materials	62.0	48.8	40.7	2.91	2.38	2.35	1.00	0.78	0.56
12	Write materials (e.g., brochures, journal articles) to promote developed curriculum and instructional materials	77.2	57.5	70.4	3.39	2.87	2.81	1.36	0.98	1.11

13	Describe and promote curriculum activities and products at local, state, regional, or national professional meetings	68.1	46.3	44.4	3.12	2.45	2.35	1.12	0.71	0.59
14	Work with local personnel to modify and develop support materials for local use of curriculum and instructional materials	83.8	75.6	63.0	3.79	2.95	3.42	1.52	1.24	1.15
15	Determine the developmental and operational costs of new curricula/instructional programs	81.9	87.5	66.7	3.74	3.46	3.46	1.56	1.18	1.26
16	Determine where the same curriculum problems are being worked on elsewhere	84.6	72.5	70.4	3.74	3.18	3.52	1.75	1.18	1.15
17	Define curriculum development goals or objectives in operational terms	91.9	85.0	85.2	4.00	3.67	3.89	1.64	1.40	1.41
18	Establish job requirements for personnel who are going to develop curriculum	66.2	63.4	44.4	3.36	2.76	3.07	1.09	0.91	0.59
19	Relate curriculum information derived elsewhere to a local problem	90.7	71.8	70.4	3.49	3.05	3.22	1.56	1.13	0.96
20	Use computerized information systems to obtain data for decision-making	52.3	29.3	37.0	3.05	2.23	2.50	0.94	0.56	0.59
21	Identify new methods and procedures for developing curriculum and instructional materials	87.6	80.5	81.5	3.80	3.60	3.70	1.79	1.44	1.56
22	Cooperate with other agencies to jointly develop curriculum and instructional materials	80.3	61.0	70.4	3.72	2.98	3.70	1.51	0.98	1.15
23	Formulate policies and priorities for curriculum planning and development	86.0	90.2	77.8	3.88	3.29	3.81	1.60	1.29	1.30
24	Prepare a long-range plan for curriculum/instructional program development	84.9	82.9	55.6	4.08	3.27	3.85	1.69	1.37	1.00
25	Prepare an annual plan for curriculum/instructional program development	84.9	75.6	55.6	3.91	3.08	3.22	1.56	1.12	0.93
26	Supervise curriculum and instructional materials development work	82.6	85.4	74.1	3.80	3.51	3.56	1.43	1.22	1.11

a: Respondents in public education
b: Respondents in business/industry
c: Respondents in government

Table 10 · Continued

Activity Number	Activity	Percent Performing a	Percent Performing b	Percent Performing c	Importance a	Importance b	Importance c	Problem/Need a	Problem/Need b	Problem/Need c
	CATEGORY B: SELECTION AND ORGANIZATION OF CONTENT									
27	Survey employees in business/industry about their job tasks	50.4	65.9	15.4	3.68	3.55	2.69	0.93	1.17	0.31
28	Utilize experienced instructors to identify curriculum content and to write instructional materials	86.5	85.4	69.2	3.98	3.93	3.48	1.47	1.29	1.04
29	Prepare occupational task inventories for use in curriculum development	59.9	56.1	33.3	3.61	3.20	2.81	1.15	0.93	0.59
30	Employ trained job analysts to obtain information on worker performance for use in curriculum development	26.0	24.4	12.0	2.84	2.38	2.85	0.46	0.41	0.24
31	Search published textbooks as a primary source of content for curriculum	70.7	73.2	65.4	2.86	3.28	2.67	1.01	1.20	1.04
32	Visit job sites to record observations of worker performance for use in curriculum development	41.9	68.3	48.1	3.33	3.24	2.85	0.67	0.95	0.67
33	Utilize advisory committees to assist in curriculum formulation	86.9	53.7	60.0	4.15	3.05	2.92	1.40	0.68	0.80
34	Determine the performance objectives to be included in a curriculum	84.1	90.2	85.2	4.10	4.05	4.04	1.53	1.44	1.59
35	Determine the knowledges/concepts to be included in a curriculum	85.3	87.5	92.6	4.15	4.00	4.15	1.54	1.48	1.63
36	Identify prerequisite and enabling skills and knowledges for each curriculum or instructional unit	80.3	85.4	66.7	3.86	3.66	3.78	1.43	1.32	1.15
37	Select curriculum content as intended learning outcomes	81.8	82.9	61.5	3.83	3.60	3.50	1.44	1.34	1.15
38	Sequence the series of intended learning outcome	78.1	82.9	74.1	3.72	3.45	3.37	1.37	1.34	1.15
39	State the ultimate performance objectives	80.7	90.2	84.6	4.12	4.00	4.15	1.47	1.29	1.50
40	State the requisite enabling objectives (behavioral requirements: knowledge, skills, attitudes)	80.7	85.4	76.9	3.99	3.70	3.63	1.47	1.27	1.27

41	Identify potential units of instruction	82.7	85.0	73.1	3.75	3.49	3.15	1.37	1.38	1.12
42	Determine the content and success of new curriculum developed elsewhere	81.5	62.5	74.1	3.61	3.00	3.15	1.52	1.03	1.33
43	Determine the extent that proposed curricula have gone through experimentation or validation	78.4	65.9	59.3	3.58	3.21	2.89	1.44	1.22	1.07
44	Prepare statements of student performance objectives from occupational task performance data	53.5	63.4	40.7	3.66	3.33	2.81	1.18	0.98	0.78
	CATEGORY C: SELECTION AND ORGANIZATION OF MATERIALS									
45	Adapt available curriculum and instructional materials to meet local curriculum development needs	82.7	78.0	81.5	3.87	3.59	3.59	1.47	1.20	1.19
46	Prepare specifications for development of necessary curriculum materials and instructional aids	74.2	76.9	66.7	3.62	3.46	3.38	1.36	1.21	1.07
47	Prepare teaching-learning materials (e.g., transparencies, information sheets, models, slides)	58.1	78.0	55.6	3.64	3.63	3.33	0.99	1.32	0.85
48	Describe the physical facilities and list necessary equipment, tools, and/or materials as part of a curriculum plan	70.8	82.9	66.7	3.62	3.34	3.26	1.22	1.12	0.96
49	Develop total instructional delivery systems (e.g., instructional packages, audiovisual materials, etc.)	60.0	63.4	53.8	3.79	3.41	3.36	1.17	0.98	1.00
	CATEGORY D: DESIGN OF INSTRUCTIONAL PLAN AND ALTERNATIVE TEACHING STRATEGIES									
50	Survey students to identify individual and group characteristics	50.8	68.3	33.3	3.53	3.12	2.92	0.92	1.00	0.56
51	Use standard tests to identify individual and group characteristics	44.2	41.5	25.9	3.11	2.46	2.77	0.73	0.63	0.30
52	Assess the adequacy of existing curriculum and instructional materials for use in local curriculum development	83.3	78.0	88.9	3.77	3.46	3.56	1.52	1.24	1.33
53	Derive instructional strategies and learning experiences to support specific learning outcomes	74.2	73.2	66.7	3.77	3.53	3.41	1.42	1.29	1.22

a: Respondents in public education
b: Respondents in business/industry
c: Respondents in government

Table 10 Continued

Activity Number	Activity	Percent Performing a	Percent Performing b	Percent Performing c	Importance a	Importance b	Importance c	Problem/Need a	Problem/Need b	Problem/Need c
	CATEGORY D: DESIGN OF INSTRUCTIONAL PLAN AND ALTERNATIVE TEACHING STRATEGIES (Continued)									
54	Recommend instructional techniques and learning experiences as part of a curriculum plan	84.2	87.8	77.8	3.87	3.80	3.41	1.53	1.34	1.33
55	Describe instructor planning activities in preparing for presentation of a curriculum or instructional unit	68.1	75.6	63.0	3.55	3.44	2.93	1.19	1.07	1.04
56	Design alternative instructional treatments (i.e., materials and experiences) for variously defined subgroups of students	60.0	68.3	59.3	3.60	2.95	2.85	1.19	1.10	1.04
57	Create situations by which students can exhibit intended learning outcomes	65.0	75.6	51.9	3.71	3.30	3.33	1.21	1.24	1.04
58	Determine new role relationships between instructors and pupils required by new curricula	59.9	53.8	59.3	3.44	2.72	3.00	1.17	0.87	0.93
59	Determine how demanding new curricula will be of students	72.1	85.4	44.7	3.48	3.44	3.22	1.32	1.32	0.96
60	Determine how new curricula are going to require instructors to change or be retrained	83.5	78.0	63.0	4.01	3.33	3.22	1.64	1.15	1.04
61	Identify alternative methods of instruction (including major resources and types of instructional aids)	81.5	85.4	81.5	3.80	3.40	3.33	1.60	1.44	1.37
	CATEGORY E: EVALUATION OF CURRICULUM									
62	Evaluate the utility of student performance and enabling objectives	76.5	80.0	70.4	3.94	3.60	3.44	1.49	1.48	1.15
63	Field test and revise instructional materials prior to publication	60.2	56.1	40.7	3.64	3.32	3.04	1.13	0.98	0.70
64	Evaluate the appropriateness of existing curriculum content for the intended purpose of learning	83.8	92.7	92.6	4.07	4.05	3.96	1.61	1.56	1.48

65	Survey former students to assess curriculum effectiveness	65.5	78.0	55.6	4.01	3.90	3.67	1.26	1.41	0.89
66	Survey employers of former students to assess curriculum effectiveness	60.5	63.4	51.9	4.01	3.85	3.44	1.14	1.10	0.85
67	Compare actual learning outcomes with intended learning outcomes	76.2	78.0	55.6	4.09	3.88	3.89	1.50	1.41	1.07
68	Revise curriculum and instructional materials based on field test data	77.3	73.2	63.0	4.06	3.98	3.59	1.48	1.22	1.11

a: Respondents in public education
b: Respondents in business/industry
c: Respondents in government

APPENDIX B

Summary Analyses of Importance and
Problem/Need Ratings

Summary Analyses of Importance and Problem/Need Ratings

Appendix B lists all of the curriculum activities for which ratings of Importance and Problem/Need were obtained. These ratings are the components of the "criticality" scores which are discussed and analyzed in the body of the report. It is of some interest, as well, to know which activities were given the highest component ratings, and by whom. This information is shown in Tables 11 and 12 for the three principal respondent groups, and overall. Similarities and differences between the rankings of these groups are indicated.

For example, it may be observed in Table 11 that the five most important activities in overall ranking (No. 35, 39, 34, 64, and 67) are also among the top ten for each group individually, and that the top four overall are identical to the top four for government and business. And, despite the influence of the large size of the public education group on the overall rankings, the "most important" activity for this dominant group (No. 33) does not even appear among the ten most important overall.

The five activities highly rated for Importance by the total respondent group, as identified in Appendix A, are as follows:

No. 35 Determine the knowledge/concepts to be included in a curriculum.

No. 39 State the ultimate performance objectives.

No. 34 Determine the performance objectives to be included in a curriculum.

No. 64 Evaluate the appropriateness of existing curriculum content for the intended purpose of learning.

No. 67 Compare actual learning outcomes with intended learning outcomes.

Activities rated very highly by a particular group, but not among the top five overall were:

No. 33 (Public Education) Utilize advisory committees to assist in curriculum formulation.

No. 68 (Business/Industry) Revise curriculum and instruction materials based on field test data.

No. 17 (Government) Define curriculum development goals or objectives in operational terms.

There was less consensus among the three groups regarding activities presenting the greatest Problem/Need, as indicated in Table 12. However, among the ten highest ranked activities for the respondent group overall are also five which appear in the lists of each of the individual groups. These are:

No. 21 Identify new methods and procedures for developing curriculum and instructional materials.

No. 6 Determine the attitudes tc be developed in a curriculum.

No. 17 Define curriculum development goals or objectives in operational terms.

No. 61 Identify alternative methods of instruction (including major resources and types of instructional aids).

No. 64 Evaluate the appropriateness of existing curriculum content for the intended purpose of learning.

Because of the special interest of this survey in the concerns of curriculum developers in public education, and especially in vocational education, an additional analysis was made. Responses of the public education group were analyzed in accordance with the sample strata shown in Table 1 of the following subgroups:

1. National R&D laboratories and state instructional materials laboratories.

2. Community and junior colleges.

3. Technical institutes and area vocational schools.

4. Departments of vocational education in colleges and universities.

5. State divisions of vocational education and research coordinating units.

6. Local school districts.

Activities most highly rated by these subgroups as to Importance and Problem/Need are identified in Table 13. The ten to twelve activities receiving the highest rating for each subgroup are included in the lists, identified numerically and arranged in numerical order, rather than by rank order of significance. In this way it becomes more apparent, not only that the most significant activities differ greatly from one subgroup to another, but that the distribution of these activities within the several activity categories is also very different. For example, the most significant Problem activities for the community and junior college respondents were all in the curriculum management and administration area (i.e., Problem activities are all numbered between 1 and 26). In contrast, Problem activities of R&D labs and instructional materials labs were found in all of the activity categories. Several other facts of interest may be noted as well:

1. There is no activity, either in the lists of Importance or Problem activities, which is common to all six subgroups.

2. Activities which are highly rated both as to Importance and Problem by any given group are few in number and are rather unique to the group.

3. In the individual lists for each group, curriculum management activities occur most often, while curriculum content activities are in second place; the remaining categories rank differently in the Importance and Problem lists.

With regard to the second observation above, activities rated most highly both for Importance and Problem/Need are as follows, for each subgroup:

National R&D Laboratories and State Instructional Materials Labs

No. 21 Identify new methods and procedures for developing curriculum and instructional materials.

No. 34 Determine the performance objectives to be included in a curriculum.

No. 35 Determine the knowledges/concepts to be included in a curriculum.

No. 63 Field test and revise instructional materials prior to publication.

Community and Junior Colleges

No. 4 Survey employers to identify skills and knowledge needed by students for entering employment.

No. 5 Determine which curriculum will be developed.

No. 7 Consult with employers to identify near-future trends and developments in occupations as they relate to curricula.

No. 15 Determine the developmental and operational costs of new curricula/instructional programs.

Technical Institutes and Area Vocational Schools

No. 1 Conduct staff in-service training for curriculum revision efforts.

No. 7 Consult with employers to identify near-future trends and developments in occupations as they relate to curricula.

No. 9 Obtain and analyze survey data (e.g., census, community needs, company needs) to help establish curriculum policy and development priorities.

Vocational Education Departments in Colleges and Universities

No. 6 Determine the attitudes to be developed in a curriculum.

No. 35 Determine the knowledges/concepts to be included in a curriculum.

State Divisions of Vocational Education and Research Coordinating Units

No. 17 Define curriculum development goals or objectives in operational terms.

No. 62 Evaluate the utility of student performance and enabling objectives.

No. 64 Evaluate the appropriateness of existing curriculum content for the intended purpose of learning.

Local School Districts

No. 1 Conduct staff in-service training for curriculum revision efforts.

No. 24 Prepare a long range plan for curriculum/instructional program development.

No. 52 Assess the adequacy of existing curriculum and instructional materials for use in local curriculum development.

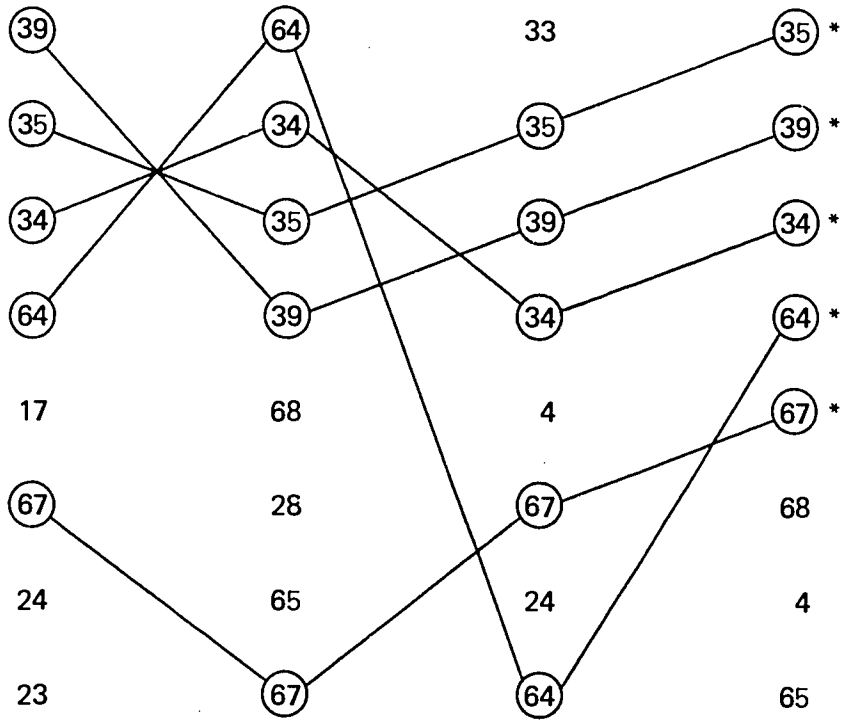
No. 60 Determine how new curricula are going to require instructors to change or be re-trained.

No. 64 Evaluate the appropriateness of existing curriculum content for the intended purpose of learning.

Table 11

Ten Most Important Activities of
Each Respondent Group

Activity Rank	Respondent Group and Activity Number			
	Government (n = 27)	Business/ Industry (n = 41)	Public Education (n = 260)	Overall (n = 328)
1	39	64	33	35 *
2	35	34	35	39 *
3	34	35	39	34 *
4	64	39	34	64 *
5	17	68	4	67 *
6	67	28	67	68
7	24	65	24	4
8	23	67	64	65
9	36	66	1	5
10	21	7	68	24

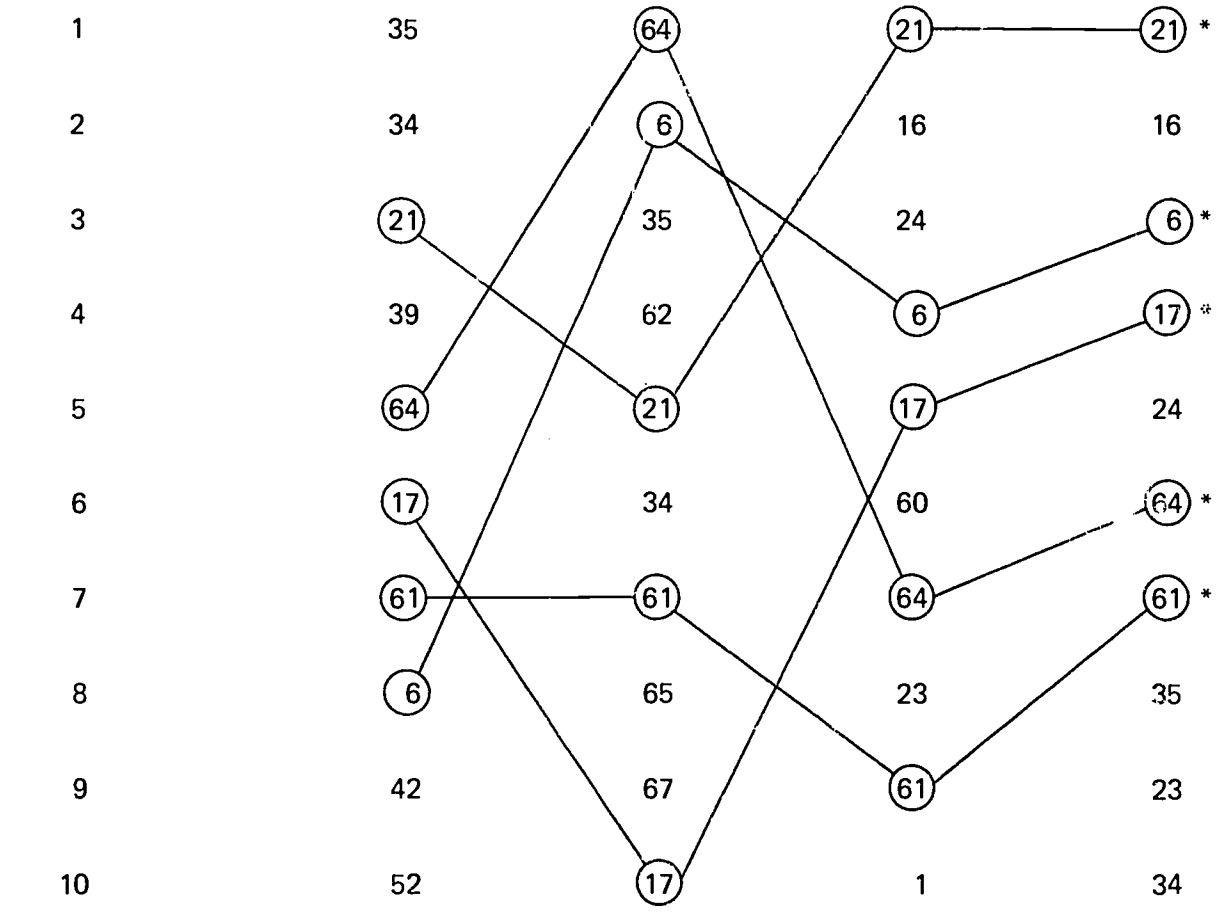


* Among the ten highest rated activities of each respondent group.

Table 12

Ten Activities Which Involve the Greatest Problem/Need for Each Respondent Group

Activity Rank	Respondent Group and Activity Number			
	Government (n = 27)	Business/ Industry (n = 41)	Public Education (n = 260)	Overall (n = 328)
1	35	64	21	21 *
2	34	6	16	16
3	21	35	24	6 *
4	39	62	6	17 *
5	64	21	17	24
6	17	34	60	64 *
7	61	61	64	61 *
8	6	65	23	35
9	42	67	61	23
10	52	17	1	34



* Among the ten highest rated activities of each respondent group.

Table 13

Activities Most Highly Rated by
Respondent Subgroups within Public Education

R&D and Instr. Mat'ls Labs	Community & Junior Colleges	Technical Institutes & Area Vocational Schools	College Dep'ts of Voc-Ed	State Voc-Ed Divisions & RCU's	Local School Districts	
8	4	1	1	4	1	
21	5	4	6	7	5	
26	7	7	24	17	24	
34	15	9	34	33	35	
35	33	28	35	34	39	
36	39	33	40	35	45	Problem/ Need Activities
39	65	34	64	39	52	
49	66	35	65	62	60	
63	67	65	66	64	64	
68	68	66	68	67	67	
		67		68		

6	4	1	2	16	1	
16	5	5	6	17	17	
21	7	6	16	21	21	
22	9	7	21	22	24	
23	10	9	22	24	34	Importance Activities
34	15	15	35	43	52	
35	16	16	42	60	54	
41	17	19	43	61	60	
43	21	24	60	62	61	
46	24	39	61	64	64	
53	25	52				
63						

Activities are identified by number (see Appendix A), and are listed in numerical (not rank) order. Activity numbers within a box belong to the same activity category.

APPENDIX C

Analysis Methodology

Analysis Methodology

Problem/Need scores were averaged using the full scale of responses (0-3) rather than deleting the responses of non-performers (zeros). Reasons for using the entire scale in computing mean values were:

1. Once the target population and sample were determined, they became, by definition, the population of interest. To calculate Problem/Need on the basis of performers only would be equivalent to redefining the target group for each activity rated.

2. None of the activities were undertaken by all of the respondents. Averaging for performers only would indeed focus attention on some activities which were a great problem, but would distort the needs of the group as a whole.

3. Scores for performers only can be readily computed from the data in Appendix A for the three main respondent groups. The mean score for performers only is obtained by dividing the mean score for all respondents, as given in Appendix A, by the proportion of persons performing the task. For example, the mean Problem/Need rating for Activity 1 for curriculum developers in public education was 1.58. Since only 83% of the respondents in public education reported performing the activity, the mean rating for public education performers only is 1.58 divided by .83, or 1.90.

4. The Problem/Need scale is a complex continuum composed of the elements "performance" and "degree of problem/need." With this in mind, the "0" point on the scale becomes a rational zero point on the dimension.

5. From a measurement and analysis point of view, since using data from performers only would in effect redefine the sample for each task, there would be no basis for comparison of mean values across tasks. In addition, computation of criticality scores would not be possible. While this might seem to be an argument against use of criticality scores, a factor analysis of the Problem/Need scale alone would also be impossible if data from performers only were used.

6. Finally, the aim of the analysis was to calculate the Problem/Need value for each activity for the average curriculum developer across all institutions sampled. Because of this and because the data of the study reflected differences in how people verbalized their problems and needs, reference back to the Problem/Need scale values for interpretation was somewhat problematic. No criterion measures were gathered in the study (and compelling criterion measures would be hard to design for the present case), so there was no basis for designation of any point on the scale as the threshold of need, separating activities requiring aid from those that do not. However, the scale means calculated across all respondents do allow a rank ordering of activities, reflecting the relative magnitude of Problem/Need for the average curriculum developer.

The criticality rating scores were formed in the following manner. First, since Problem/Need and Importance were rated using different scale ranges (0-to-3 and 1-to-5 respectively) which differed as to the number of scale intervals (three and four, respectively), the Problem/Need ratings were adjusted by a four-thirds factor, thus defining a new Problem/Need scale having the same number of units as the Importance scale, and with values ranging from 0-to-4. Addition of the Importance and Problem/Need ratings then resulted in this being reduced to one rating, on a 1-to-9 continuum, for each of the sixty-eight items for each respondent.

The criticality ratings were formed by addition, rather than some other mode of combination, since the model usually assumed to underlie judgments is an additive one, and because the parameters of the distribution of the sum of random variables are predictable. Further, the variables, Problem/Need and Importance, were not separately standardized before addition. To do so would have involved loss of the information which is contained in the score variances, which reflect the degree of consensus of the judgments given, and which was considered to be important information to be incorporated in the criticality ratings and retained for the factor analysis.

One 68 x 68 product-moment correlation matrix was computed from the criticality ratings on the sixty-eight tasks. Communalities were estimated by the squared multiple correlation of a variable with all of the remaining variables, and the principal axes factor extraction technique was used. Both the scree test (Cattell, 1966) and interpretability were used as criteria for the number of factors. The factors were rotated by the varimax, binormamin, and orthoblique independent cluster and nonindependent cluster (Harris &Kaiser, 1964) procedures.

A second-order factor analysis was performed on the intercorrelations of the first-order factors following the same procedures as those outlined above for the first-order analysis. A matrix transformation (Schmid & Leiman, 1957) was used to make factors on all levels orthogonal, or independent. All of the above procedures are standard factor analytic options (Gorsuch, 1974; Rummel, 1970).

Traditional notions of reliability and validity were not directly applicable to the Problem/Need and Importance responses. Reliability measures are usually computed to assess the stability of a total score over a set of items. Since the items were factor analyzed and total scores were not evaluated and since the instrument was only administered one time, traditional measures could not be used. Therefore, since factor scores were used, factor reliabilities were computed using a generalization of the Kuder-Richardson method (Magnusson, 1966). The Kuder-Richardson method results in lower bound estimates for split-half reliability; instruments, like the present one, which attempt to completely map a domain with minimal item overlap will tend to exhibit lower split-half reliabilities even though their stabilities, or test-retest reliabilities, may be very high.

Finally, of the four major types of validity, the primary type which applied to the present data collection was content validity; the procedures to ensure content validity are discussed in the body of the paper. One form of construct validity, factorial validity, is also satisfied if clear, meaningful factors emerge from a factor analysis. In the present study, the emergence of factors corresponding to the five apriori categories into which activities had been initially classified illustrated the factorial validity of the data and enhanced the construct validity of the hypothesized classes of curriculum development activities. The remaining two types of validity—predictive and concurrent—were inapplicable since data were not gathered on criterion measures.

APPENDIX D

Most Critical Activities and Scores

Table 14

Most Critical Activities and Scores, by Respondent Group

Rank	Public Education (n=260)		Business/ Industry (n=41)		Government (n=27)		All Respondents (n=328)	
	Activity Number	Score	Activity Number	Score	Activity Number	Score	Activity Number	Score
1	24	6.33	64	6.13	35	6.32	35	6.19
2	64	6.21	35	5.97	34	6.16	64	6.18
3	35	6.20	34	5.97	39	6.15	34	6.13
4	60	6.20	65	5.79	64	5.94	24	6.08
5	17	6.19	67	5.76	21	5.78	17	6.07
6	21	6.19	39	5.73	17	5.76	21	6.07
7	1	6.16	28	5.65	23	5.54	39	6.04
8	34	6.15	5	5.61	5	5.34	5	6.00
9	5	6.12	68	5.60	52	5.33	67	5.99
10	67	6.10	54	5.59	40	5.33	6	5.93
11	6	6.09	6	5.59	67	5.32	60	5.90
12	39	6.07	62	5.57	36	5.31	68	5.89
13	16	6.07	17	5.55	22	5.23	23	5.84
14	68	6.03	21	5.52	54	5.18	1	5.84
15	33	6.00	7	5.51	24	5.18	16	5.82
16	23	6.00	36	5.41	45	5.17	40	5.82
17	25	5.99	40	5.40	61	5.16	28	5.82
18	28	5.95	37	5.39	15	5.15	54	5.81
19	40	5.94	47	5.39	68	5.07	62	5.80
20	61	5.93	41	5.33	37	5.06	61	5.79

APPENDIX E

Criticality Rotated Factor Matrix

Table 15

Criticality Rotated Factor Matrix
(Schmid-Leiman Transformation)

Activity	General Factor	Primary Factors								h^2
		1	2	3	4	5	6	7	8	
1	.472	.156	.114	.413	-.085	-.094	-.037	.001	.114	.469
2	.414	-.071	-.012	.263	.067	-.021	-.006	.065	.147	.276
3	.398	.086	-.006	.356	-.001	-.125	.115	-.108	.091	.342
4	.390	.026	-.046	.366	.386	.198	-.119	-.048	-.082	.501
5	.364	.070	-.001	.326	.000	-.068	-.004	.271	-.141	.342
6	.510	.214	.171	.238	.101	-.096	-.105	.112	-.016	.435
7	.460	.045	-.055	304	.429	.158	-.075	-.003	-.064	.528
8	.428	-.220	.041	.219	.172	-.148	.060	.018	.198	.376
9	.437	-.030	-.064	.310	.126	.158	-.104	-.002	.180	.376
10	.475	-.054	.150	.487	-.090	.106	-.059	.004	-.013	.311
11	.510	-.176	.085	.213	.072	-.093	.294	-.041	.039	.448
12	.504	-.190	-.036	.166	-.025	-.040	.313	.095	.095	.430
13	.484	-.301	.105	.145	.181	-.153	.149	.020	.185	.472
14	.564	.061	-.025	.230	-.071	.065	.090	-.157	.359	.546
15	.492	.031	-.056	.229	063	-.047	.007	.305	.030	.398
16	.515	-.063	-.044	.066	361	-.015	-.062	.040	.473	.511
17	.561	.337	-.032	.157	-.051	.017	-.060	.170	.159	.515
18	.546	-.047	.005	.183	.101	-.098	.060	.218	.114	.418
19	.551	-.060	-.028	.143	-.096	.088	.043	-.015	.414	.519
20	.440	-.139	.078	.026	.190	-.024	.027	.272	.005	.331
21	.513	.058	.030	-.038	.026	-.120	.021	.159	.309	.405
22	.520	-.092	.008	.124	.123	-.067	.048	.010	.311	.414
23	.572	.050	.020	-.012	-.033	.014	.055	.510	.025	.595
24	.568	.028	-.067	-.039	-.028	.085	-.006	.611	.038	.712
25	.606	.005	-.061	.017	-.002	.108	.028	.573	.004	.712
26	.588	.137	-.021	.136	-.019	-.151	.122	.264	.110	.503
27	.503	.084	-.077	.090	.480	.213	.060	-.030	-.054	.558
28	.537	.205	-.119	.243	.103	.124	.004	-.057	.206	.476
29	.578	.133	-.020	.093	.490	.031	.030	.096	.014	.603
30	.390	-.021	.018	-.087	.461	-.040	.032	.038	.070	.382
31	.479	.214	-.111	-.023	-.062	.097	.284	.061	.059	.388
32	.464	.129	-.007	.014	.417	.110	.100	-.128	.009	.444
33	.493	.023	-.124	.226	-.027	.143	.035	.035	.248	.395
34	.575	.575	-.004	.036	.060	-.100	.074	.021	.081	.689
35	.584	.590	.020	.054	.067	-.067	.088	.020	.005	.710
36	.596	.504	.123	.172	.067	-.080	.048	.000	-.064	.671
37	.597	.522	.054	.081	.041	-.103	.126	.129	-.097	.693
38	.623	.455	.126	.074	.032	-.114	.175	.060	-.087	.671
39	.590	.595	.095	.033	.158	-.054	.060	-.060	-.024	.747
40	.640	.506	.209	.088	.164	-.065	.014	-.045	-.050	.753
41	.640	.379	.105	.156	.047	-.138	.180	.033	-.044	.646
42	.587	.046	.146	-.005	-.003	.681	-.067	.018	.346	.499
43	.591	-.019	.281	-.065	.210	.019	-.155	.027	.280	.581
44	.625	.248	.128	.085	.319	.005	-.047	.023	.041	.582
45	.616	.133	-.069	.087	-.159	.228	.265	.021	.138	.576
46	.617	.096	.058	.038	-.052	-.111	.362	.108	.023	.553
47	.534	.088	-.001	-.187	.665	.065	.516	-.053	-.024	.606
48	.588	.170	-.104	.090	.065	.102	.410	.027	-.095	.586
49	.561	.087	.031	-.181	.166	-.045	.411	.048	-.010	.557
50	.559	-.112	.254	.138	-.074	.253	.183	-.014	-.098	.521
51	.480	-.148	.211	.085	-.194	.258	.191	.051	-.055	.450
52	.587	.058	.084	.123	-.227	.236	.031	.110	.177	.521
53	.637	.705	.316	-.034	-.006	.083	.086	-.040	.032	.566
54	.576	.152	.239	.127	-.142	.019	.112	-.170	.177	.521
55	.644	.172	.238	.098	.012	.039	.193	-.097	-.005	.559
56	.651	.037	.429	.018	.046	.044	.063	-.036	.022	.624
57	.626	.110	.439	-.064	.050	.116	.109	-.084	-.071	.641
58	.613	.037	.531	.131	.021	-.042	.009	-.115	-.036	.693
59	.557	.063	.479	.110	-.070	.103	-.044	.203	-.117	.587
60	.584	.044	.418	.136	-.013	.054	-.206	.071	.084	.593
61	.574	.088	.399	.031	-.036	.088	-.083	-.057	.119	.531
62	.606	.210	.267	-.021	.121	.166	-.098	-.062	.129	.556
63	.577	.041	.241	-.157	.350	-.024	.092	.017	.030	.550
64	.532	.049	.080	-.139	-.053	.384	-.040	.129	.192	.517
65	.478	-.101	.014	-.042	.074	.614	.038	.063	-.011	.629
66	.497	-.133	-.011	.076	.142	.649	.024	-.025	-.012	.714
67	.543	.055	.241	-.125	.050	.432	-.064	-.013	-.013	.570
68	.597	.059	.284	-.256	.247	.177	.094	.050	.050	.610
Variance	20.259	3.156	2.230	2 018	2.043	1.971	1.583	1.242	1.516	36.419
Percent Common Variance	55.6	8.7	6.1	5.5	5.6	5.4	4.3	4.5	4.2	100.0