AN ABSTRACT OF THE THESIS OF

Margaret A. Soukup for the degree of Doctor of Philosophy in Education presented on December 6, 1983.

Title: A Survey of Research Tasks Required by Secondary School Counselors, State Department of Education Professionals, & College & University Faculty in Oregon

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Dr. E. Wayne Courtney

This study determined the importance of specific research tasks to the present job requirements of State Department of Education professionals, college and university instructional faculty, and secondary school counselors in Oregon.

The instrument utilized in the research was designed and validated through a Delphi process. The computed reliability coefficient was +.980. The mail-out questionnaire contained 35 research task statements, with a six-point Likert-type scale used to indicate each task's importance. Questionnaires were completed by 400 randomly selected educators representing three populations. A one-way analysis of variance was applied for the hypothesis testing. Tukey's ω test was used in pairwise comparisons testing for rejected hypotheses, and R-mode factor analysis was utilized to cluster tasks.

The following major findings were noted; 34 of the 35 hypotheses were rejected. Tukey's ω test revealed that the pattern of pairwise comparison results indicated that the means of college and university faculty were higher than those of secondary school counselors in 34

instances. State Department of Education professionals had higher means than the counselors 31 times. Similarity was seen between State Department of Education professionals and college and university faculty in 23 cases, reflecting the agreement of the importance of these tasks. The faculty respondents had means that were higher than State Department professionals 11 times. There was agreement of task importance shared by State Department professionals and the counselors in three instances.

The total group results identified 34 of the 35 tasks as being "somewhat important," while 10 of the 35 tasks were identified as being "important" overall. State Department professionals noted 16 tasks as being "important" and faculty respondents rated 29 tasks in the same manner. Counselors rated three tasks as being "important". A five-factor solution extracted 30 tasks with factor loadings of +.50 or higher. The five factors were labeled Design Components, Types of Measurement and Data Presentation, Use of Computers, Data Gathering and Interpretation, and Proposal Writing, reflecting factor content based on task inclusion.

Based on the findings, 34 of the 35 tasks should be included in a broad, general educational research curriculum. Specific differences were noted between groups, with the secondary school counselors rating the questionnaire's tasks much lower than did the other two groups.

A Survey of Research Tasks Required by Secondary School Counselors, State Department of Education Professionals, & College & University Faculty in Oregon

by

Margaret A. Soukup

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This experience serves not as an ending, but a beginning; the degree is less a reward, and more an opportunity, and yet another rite of passage. I have been at this task long enough--it is time to choose and commit again...

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Chapter I

BACKGROUND AND RELATED LITERATURE

Research is an integral part of most academic disciplines; a profession must be self-renewing in order to anticipate future needs and directions (Kuh & McCarthy, 1980). Education generally, however, is a discipline which has long exercised a practice of borrowing the majority of its researchers and scholars from other disciplines (Barger, Okorodudu, & Duorkin, 1970). Hence, the field is handicapped by virtue of its professionals lacking, in many cases, adequate skill and knowledge about substantive and methodological requisites in research (Worthen, 1974).

Purpose

The present study has chosen to assess the importance of specific research tasks with sample groups representing three Oregon populations; namely, State Department of Education professionals, college and university faculty in Education, and secondary school counselors.

Rationale and Importance of the Study

The American Educational Research Association (AERA) has worked since the mid-1960's to offer inservice training opportunities to its members and other professionals engaged in research and research-related activities in education (Popham, 1974). Part of this training included the formation of a panel to serve as a Task Force on Research Training from 1969-71. The Task Force recognized a major problem in research personnel's lack of knowledge about which competencies were most important in research activities. Hence, the major activities conducted by this Task Force were to: draft lists of research skills, "reality test" these lists through interviews with personnel involved in research as to their importance, and finally, to survey research and evaluation workers in various educationally-related agencies to determine what tasks they were called upon to perform their work, as well as what competencies (skills and knowledge) were required to perform them (Worthen & Gagne, 1969; Glass & Worthen, 1970a, 1970b; Anderson, Soptick, Rogers & Worthen, 1971). All of these studies, and others, were synthesized into a single list of competencies frequently needed in educational research and evaluation (Moss, 1966; Worthen, 1974).

There have been few studies conducted since the mid-1970's which identify specific skills desirable for personnel involved in educational research. This would seem to suggest that there may be

cause for concern regarding the curriculum of those individuals receiving teacher-training, preparation for counseling, and college and university faculty who are preparing and being prepared for planning and implementing research, reading professional journals and reports, within and outside of one's own specific field of preparation.

Related Literature

According to Schmidt (1974), no one is in a better position than the practitioner to do the kind of research that will advance the techniques of helping others. Some postulate that experimental research in counseling does most to advance the profession (Thoresen & Anton, 1974), while others would strongly disagree. Goldman (1977) feels that research has not assisted counselors in doing better counseling. He states a number of reasons, including the statement that counseling deals with intangibles (e.g., thoughts, feelings, attitudes, and goals), which are psychological qualities, and obviously difficult to measure. He and Pine (1981) suggest that perhaps case studies would be more useful than other types of studies. Raush (1974) went so far as to strongly suggest that the consumers for formal, statistical psychological research are other researchers. School counselors, for example, rarely conduct research and often question the relevance and importance of research being conducted (Pine, 1981).

There is concern that counselors may need special training in order to conduct research with confidence, due to the complexity of the counseling process (Hill, 1982). Gordon (1971) discussed the needs of counselor-educators being met by the American Psychology and Guidance Association research training programs, implying a lack of experience in conducting sound applied research. This has been equally true for school counselors (Long, 1968; Brown, Hartman, & Fuqua, 1981) and rehabilitation counselors (Greenwood, 1975; Spaniol, 1977). Creative approaches are needed to involve students in the research process (Miller, 1976; Gelso, 1980; Remer, 1981; Barkley, 1982). One study surveyed counselors and found that only one half of all respondents had had coursework in research methodology in their graduate programs (Gelso, 1974).

Counseling is a profession that seems to attract students with ambivalent attitudes toward research; this makes the influence of faculty modeling in conducting and utilizing research very important (Gelso, 1974, 1980). Training counselors as researchers should be viewed as an exciting challenge (Froehle & Fuqua, 1981), one that will actually improve counseling (Mehrens, 1978). Walton's (1982) study of scholarly productivity in counseling indicates the "carry-over effect" of early interest and involvement in research. Participation of graduate students on research teams has been very useful as a training procedure (Gelso, 1974; Stockton & Hulse, 1983).

Relevance and research in counseling has long been a concern

(Thoresen, 1969) but one which need not be if the research evolves directly from the problems of counselors and their clients. It has also been noted that little replication of research studies is evidenced (Tukey, 1969), suggesting that counselors are too often guided by "one-time" findings.

As a practice, counseling has had a "long and ambivalent relationship with research" (Sprinthall, 1981). This is reflected in the relatively underdeveloped research base in counseling practice (Gazda & Peters, 1973; Bergin & Lambert, 1978; Garfield, 1978; Stockton & Morran, 1982). Still, if counselors do not assume the responsibility for research in counseling, they will cease as practitioners to represent a profession (Baldridge, 1969), and the field cannot advance (Stockton & Hulse, 1983). Remer (1981) wrote that a person cannot be a counselor, ethically or morally, without sound research skills and experience.

The State Department of Education is involved in and responsible for the general education of the state's children and young adults. Charged with the responsibility for providing full educational opportunity throughout the state educational system, the staff is in a unique position to stimulate, initiate, coordinate, and officially promote a broad program of educational research throughout a state (Elswick, 1967). The author goes on to suggest that the staff may conduct studies and surveys, provide technical assistance, and assist schools in evaluating innovative projects at the classroom level. The

State Department of Education is assisted in its efforts by regional laboratories (Lasser, 1981), who conduct educational research and development to help improve education.

There are many reasons for conducting research. In some cases doctoral students adopt an instrumental view of the dissertation in which the experience is perceived primarily as a degree requirement rather than as an opportunity to enhance self-development and contribute to the knowledge base of the profession (Haller, 1979). This instrumental perspective on the dissertation is common among students in educational administration, as well as education generally (Weigel & Corazzini, 1978; Gelso, 1974; Sprinthall, 1981). In fact, the majority of doctoral students in applied academic disciplines in education do not publish after completing the degree (Barger & Duncan, 1982).

Minor (1981) makes a distinction between theoretical and practical research; the first concentrates on theory-building and the latter on application or action. Certainly one type of research does not hold greater status or import than the other; both are necessary and relevant (Schubert, 1980).

Still, effective research skills include the ability to utilize as well as conduct research (Elswick, 1967). If educators are to respond to public criticism of education, the response must be more than mere rhetoric; it must be based on research and well-reasoned reform (McDaniel, 1981).

The improvement of teaching will come from the continued search for a scientific basis for the art of teaching (Gage, 1978). Teacher-training institutions, particularly those that maintain laboratory schools, are in a position to relate basic research to applied research in campus and the cooperative schools serving to train student teachers (Elswick, 1967). Classroom research differs greatly from traditional laboratory settings (Shulman, 1970) but also provides invaluable findings (Goldman, 1978). McDonald (1977) suggests that teacher-training coursework should provide research skill background. There is a feeling that teachers are not disinterested so much as they are untrained in conducting research (Kaplan, 1976). However, schools of education generally have been negligent regarding both undergraduate and graduate training in research, particularly in the area of provision of opportunities for intense research and development experiences and mature researcher-student interactions (Barger, Okorodudu, & Duorkin, 1970; Kuh & McCarthy, 1980). A climate must be created in which teacher trainees can see and appreciate the influence of research upon teaching and its effectiveness (Seibert, 1980; Lippitt, 1981). Barkley (1982) offers a number of alternative approaches in which introductory research courses could be taught and stimulate an interest in the creativity of the research process. There must first be an interest displayed by university faculty in terms of their own research activity and the mentoring of students (Melnick, 1971; Harvey, 1972; Banta, 1980). Faculty development

should emphasize both teaching and scholarly research (Linsky, 1972; Nelsen, 1981).

Often alluded to is the conflict of "dichotomous cultures," that is, the scientific and humanistic. "Science connotes objectivity, research, quantitativeness, and rigor, whereas humanism connotes subjectivity, intuition, qualitativeness, and amorphousness" (Sprinthall, 1975). Hence, educational researchers are at the interface between the scientific and humanistic poles. These types of conflicts should be addressed early on in educational training for teachers and counselors.

Statement of the Problem

The central goal of the present study was to determine those research tasks perceived to be essential to the job activities of different groups of individuals involved in education, specifically, secondary school counselors, State Department of Education professional personnel, and college and university faculty in Oregon. The problem involved four major dimensions:

1. the construction of a list of research tasks required in conducting and/or utilizing educational research.
2. the assignment of a value to each statement by samples of individuals currently involved in different areas of education to denote a judgement as to the type of knowledge required in each respective position of employment.

3. the statistical analysis of the data to determine which research tasks and clusters of tasks are perceived as being most important among the three groups of educators in the state of Oregon.
4. the formulation of suggestions and implications for curriculum planning by college and university schools of education.

The following questions were addressed by this study:

1. What specific research tasks are viewed as desirable for secondary school counselors, State Department of Education professional personnel, and college and university faculty?
2. What clusters can be identified as relevant to college and university curriculums?
3. What differences exist between the sample groups?

Definition of Terms

The following terms have been used extensively in this study; thus, they merit clear and concise definitions. Other terms used in this text are self-explanatory.

College and university faculty in education: Individuals presently employed in Oregon state colleges and universities in instructional positions in Education, and possess a Master's or higher level degree.

Common factor: Statistical representations of some task or

trait which two or more items in the questionnaire have in common (Cattell, 1952).

Common variance: The sharing of variance by two or more elements. In such a sharing, the elements are correlated and therefore have some traits in common.

Delphi technique: A method developed by the Rand Corporation to circumvent problems associated with committees reaching concensus; the technique utilizes a panel of experts and a series of three to four questionnaires with controlled feedback. The Delphi technique is based on the premise that experts can make conjectures about the future, based upon rational judgment and shared information. It has been used successfully by industry and for the identification of goals for education.

Factor analysis: A statistical method which consists of:

"1. a large number of tests which measure some aspects of the general trait and will represent a wide range of elements that might enter into the trait;

2. evaluating intercorrelations among these tests to find those which tend to measure the same element or factor;

3. deducing what this trait measures in common and giving it a name" (Gunderson, 1971).

Factor loading: Correlation of any particular task with the other tasks being extracted in the same factor (Cattell, 1952).

R-mode: A factor analytic technique which examines the

relationship of every task with every other task and provides for a clustering of common tasks. This process orders tasks according to respondents.

Research tasks: Those elements required in conducting and utilizing research, and in the performance of research-related activities.

Secondary school counselors: Counselors presently employed in Oregon's public high schools, whose major responsibility is for counseling, and who possess a Master's or higher level degree.

Specific factor: A statistical representation of some ability or trait whose factor loadings are ±.50 or greater.

Spurious factor: A task with a factor loading of less than ±.50. It is tentatively identified as clustering with the factor in which its highest factor loading occurred, even though its loading is less than ±.50.

State Department of Education professional personnel: Professional personnel presently employed in the Oregon State Department of Education in a supervisory capacity, and who possess a Master's or higher level degree.

Tukey's ω Method: A multiple contrast procedure which is applicable to pairwise comparisons of means. It is appropriately used as a follow-up procedure in situations where null hypotheses have been rejected in analysis of variance testing.

Background of the Problem

Techniques developed thirty years ago continue to serve as forerunning guides in the analysis of occupational requirements (McCormick, 1954). McCormick and others were concerned primarily with the study of job interrelationships--the identification of job components, factor analysis of the components, and the identification of clusters of jobs (Thomas, 1952; Chalupsky, 1954; Schieps, 1954). Basic data collection is often done in the form of checklists; established workers are asked to indicate jobs pertinent to their occupation (Courtney, 1962). Other studies have assessed the extent to which one occupation has elements in common with another occupation (Courtney, 1963). In other words, what the worker does is made the criterion for occupational classification.

Chapter II

METHODOLOGY

The design of the present study was to select three occupational groups within the education profession, and compare scores denoting the importance of specific research tasks for each group. The list of 35 statements, which formed the questionnaire, was compiled on the basis of a Delphi Panel review process comprised of individuals within the respective occupations. Each respondent judgmentally assigned a quantitative score to each statement to denote its relative importance to the job setting, based on individual background and experience.

The Dependent Variable

The dependent variable in this study was a score judgmentally assigned by randomly selected respondents in each of three selected sample groups to denote the perceived importance for each of 35 research task statements. Scores (values) were assigned on the basis of the following six-point scale:

1 - Very little importance

2 - Little importance

3 - Somewhat important

4 - Important

5 - Very important

6 - Extremely important

Each statement was scored independently; hence, there were 35 dependent variables considered in the study.

Respondents represented secondary school counselors, Oregon State Department of Education professional personnel, and state college and university faculty. Each respondent was asked to indicate the level of importance of each research task based upon personal experience and current job setting.

Preparation of the Instrument

The instrument used in this study was a mail survey questionnaire containing 35 research task statements and a six-point Likert scale which enabled the respondents to judgmentally score the level of importance of each research task to specific groups of educators. The development of the questionnaire was accomplished in conjunction with a companion study conducted concurrently (Burton, 1984), which looked specifically at elementary and secondary teachers and administrators in Oregon. This required the identification of research tasks which were not considered unique to any one specific group within the sample(s).

Initially, the literature on professional research tasks in all areas of education was reviewed in order to develop the first draft questionnaire. Many of the early studies were conducted in trade and industrial education (Nichols, 1965; Sjorgren, 1967), as well as vocational education (Crawford, 1967; Samson, 1968; Halfin & Courtney,

1970; Florida State, 1976; Owenby, 1978), community college education (Gunderson, 1971; Lindahl, 1971; Miller, 1971), education (Moss, 1966; Elswick, 1967; Worthen & Gagne, 1969; Baker, 1970; Glass & Worthen, 1970a, 1970b; Anderson et al., 1971; Schalock & Sell, 1972; Worthen, 1974; Gay, 1979; Maryak, Gray, Mehrens & Lezotte, 1979), teacher-education and counseling (Barkley, 1982). An applied statistics text (Stahl & Hennes, 1980) was perused as a part of the initial review.

This primary search resulted in 182 research task statements, which were reduced to 69 statements for Round One of the Delphi process. The Delphi Technique described below was used to reduce these 69 statements to the final 35.

The questionnaire was field-tested by 30 respondents representing all populations. Field-test respondents were asked to complete the questionnaire and to identify any research task statements which were unclear or difficult to read. Following field-testing, only minor changes were required prior to preparation and printing of the actual instrument used in the study.

Delphi Process

The Delphi Technique may be described as a method for structuring a group communication process that is effective in allowing a group of individuals, as a whole, to deal with a complex problem (Linstone & Turoff, 1975). It originated at the Rand Corporation in the late 1940's as a systematic method for eliciting expert opinion on various

topics (Sackman, 1974) and was popularized for use in business, industry, and education by Helmer (1966) and others in the 1960's. Part of the Delphi appeal lies in the presumed superiority of group rather than individual opinions, as stated by Martino (1972).

Although the Delphi method was originally intended as a forecasting tool, its more promising application in education appears to be in the following areas: 1) a method for studying the process of thinking about the future, 2) as a pedagogical tool which forces people to think about the future in a more complex manner than they ordinarily might, and 3) as a planning tool which may aid in probing priorities held by members and constituencies of an organization (Weaver, 1971). The many advantages, including the simplicity and directness of the method, ease of administration, minimal application time requirements, and low cost, make this technique particularly well-suited to educational research.

Usually one or more of the following properties of the application leads to the need for employing Delphi (Samahito, 1984):

1. The problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis.

2. The individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communication and may represent diverse backgrounds with respect to experience or expertise.

3. More individuals are needed than can effectively interact in a face-to-face exchange.

4. Time costs make frequent group meetings infeasible.

5. The efficiency of face-to-face meetings can be increased by a supplemental group communication process.

6. Disagreements among individuals are so severe or politically unpalatable that the communication process must be referred and/or anonymity assured.

7. The heterogeneity of the participants must be preserved to assure the validity of the results (e.g., avoidance of domination by quantity or by strength of personality).

The conventional "Delphi Exercise" was employed for use in this study. A paper-and-pencil questionnaire consisting of a series of items was developed using a quantitative, six-point Likert scale. This questionnaire was submitted to a Delphi panel established for the purpose of validation of the questionnaire as the study instrument. The three critical conditions required for a successful Delphi (Delbecq, Van DeVen, & Gustafson, 1975) were present:

1. Adequate time. Delphi should not be used when time is limited. Most Delphi studies take more than a month to implement. As a rule of thumb, the minimal required time for a Delphi is about 45 days.

2. Participants' skill in written communication. Delphi should not be used with groups that have difficulty

in reading or in expressing themselves in written communication.

3. High participant motivation. Like all other group processes, the quality of responses is influenced by the interest and commitment of the participants. Delphi requires especially high participant motivation, since other people are not present to stimulate and maintain motivation.

A total of 18 individuals formed the Delphi panel, representing all populations under study (Appendix A). This number is within the 18-25 member size recommended by others (Helmer, 1966). However, as few as six members have been shown to be acceptable (Samahito, 1984). Members were initially contacted by phone and asked to serve on the Delphi panel, with the first round instrument and instruction letter sent shortly after acceptance was assured (Appendix B). Panel members were selected on the basis of the following criteria: availability, expertise in professional area of employment, were representative of the profession, possessed a Master's degree or higher, were residents and employed in the state of Oregon, and in traditional Delphi form, never met in face-to-face sessions. The goal of the Delphi process is to arrive at consensus among experts; the process ends when consensus has been reached or when sufficient information exchange has occurred (Dalkey, 1967). Four steps have been identified which establish the Delphi process:

1. The first questionnaire calls for a judgment about

the possible contents of a data-gathering device. Usually the question asked by the researcher is whether or not items should be rejected for inclusion in the instrument, accepted for use as a part of the data-gathering tool, or modified for use in the device.

2. On the second round, each panel member, who is isolated from other members, receives a copy of the proposed list of items to be considered for the instrument's makeup and is asked to rate or evaluate each item by some criteria, such as importance level, probability of success, or others.

3. The third questionnaire includes the list of the ratings from the second step. In effect, this step asks the individual panel members to either revise their opinions or else to specify their reasons for remaining outside of the consensus of the other panel members.

4. The fourth questionnaire, if one is needed before consensus is met, includes the list of items, the previous ratings, and consensus and minority views from panel members. This step provides the final chance for revision of the items to be included on the research instrument. If more steps are needed before consensus is reached, the process is continued (Courtney, 1983).

In this study, the Delphi procedure was followed. Specifically, Round One consisted of a set of instructions and the 69 research task

statements. Panel members were asked to retain, reject, or revise each statement and to submit comments and additional statements.

Statements that were rejected by one third of the Delphi panel were eliminated. The Round Two questionnaire consisted of 66 revised statements, with panel instructions to rank the value of each statement's importance for inclusion in the final questionnaire. Both rounds emphasized the need for content accuracy and clarity.

Round Three delineated the remaining statements, clustered by content, and each had the corresponding statistical average (based on Round Two results) listed with the statement. Following the compilation of Round Three results, the final instrument draft was produced which was first field-tested, then sent to respondents in the sample (Appendix C).

Instrument Reliability

An estimate of the internal consistency reliability of the scores assigned by respondents to the research tasks was determined using the method described by Hoyt and Stunkard (1952). This method, using the analysis of variance, provided a straightforward solution to the problem of estimating the reliability coefficient for unrestricted scoring items. For this test the responses for all 35 research tasks were included, with a total of 400 respondents' scores being utilized. Therefore, there was one matrix, with 400 respondents, research tasks, and one response per cell. Schematically, the matrix is shown as

follows:

Research Tasks	Respondents					
	1	2	3.....	j.....	400	Total
1	Y_{11}	Y_{12}	Y_{13}	Y_{ij}	Y_1	$Y_{1\cdot}$
2	Y_{21}	Y_{22}	Y_{23}	Y_{2j}	Y_2	$Y_{2\cdot}$
3	Y_{31}	Y_{32}	Y_{33}	Y_{3j}	Y_3	$Y_{3\cdot}$
.						
.						
.						
i	Y_i1	Y_i2	Y_i3	Y_{ij}	Y_i	$Y_{i\cdot}$
.						
.						
.						
k	Y_k1	Y_k2	Y_k3	Y_{kj}	Y_k	$Y_{k\cdot}$
Total	$Y_{\cdot}1$	$Y_{\cdot}2$	$Y_{\cdot}3$	$Y_{\cdot j}$	$Y_{\cdot}$	$Y_{\cdot\cdot}$

Each Y_{ij} represents the score judgmentally assigned by the jth respondent to the ith component. The total sum of squares is given by:

$$\sum_{i=1}^{k} \sum_{i=1}^{400} Y_{ij}^{2} = \frac{\left(\sum_{i=1}^{k} \sum_{j=1}^{400} Y_{ij}\right)^2}{400k}$$

The sum of squares for respondents is obtained by:

$$\frac{\sum_{j=1}^{400} (Y\cdot j)^2}{k} = \frac{(Y_{\cdot\cdot})^2}{400k}$$

The sum of squares for components is obtained by:

$$\frac{\sum_{j=1}^{K} (Y_{i.})^2}{400} = \frac{(Y_{..})^2}{400K}$$

The residual sum of squares is obtained by subtraction.

The estimate of reliability is obtained by:

$$\frac{\text{Mean Square Respondents} - \text{Mean Square Residual}}{\text{Mean Square Respondents}}$$

Reliability Layout (ANOVA)

Source of Variation	df	SS	MS	r
Tasks	34	A	A/34	
Respondents	399	B	B/399	$\frac{(B/399 - (C/13566)}{(B/399)}$
Residual	13566	C	C/13566	
Total	13599			

Selection of the Sample

The study's population utilized three groups within the state of Oregon, including Oregon State Department of Education professionals,

state college and university instructional faculty, and secondary counselors. These groups all influence and impact upon education and research in the state.

The three sample groups were randomly drawn from Oregon's secondary school counselors (personnel with 50% or higher percentage of their assigned time devoted to counseling responsibilities), the Oregon State Department of Education's professional personnel (defined by R. Clemmer, state department representative, as those individuals possessing an advanced degree and whose duties included administrative decision-making and supervision of programs and personnel, in phone conversation, July, 1983), and education faculty in the six state (public) colleges and universities. Names of counselors were obtained from the Student Services Personnel Roster, Oregon State Department of Education names were provided by the department's personnel office, and names of college and university instructional faculty in the six state institutions were taken from lists provided by each respective school or college of education.

The total sample consisted of 400 randomly selected respondents. The adequacy of the sample was determined by utilizing a sample size formula (Welkowitz, Ewen & Cohen, 1982).

GROUPS		
A	B	C
N=55	N=145	N=200

The sample size of N=400 exceeded the power level of .80 where the effect size is equal to .25 and the significance level is .05. These criteria were utilized as a reference base for assuming adequacy of sample size.

Collection of Data

Data were collected by mailing a questionnaire (coded for identification and follow-up), a stamped, self-addressed envelope, and an explanatory letter to each respondent (Appendix D). All data were collected within a period of eight weeks.

Different methods of follow-up were used. Respondents who did not respond by the date requested in the first mailing were sent a second letter and questionnaire. The cover letter (Appendix E) informed the respondent that the questionnaire had not been received and included a restatement of the basic appeal from the original cover

letter, a replacement questionnaire, and a second return envelope (Dillman, 1978). The third and final follow-up consisted of a telephone call requesting that the questionnaire be returned. If another questionnaire was needed it was forwarded immediately. After the third attempt, non-respondents were replaced with randomly assigned alternates.

The final step in the collection of data was to check and code each returned questionnaire before transferring the data to the computer for analysis.

Statistical Design

As previously stated, the central goal of this study was to determine the common professional research tasks required in conducting and utilizing educational research by Oregon State Department of Education professional personnel, college and university instructional faculty, and secondary counselors. There was particular interest in learning if differences existed among the three groups in the importance level assigned by the respondents for each statement. The hypothesis tested was that there was no significant difference among the mean responses to the importance level scale values.

The following hypothesis, applicable to each of the 35 research task statements, was tested using one-way classification analysis of variance.

$$\mu_1 = \mu_2 = \mu_3$$

Where, μ_1 is the mean score for Oregon State Department of Education professional personnel,

μ_2 is the mean score for Oregon college and university instructional faculty in Education,

μ_3 is the mean score for Oregon secondary school counselors.

The mathematical model for the study specifies the components of the analysis of variance process for the one-way field arrangement. The components of the model are as follows:

$$Yij = \mu + \alpha i + \varepsilon ij$$

Where, μ is a fixed but unknown constant,

α is a differential (fixed) effect associated with groups, and

εij is a random variable characterized as being normally and independently distributed with a mean of zero and a variance of σ^2.

The model is implemented for the present research using the analysis of variance arrangement shown here:

Analysis of Variance Layout (fixed design)

Sources of Variation	df	SS	MS	F
Between groups	2	A	A/2	MS_B/MS_E
Error	397	B	B/397	
Total	399	C		

The .05 level of significance was selected as the basis for retention or rejection of the null hypothesis. In instances where the null hypothesis was rejected, Tukey's ω Method was utilized as the multiple comparison vehicle for indicating positions of rejections of the means of the three groups.

Factor analysis was used to ascertain the groupings of research statements for purposes of curriculum planning. Clusters of research tasks were identified utilizing the R-technique with factor loadings of $\pm$.50 or higher being considered as the criterion for inclusion of a task as a member of a factor.

The mathematic model for factor analysis is keyed to three kinds of variances which are present for all data. The model consists of the following:

$$V_t = V_{co} + V_{sp} + V_e$$

<u>Where</u>, V_t is the <u>total</u> variance.

share in common.

V_{sp} is the variance which is specific to each individual measure.

V_e is the variance attributed to error.

The R-technique orders research tasks according to cluster membership. This type of analysis examines the relationship of every task with every other task and provides for a clustering of common research tasks required by professional educators.

Factor loading of ± .50 or higher were recorded as being clustered within a factor. Hence, a 35-research task intercorrelation matrix, based upon data collected from 400 respondents, was generated. Tasks were clustered in a manner that accounted for the largest percentage of common factor variance using the varimax rotation method of control.

Chapter III

RESULTS AND DISCUSSION

The findings were the results of analyses which utilized analysis of variance, Tukey's ω Method, and factor analysis. These results reflect internal consistency reliability of the data collection questionnaire, the testing of significance, and the clustering of tasks.

Reliability of the Instrument

The computed reliability coefficient for the instrument appears in Table 1. The Hoyt-Stunkard procedure utilizes analysis of variance to provide a straightforward assessment of the internal consistency reliability of the instrument, which utilized a 6-point Likert-type scale. This reliability coefficient, +.980, indicated that 343 respondents* were consistent in providing scaled information on the levels for the 35 tasks included in the instrument.

*Because only 343 of the 400 returned questionnaires contained complete scoring for all 35 tasks, this number was used for purposes of assessing reliability.

TABLE 1

The Reliability Coefficient for the Instrument

Source of Variation	Degrees of Freedom	Mean Square	r
Respondents	342	54.278	
Tasks	34	52.419	0.980
Residual	11628	1.067	
Total	12004		

Results of the Hypothesis Testing

The study's scope included the assignment of respondent judgments to each of 35 research tasks. In all, a total of 400 personnel provided scaled data for the analysis, with mean scores being based upon respondent judgments to each of the tasks. A 6-point Likert-type scale was utilized for the data inventory.

The mean values for the total respondent group ranged from a high of 4.534 (Task 5 - Draw appropriate implications or generalizations from data analysis) to a low of 2.897 (Task 29 - Identify properties of nominal, ordinal, and internal measurement scales). Means are reported in Table 3. The pattern of total mean ranges is depicted below:

Mean Range	Frequency
>4.000	10
3.500-3.999	9
3.000-3.499	15
2.500-2.999	1
<2.500	0

Hence, ten of the means tallied in the mean range category 4.000, while twenty-four others met the qualifications for 3.000-3.999. Only one mean was listed for the range 2.500-2.999. No tasks were judged <2.500.

The five highest means represented the areas of data gathering and interpretation, computer use, and measures of central tendency. Those which were found to be the lowest were concerned with information retrieval systems and publication outlets, precision and randomization in research design, the establishment of confidence levels in hypothesis testing, and the lowest mean delineated the area of identification of nominal, ordinal, and interval measurement scales.

When standard deviations were computed for total respondent data, the ranges extended from a low of 1.408 (Task 5 and Task 20) to a high of 1.785 (Task 10). These results reflect a stability in variation for the data as measured by the fairly equal variation in scaled task responses. Standard errors for overall data showed an equally stable trend with ranges between 0.071 and 0.090. Table 3 carries these results.

The hypothesis testing concerned itself with the matter of determining differences between the means for three personnel groups; namely, group 1 (State Department of Education), group 2 (College and University), and group 3 (Secondary School Counselors). The ranges of mean scores for these groups are reported as follows:

TABLE 2

Mean Range, Frequency, and Tasks by Group

GROUP	MEAN RANGE	FREQUENCY	TASKS
1	>4.000	16	1,2,5,6,12,13,18,20,21,22, 23,24,26,33,34,35
	3.500-3.999	13	3,4,8,9,10,11,14,15,16,19, 25,27,32
	3.000-3.499	5	7,17,28,30,31
	2.500-2.999	1	29
	<2.500	0	
2	>4.000	29	1-3,5-9,11-13,15-27,31-35
	3.500-3.999	6	4,10,14,28,29,30
	3.000-3.499	0	
	2.500-2.999	0	
	<2.500	0	
3	>4.000	3	4,5,20
	3.500-3.999	9	1,12,13,23,24,26,33,34,35
	3.000-3.499	3	2,6,22
	2.500-2.999	17	7,8,9,10,11,14-18,21,25, 27,28,30,31,32
	<2.500	3	3,19,29

These results clearly indicate that groups 1 and 2 scaled task values at a higher level than did group 3. Group 1 respondents recorded 29 tasks above 3.500 while group 2 showed all 35 of its means above that level. Group 3 tallied only 12 tasks at and above 3.500 with a large number falling below 3.000 on the 6-point scale. Task 5

(Draw appropriate implications or generalizations from data analysis) was provided with the highest mean for both groups 1 and 2 while Task 4 (Select appropriate standardized tests or instruments) showed the largest mean for group 3. These results are provided in Table 4.

Group 1 means ranged from 2.907 to 4.964. Sixteen tasks were valued at 4.000 or higher. Standard deviations ranged from .891 to 1.561, while standard errors ranged from .120 to .212.

Group 2 means ranged from 3.810 to 5.056. Twenty-nine tasks had means of 4.000 or higher. Standard deviations ranged from 1.193 to 1.725, while standard errors ranged from .099 to .144.

Group 3 means ranged from 2.223 to 4.061. Three tasks had means of 4.000 or higher. Standard deviations ranged from 1.314 to 1.787, while standard errors ranged from .095 to .128.

The study utilized analysis of variance to ascertain differences for the hypothesis

$$\mu_1 = \mu_2 = \mu_3$$

The results of the 35 F-tests which were made for the testing of hypotheses are presented in Table 4. The rejection level for the study was set at $\alpha = .05$. This pattern of testing resulted in 34 rejections of the 35 hypotheses under study.

TABLE 3

Data Analysis Results

Task Number	Factor Number	$\overline{X}_T$	$S\overline{X}_T$	$\overline{X}$ Rank Order	S_T	$\overline{X}_1$	$\overline{X}_2$	$\overline{X}_3$	Computed F	P	Ho Decisions	Tukey's Pairwise Comparisons 1-2	1-3	2-3
1	4	4.109	.074	5	1.479	4.127	4.382	3.904	4.431	.012	Reject	No	No	Yes
2	1	3.654	.083	20	1.656	4.018	4.312	3.062	28.664	.000	Reject	No	Yes	Yes
3	1	3.207	.081	24	1.609	3.527	4.167	2.416	67.457	.000	Reject	Yes	Yes	Yes
4	2	3.952	.081	23	1.606	3.582	3.944	4.061	1.924	.147	Retain			
5	4	4.534	.071	34	1.408	4.964	5.056	4.035	28.293	.000	Reject	No	Yes	Yes
6	1	3.789	.080	1	1.592	4.291	4.657	3.015	61.765	.000	Reject	No	Yes	Yes
7	1	3.292	.085	26	1.701	3.436	4.167	2.616	42.087	.000	Reject	Yes	Yes	Yes
8	1	3.384	.085	13	1.685	3.685	4.229	2.687	43.679	.000	Reject	No	Yes	Yes
9	1	3.491	.085	33	1.688	3.667	4.236	2.898	30.405	.000	Reject	No	Yes	Yes
10	5	3.426	.090	12	1.785	3.854	3.896	2.959	14.131	.000	Reject	No	Yes	Yes
11	1	3.473	.088	4	1.747	3.818	4.444	2.673	55.678	.000	Reject	Yes	Yes	Yes
12	4	4.030	.074	35	1.474	4.109	4.500	3.660	14.447	.000	Reject	No	No	Yes
13	3	4.079	.073	22	1.438	4.352	4.396	3.766	9.415	.000	Reject	No	Yes	Yes
14	1	3.289	.081	6	1.593	3.527	3.986	2.698	31.988	.000	Reject	No	Yes	Yes
15	1	3.438	.085	2	1.693	3.818	4.371	2.655	56.640	.000	Reject	No	Yes	Yes
16	1	3.495	.081	18	1.614	3.582	4.266	2.902	34.553	.000	Reject	Yes	Yes	Yes
17	1	3.283	.079	32	1.568	3.291	4.197	2.615	52.895	.000	Reject	Yes	Yes	Yes

TABLE 3 continued

Task Number	Factor Number	$\overline{X}_T$	$S\overline{X}_T$	$\overline{X}$ Rank Order	S_T	$\overline{X}_1$	$\overline{X}_2$	$\overline{X}_3$	Computed F	P	Ho Decisions	Tukey's Pairwise Comparisons 1-2	1-3	2-3
18	1	3.599	.087	27	1.730	4.054	4.531	2.791	56.489	.000	Reject	No	Yes	Yes
19	1	3.165	.083	25	1.628	3.537	4.070	2.382	59.339	.000	Reject	No	Yes	Yes
20	3	4.249	.071	16	1.408	4.727	4.408	4.000	7.392	.001	Reject	No	Yes	Yes
21	1	3.482	.084	9	1.575	4.309	4.098	2.801	38.853	.000	Reject	No	Yes	Yes
22	1	3.924	.081	21	1.606	4.654	4.601	3.220	45.521	.000	Reject	No	Yes	Yes
23	4	4.227	.079	11	1.569	4.854	4.734	3.675	27.040	.000	Reject	No	Yes	Yes
24	1	4.239	.072	15	1.432	4.509	4.706	3.821	18.434	.000	Reject	No	Yes	Yes
25	1	3.501	.086	10	1.709	3.764	4.362	2.805	41.959	.000	Reject	Yes	Yes	Yes
26	2	4.105	.074	8	1.468	4.000	4.518	3.836	9.373	.000	Reject	No	No	Yes
27	1	3.578	.083	31	1.645	3.745	4.503	2.845	53.416	.000	Reject	Yes	Yes	Yes
28	1	3.212	.080	7	1.589	3.327	3.951	2.634	33.111	.000	Reject	Yes	Yes	Yes
29	1	2.897	.080	14	1.576	2.907	3.810	2.223	52.480	.000	Reject	Yes	Yes	Yes
30	1	3.178	.084	17	1.670	3.426	3.895	2.587	29.898	.000	Reject	No	Yes	Yes
31	1	3.360	.087	28	1.725	3.273	4.434	2.602	60.962	.000	Reject	Yes	Yes	Yes
32	1	3.579	.085	3	1.686	3.618	4.510	2.881	47.604	.000	Reject	Yes	Yes	Yes
33	2	4.071	.076	30	1.503	4.564	4.514	3.612	20.015	.000	Reject	No	Yes	Yes
34	2	4.161	.078	19	1.551	4.382	4.650	3.737	16.065	.000	Reject	No	Yes	Yes
35	3	3.949	.079	29	1.577	4.164	4.399	3.561	12.999	.000	Reject	No	Yes	Yes

TABLE 4

Mean Rank Order

Total Sample Rank	$\overline{X}_T$	GROUP 1 Rank	$\overline{X}_1$	GROUP 2 Rank	$\overline{X}_2$	GROUP 3 Rank	$\overline{X}_3$
5	4.534	5	4.964	5	5.056	4	4.061
20	4.249	23	4.854	23	4.734	5	4.035
24	4.239	20	4.727	24	4.706	20	4.000
23	4.227	22	4.654	6	4.657	1	3.904
34	4.161	33	4.564	34	4.650	26	3.836
1	4.109	24	4.509	22	4.601	24	3.821
26	4.105	34	4.382	18	4.531	13	3.766
13	4.079	13	4.352	26	4.518	34	3.737
33	4.071	21	4.309	33	4.514	23	3.675
12	4.030	6	4.291	32	4.510	12	3.660
4	3.952	35	4.164	27	4.503	33	3.612
35	3.949	1	4.127	12	4.500	35	3.561
22	3.924	12	4.109	11	4.444	22	3.220
6	3.789	18	4.054	31	4.434	2	3.062
2	3.654	2	4.018	20	4.408	6	3.015
18	3.599	26	4.000	35	4.399	10	2.959
32	3.579	10	3.854	13	4.396	16	2.902
27	3.578	11	3.818	1	4.382	9	2.898
25	3.501	15	3.818	15	4.371	32	2.881
16	3.495	25	3.764	25	4.362	27	2.845
9	3.491	27	3.745	2	4.312	25	2.805
21	3.482	8	3.685	16	4.266	21	2.801
11	3.473	9	3.667	9	4.236	18	2.791

TABLE 4 continued

Total Sample Rank	$\bar{X}_T$	GROUP_1 Rank	$\bar{X}_1$	GROUP_2 Rank	$\bar{X}_2$	GROUP_3 Rank	$\bar{X}_3$
15	3.438	32	3.618	8	4.229	14	2.698
10	3.426	4	3.582	17	4.197	8	2.687
8	3.384	16	3.582	3	4.167	11	2.673
31	3.360	19	3.537	7	4.167	15	2.655
7	3.292	3	3.527	21	4.098	28	2.634
14	3.289	14	3.527	19	4.070	7	2.616
17	3.283	7	3.436	14	3.986	17	2.615
28	3.212	30	3.426	28	3.951	31	2.602
3	3.207	28	3.327	4	3.944	30	2.587
30	3.178	17	3.291	10	3.896	3	2.416
19	3.165	31	3.273	30	3.895	19	2.382
29	2.897	29	2.907	29	3.810	29	2.223

The results of the analysis of variance testing verified the presence of significant differences for all of the 35 null hypotheses except one. Only group means for Task 4 (Select appropriate standardized measurements) indicated no significant difference when the F-test was applied to the data. All other hypotheses were rejected. Probabilities of rejection are indicated in Table 3.

Results of Multiple Testing

The F-statistic was utilized to determine if differences existed in the analysis of the three groups. The F-statistic cannot establish specific pairwise differences between means. Consequently, when hypotheses involving three or more means were rejected as a result of testing with analysis of variance, a multiple comparison follow-up analysis was necessary. The Tukey's ω method was used as the multiple comparisons' vehicle for the present study.

Federer (1955) points out that where three means are present, nineteen comparison possibilities exist. These include:

(1) $\mu_1 = \mu_2 = \mu_3$

(2) $\mu_1 <$ (μ_2 is not appreciably different from μ_3)

(3) $\mu_2 <$ (μ_1 is not appreciably different from μ_3)

(4) $\mu_3 <$ (μ_1 is not appreciably different from μ_2)

(5) (μ_1 is not appreciably different from μ_2) $< \mu_3$

(6) (μ_1 is not appreciably different from μ_3) $< \mu_2$

(7) (μ_2 is not appreciably different from μ_3) $< \mu_1$

(8) $\mu_1 < \mu_2 < \mu_3$

(9) $\mu_1 < \mu_3 < \mu_2$

(10) $\mu_2 < \mu_1 < \mu_3$

(11) $\mu_2 < \mu_3 < \mu_1$

(12) $\mu_3 < \mu_1 < \mu_2$

(13) $\mu_3 < \mu_2 < \mu_1$

(14) $\mu_1 < \mu_2$ but μ_3 cannot be ranked relative to μ_1 or μ_2

(15) $\mu_2 < \mu_1$ but μ_3 cannot be ranked relative to μ_1 or μ_2

(16) $\mu_1 < \mu_3$ but μ_2 cannot be ranked relative to μ_1 or μ_3

(17) $\mu_3 < \mu_1$ but μ_2 cannot be ranked relative to μ_1 or μ_3

(18) $\mu_2 < \mu_3$ but μ_1 cannot be ranked relative to μ_2 or μ_3

(19) $\mu_3 < \mu_2$ but μ_1 cannot be ranked relative to μ_2 or μ_3

Tukey's ω method allows for the contrasting of each mean with every other mean in the analysis. The following pairwise contrasts were made available to the research as this procedure was utilized.

$$K_1 - K_2 \qquad K_1 - K_3$$

$$K_2 - K_3$$

The results of the followup testing are shown in Table 5. All multiple comparison tests were made at the .05 level of significance. The following composite exemplifies the pattern of the outcomes.

TABLE 5

Hypothesis Testing Results

Results of hypothesis testing	Frequency
$\mu_1 = \mu_2 = \mu_3$	1
$\mu_1 = \mu_2$	23
$\mu_1 = \mu_3$	3
$\mu_1 > \mu_3$	31
$\mu_2 > \mu_1$	11
$\mu_2 > \mu_3$	34

The pattern of the pairwise comparison results indicated that the means of college and faculty were higher than those of secondary school counselors in 34 instances. State Department of Education professionals had higher means than the counselors 31 times. Similarity was seen between State Department of Education professionals and college and university faculty in 23 cases, reflecting the agreement of the importance of these tasks. The faculty respondents had means that were higher than State Department professionals 11 times. There was agreement of task importance shared by State Department professionals and the counselors in three instances.

Results of Factor Analysis

Factor analysis was used to establish the clustering patterns for the 35 research task statements. The R-mode, which clustered tasks according to respondent ratings on a 6-point scale, examined the data for purposes of grouping the tasks.

A total of five factors were generated through the R-mode process when the minimum factor loading was set at +.50. Fruchter (1955) classifies factor loadings of greater than .50 as being highly significant. The results of the present analysis verified that 30 of the 35 task statements met the criterion of having loadings which equaled or exceeded the +.50 level. Five tasks with loadings of less than +.50 were classified as spurious.

Cluster titles were arbitrarily assigned to each of the five factors and are assumed to be indicative of the nature of the tasks within each cluster. The five factors are as follows:

Factor I: Design Components

Factor II: Types of Measurement and Data Presentation

Factor III: Use of Computers

Factor IV: Data Gathering and Interpretation

Factor V: Proposal Writing

The results of the factor analyses are shown in Tables 6 through 10.

Factor I - Design Components

The first factor accounted for 21 task statements; factor loadings exceeded +.50, ranging from a low of +.585 to a high of +.798. Two spurious tasks, Task 17 (Locate publication outlets for research reports, articles, or books) and 24 (Collect data in a systematic manner), loaded at less than +.50. Task statements, means, and factor loadings are shown in Table 6.

TABLE 6

Factor I - Design Components

Task Number	Task Statement	$\bar{X}_T$	Vco
2	Identify factors which jeopardize internal and external validity	3.654	.585
3	Obtain information through Dissertation Abstracts, Indices, and data-based computer retrieval systems	3.207	.608
6	Evaluate research reports	3.789	.551
7	Identify the sample for a research study	3.292	.734
8	Determine the type of research (descriptive, historical, experimental) that should be utilized	3.384	.737
9	Define general principles of instrument construction, including reliability and validity	3.491	.618
11	State appropriate assumptions and definitions for a research study	3.473	.765

14	Apply sampling theory and techniques, including variations of simple random sampling	3.289	.689
15	Specify data necessary for testing an hypothesis	3.438	.785
16	Understand the effect of measurement error on the precision of an experiment	3.495	.668
18	State the purpose and rationale for a research project	3.599	.775
19	Apply techniques for increasing precision in research designs	3.165	.793
21	Assess feasibility constraints (time, access to subjects, control, money) which are associated in conducting a study	3.482	.664
22	Report research findings and implications	3.924	.597
25	State the hypotheses in a research study	3.501	.798
27	Organize the research process (hypothesis, evidence, inferences)	3.578	.795
28	Use randomization and sample selection as a means of experimental control	3.212	.751
29	Identify properties of nominal, ordinal, and interval measurement scales	2.897	.753
30	Establish confidence levels in the testing of hypotheses	3.178	.716
31	Specify appropriate independent and dependent variables for a study	3.360	.789
32	Apply appropriate statistical techniques for the analysis of a particular set of data	3.579	.662
	Spurious Tasks		
17	Locate publication outlets for research reports, articles, or books	3.283	.440
24	Collect data in a systematic manner	4.239	.486

The makeup of tasks contained in Factor I included means which

ranged from a low of 2.897 (Task 29 - Identify properties of nominal, ordinal, and measurement) to a high of 4.239 (Task 24 - Collect data in a systematic manner), listed as spurious to the cluster. For the first cluster, all but two of the means ranged between 3.165 and 3.924. Factor I accounted for 86.3 percent of the common factor variance in the analysis. These results are shown in Table 11 and Figure 1.

Factor II - Types of Measurement and Data Presentation

The second factor generated four tasks, one of which was spurious to the cluster. The spurious task (Task 4 - Select appropriate standardized tests or instruments) had a factor loading of +.364. Task means were high for this factor, with three ranging above 4.000; the spurious task carried a mean of 3.952. These results are shown in Table 7.

TABLE 7

Factor II - Types of Measurement and Data Presentation

Task Number	Task Statement	$\overline{X}$	Vco
26	Understand measures of dispersion (percentiles, range, standard deviation)	4.105	.731
33	Utilize methods of presenting data (charts, graphs, tables)	4.071	.519
34	Understand measures of central tendency (mean, median, mode)	4.161	.743
	Spurious Task		
4	Select appropriate standardized tests or instruments	3.952	.364

Factor II accounted for 6.2 percent of the common variance in the factor analysis. These results are depicted in Table 11 and Figure 1.

Factor III - Use of Computers

Factor III produced three tasks which loaded above the +.50 criterion necessary for the establishment of a cluster. The three tasks included in this factor generated two means which exceeded 4.000; the third task (35 - Use of computer equipment for data analysis) had a mean of 3.949. Factor III results are reported in Table 8.

TABLE 8

Factor III - Use of Computers

Task Number	Task Statement	$\bar{X}$	Vco
13	Interpret computer output	4.079	.600
20	Understand the capabilities of computer systems	4.249	.656
35	Use computer equipment for data analysis	3.949	.721

Factor III accounted for 3.3 percent of the common variance.

Factor IV - Data Gathering and Interpretation

The fourth cluster produced two tasks which loaded above +.50, and two spurious tasks, which had loadings which did not meet the +.50 criterion. The means for each of the four tasks exceeded 4.000. These data are shown in Table 9.

TABLE 9

Factor IV - Data Gathering and Interpretation

Task Number	Task Statement	$\overline{X}_T$	Vco
5	Draw appropriate implications or generalizations from data analysis	4.534	.569
23	Translate data analysis into recommendations	4.227	.513
	Spurious Tasks		
1	Conduct necessary "non-instrument" data collection techniques, such as observation and interviews	4.109	.346
12	Construct and use rating scales, checklists, questionnaires, interview schedules, and observation systems	4.030	.381

The fourth factor generated 2.6 percent of the common factor variance in the study. Figure 1 depicts the placement of common factor variance in the analysis.

Factor V - Proposal Writing

Factor V generated one task; namely 10 (Write and submit proposals to obtain funding). Task 10 had a mean of 3.426. Factor V is reported in Table 10.

TABLE 10

Factor V - Proposal Writing

Task Number	Task Statement	$\overline{X}_T$	Vco
10	Write and submit proposals to obtain funding	3.426	.580

Factor V generated 1.6 percent of the common factor variance.

Common Factor Variance

Common variance is the sharing of variance by two or more tasks. In such a sharing, the tasks are correlated and therefore have some traits in common. Thus, all tasks which cluster within a factor share some trait in common.

The cumulative percentage of the common variance accounted for in the analysis totalled 100 percent with the five factor solution. Table 11 presents the cumulative percentage breakdown.

TABLE 11

Percentage of Common Variance for the R-Mode Analysis

Factor Solution	Percentage	Cumulative Percentage
1	86.3	86.3
2	6.2	92.5
3	3.3	95.8
4	2.6	98.4
5	1.6	100.0

Factor I accounted for the majority of the common variance, 86.3 percent, encompassing 23 tasks. A sharp decrease is shown between Factor I and Factor II, with Factor II accounting for 6.2 percent, and containing four tasks. Less common variance is accounted for, as each factor solution is added, with Factors III, IV, and V accounting for 3.3, 2.6, and 1.6, respectively. The pattern of the common variance logically structured itself according to the factor analysis model, which supports the contention that the first generated factor should account for the largest percentage of common variance. The model's premise calls for each subsequent factor to generate less and less common factor variance. The results of this study verifies the model's requirements for common factor variance accountability.[1]

Figure 1 illustrates the pattern of the five-factor solution depicted graphically for this problem.

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[1](SPSS Inc. SPSS User's Guide, McGraw-Hill Book Co., N.Y., 1983. p. 657), and (Courtney, Analysis, 1984, p. 593)

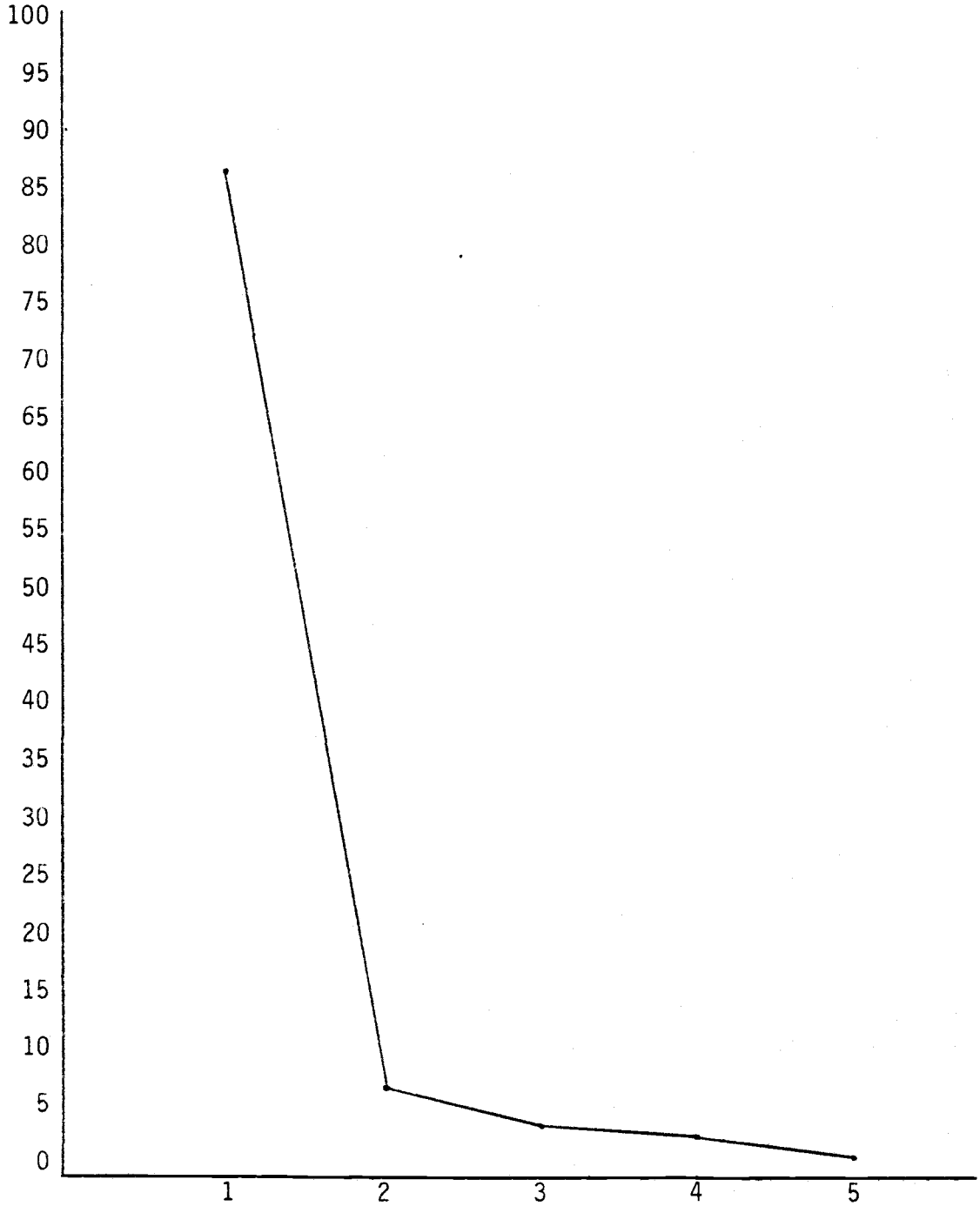

Figure 1. Common Factor Variance

Chapter IV

CONCLUSIONS AND IMPLICATIONS

The purpose of this study was to assess the perceived needs of three groups of educators in the state of Oregon by comparing scores denoting the importance of specific research tasks for each group. Each respondent judgmentally assigned a quantitative score to each statement to denote its relative importance to the job setting, based necessarily on individual (educational) background and experience; this score served as the dependent variable. The study involved four major dimensions:

1. the construction of the Research Task Analysis questionnaire which included research tasks peculiar to a number of selected groups of educators,
2. the assignment of a score to each task by a sample of 400 randomly selected Oregon educators to denote a judgment as to the importance of each task,
3. the statistical analysis of the data to determine the level of importance of the research tasks of three sample groups of educators,
4. the formulation of guidelines for curriculum planning activities in educational research and design.

The Dependent Variable

The dependent variable for the research was a scale score which

was judgmentally assigned by each of the randomly selected respondents in the study. The scale covered six interval points, with respondents assigning an importance description to each of 35 research-oriented tasks.

Reliability of the Instrument

The 35-item research instrument was developed with the assistance of a Delphi panel. A field test was conducted prior to data collection. The reliability was established using the analysis of variance procedure advocated by Hoyt and Stunkard (1952). The computed reliability for the instrument was +.980, a coefficient which provided a very high consistency indicator for the data collection device.

Conclusions of the Hypothesis Testing

Analysis of variance was used to test for significance for the hypothesis $\mu_1 = \mu_2 = \mu_3$. In all, a total of 35 F tests were made in the hypothesis testing with the level of significance being set at .05 in each instance. In cases where the null hypothesis was rejected, Tukey's ω method was employed to detect the location of specific differences.

The resulting F-tests revealed a general pattern of significant differences among the means for the three groups. The analysis of variance procedure showed rejections in 34 instances.

As Tukey's ω test was applied to the data analysis, the rejection pattern became particularly obvious as differences were noted between Group 2 and Group 3 ratings. Likewise, Group 1 and Group 2 means

showed difference patterns as the analysis was made. Twenty-three task statements were determined to be alike for Group 1 and Group 2 respondents while Groups 1 and 3 agreed with each other only three times. Means for Groups 1 and 2 were significantly different in 11 situations. All task statements except one had means which ranged above 3.000. Standard errors for these means fell between .120 and .212 for Group 1, .099 and .144 for Group 2, and .095 and .128 for Group 3. These standard errors are deemed to be acceptable in their ranges for a scale with a magnitude of six interval units.

Factor Analysis Conclusions

The R-mode of factor analysis was utilized to identify the clusters of common tasks for their importance of content. A five-factor solution generated the best fit for meeting the criteria of the clustering process. The minimum factor loading necessary for inclusion of a task in a cluster was set at .50; all factors were positive. The five factors of the tasks were identified as follows:

Factor 1 - Design Components (23 tasks)

Factor 2 - Types of Measurement and Data Presentation (4 tasks)

Factor 3 - Use of Computers (3 tasks)

Factor 4 - Data Gathering and Interpretation (4 tasks)

Factor 5 - Proposal Writing (1 task)

The ordering of each of the factors reflected the percentage of variance which was accounted for within the individual clusters, with Factor 1 contributing 86.3% of the common variance. Other factors (clusters) accounted for lesser amounts of common variance.

Implications

In traditional graduate programs in education, research and statistics courses draw upon one model and philosophy and presume to teach future educators, regardless of function, within a singular format. That is, all students receive one and the same training. The existing literature suggests that students begin research coursework with varying degrees of preparation and inclination; indeed, counseling students are often quite ambivalent about research. The obvious question arises as to whether or not a singular format serves all students equally well.

Many secondary school counselors and State Department of Education professionals are former teachers which highlights the importance and impact of teacher training programs. Judge (1982) points out that no other profession allows access to a field with only undergraduate preparation, and emphasizes that only minimal professional preparation is possible in the current educational system. The concept of a professional school preparation has been casually discussed over time, but there is increasingly a serious note to the discussion (Carroll, 1983). Carroll proposes as a prerequisite a four-year bachelor's degree in liberal arts, followed by professional preparation of teachers reserved for the graduate level. This training is comparable to other professions, and requires greater subject area expertise through better controls and higher standards. If professional schools become the new training ground for teachers, such a professional graduate experience may well make research an integral program component.

Bearing general implications in mind, there are a number of specific implications which could easily translate into practical considerations, based upon the review of literature and the information derived from this study. Included are:

1. Tasks with means of 3.000 ("somewhat important") and higher (34 tasks in all), should be included in a broad, general educational research curriculum. For the present study, this excludes only one topic, Task 29 (Identify properties of nominal, ordinal, and interval measurement scales), which may, in reality, be prerequisite to the mastery of other tasks which were assigned higher means in the study.
2. For specific groups, namely Groups 1 (State Department of Education professionals), 2 (college and university instructional faculty) and 3 (secondary school counselors), the following implications evolved:

   Group 1 - Tasks with means of 3.000 and higher (Tasks 1-28, 30-35) should be included in a curriculum preparing individuals to work in a State Department of Education or similar capacity.

   Group 2 - Tasks with means of 3.000 and higher in this group included all 35 tasks, which reflects the importance of these research tasks to individuals preparing and/or involved in higher education.

   Group 3 - Tasks with means of 3.000 numbered 15 (Tasks 1,2,4,5,6,12,13,20,22,23,24,26,33,34,35), and should be included in a curriculum established for the training of counselors.

3. Clusters of tasks formulate the basis for course organization. In all, five areas of content are suggested for the 35 tasks included in this research. Courses could be organized around this framework of five factors.
4. The procedures of analysis of variance and factor analysis formulate an appropriate basis for the assessment of task data. This methodology should be encouraged as a means of studying curriculum content requirements.

Suggestions for Further Study

The following suggestions are based on the findings of the study:

1. The present research study should be replicated in the state of Oregon; differences may surface between respondents, particularly over time.

2. Studies should be conducted in other states of the northwest; findings could prove useful to students who "transfer" credits, and eventually, if studies were conducted in several states, an effort could be made to create national curriculum guidelines and geographic reciprocity for certification purposes.

3. Research looking specifically at respondents' demographic characteristics, such as sex, age, and number of years in profession, should be conducted to learn if and what types of influences these factors may exert. A multiple regression design is recommended for such a research effort.

4. It is desirable to suggest an evaluation of the methods of teaching research and statistics courses, as well as any tutorial assistance programs, to ascertain differences in approaches and

support provision to students. Mentoring as a practice of support and nurturance of involvement in research should be studied more extensively.

5. Little followup research has been conducted regarding the professional preparation and involvement afforded by research assistantship recipients (Worthen & Roaden, 1975) in encouraging research by degree holders after completion of the degree. This aspect of preparatioon needs to be researched.

6. Research articles in widely read professional journals should be analyzed in terms of content, research design and statistics, and postulation of inferences, implications, and recommendations, to determine which of the highest ranked tasks from the present study have been employed and what types of tasks might have been used but were not included in this study.

7. Cognitive levels of tasks which were assessed in the present research need to be identified for purposes of curriculum planning. A future assessment of cognitive domain aspects is suggested.

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APPENDICES

APPENDIX A

DELPHI PANEL MEMBERS

Faculty in Education

F. Cross

S. Stearn

D. Thomas

Administrators

L. Bick

R. Hajduk

T. Howard

Oregon State Department of Education

R. Clemmer

W. Monthey

E. Vinarskai

Elementary Teachers

S. Howard

G. Roush

C. Sixberry

Secondary Counselors

J. Colonna

A. Davis

N. McBride

Secondary Teachers

E. Bick

C. Roush

J. Sixberry

APPENDIX B

Dear :

Thank you for your willingness to contribute your time and expertise to a research project that may enhance curricula updating at Oregon State University.

As a member of a Delphi panel your role is to determine what people in your field believe to be important tasks required in educational research and related activities. The basis of the Delphi method is expert informed intuitive judgment.

The Delphi method was developed in the 1950's by the Rand Corporation under the direction of Olaf Helmer. The Delphi procedure is as follows:

1. Each Delphi panel member is provided a list of tasks that may be required in educational research. Feedback provided by panel members is the basis for selecting items that will be included in the main research questionnaire.

2. Each member is asked to analyze and evaluate each item with the purpose of deciding whether to RETAIN, REJECT, or REVISE the statement. It is important that each member adds any task he/she feels is important to educational research that has not been included.

3. The second list of tasks is to be generated from the analysis of the first evaluation by the Delphi panel.

4. If needed, a third list will be provided for panel consideration in order to reach consensus on items to be included on the final questionnaire.

We appreciate your interest in research leading to educational improvement. Please return this list within three days to help us maintain our tight time schedule. We appreciate this extra consideration. A self-addressed envelope is provided.

Sincerely,

E. Wayne Courtney	H. James Burton	M. A. Soukup
Professor	Project Co-Director	Project Co-Director

APPENDIX C

ID:_____

RESEARCH TASK ANALYSIS

Instructions: Listed below are 35 research tasks which may or may not be important to you in your present position. Please rate each item carefully, based on its importance to you, by circling the appropriate number to the right.

		Very little importance	Little importance	Somewhat important	Important	Very important	Extremely important
1.	Conduct necessary "non-instrument" data collection techniques, such as observation and interviews	1	2	3	4	5	6
2.	Identify factors which jeopardize internal and external validity	1	2	3	4	5	6
3.	Obtain information through Dissertation Abstracts, Indices, and data-based computer retrieval systems	1	2	3	4	5	6
4.	Select appropriate standardized tests or instruments	1	2	3	4	5	6
5.	Draw appropriate implications or generalizations from data analysis	1	2	3	4	5	6
6.	Evaluate research reports	1	2	3	4	5	6
7.	Identify the sample for a research study	1	2	3	4	5	6
8.	Determine the type of research (descriptive, historical, experimental) that should be utilized	1	2	3	4	5	6
9.	Define general principles of instrument construction, including reliability and validity	1	2	3	4	5	6
10.	Write and submit proposals to obtain funding . .	1	2	3	4	5	6
11.	State appropriate assumptions and definitions for a research study	1	2	3	4	5	6
12.	Construct and use rating scales, checklists, questionnaires, interview schedules, and observation systems	1	2	3	4	5	6

13. Interpret computer output 1 2 3 4 5 6

14. Apply sampling theory and techniques, including variations of simple random sampling. 1 2 3 4 5 6

15. Specify data necessary for testing an hypothesis 1 2 3 4 5 6

16. Understand the effect of measurement error on the precision of an experiment 1 2 3 4 5 6

17. Locate publication outlets for research reports, articles, or books 1 2 3 4 5 6

18. State the purpose and rationale for a research project 1 2 3 4 5 6

19. Apply techniques for increasing precision in research designs 1 2 3 4 5 6

20. Understand the capabilities of computer systems . 1 2 3 4 5 6

21. Assess feasibility constraints (time, access to subjects, control, money) which are associated in conducting a study 1 2 3 4 5 6

22. Report research findings and implications 1 2 3 4 5 6

23. Translate data analysis into recommendations . . 1 2 3 4 5 6

24. Collect data in a systematic manner 1 2 3 4 5 6

25. State the hypotheses in a research study 1 2 3 4 5 6

26. Understand measures of dispersion (percentiles, range, standard deviation) 1 2 3 4 5 6

27. Organize the research process (hypothesis, evidence, inferences) 1 2 3 4 5 6

28. Use randomization and sample selection as a means of experimental control 1 2 3 4 5 6

29. Identify properties of nominal, ordinal, and interval measurement scales 1 2 3 4 5 6

30. Establish confidence levels in the testing of hypotheses 1 2 3 4 5 6

31. Specify appropriate independent and dependent variables for a study 1 2 3 4 5 6

32. Apply appropriate statistical techniques for the analysis of a particular set of data 1 2 3 4 5 6

33. Utilize methods of presenting data (charts, graphs, tables) 1 2 3 4 5 6

34. Understand measures of central tendency (mean, median, mode) 1 2 3 4 5 6

35. Use computer equipment for data analysis 1 2 3 4 5 6

RESPONDENT INFORMATION

Sex:	Age:	Highest degree completed:
_____Female	_____20-30	_____Master's
_____Male	_____31-40	_____Doctorate
	_____41-50	
	_____51-60	
	_____over 60	

APPENDIX D

Dear Colleague:

The School of Education at Oregon State University is updating the curriculum in the area of educational research in order to meet the current needs of the educational community. The tasks required in conducting and utilizing research are numerous. Which ones, then, are most important and should be included in a curriculum? Your experience and opinions are highly valued in this important endeavor.

You are among a small group of randomly selected educators representing elementary and secondary teachers, secondary counselors, school administrators, State Department of Education professionals, and college and university instructors being asked to give their opinions; therefore, your response takes on added importance.

We want to assure you that confidentiality is being maintained. The questionnaire has an identification number for mailing purposes only, allowing us to check your name off of the mailing list when your questionnaire has been returned. In order for your responses to be carefully considered, we would appreciate having the questionnaire sent back not later than one week from today. An addressed, stamped envelope has been provided for your convenience.

The results of this research will be made available to individuals involved in curriculum planning at Oregon's educational institutions. You may receive a summary of results by requesting one through the Dean's Office in the School of Education after December 15, 1983.

Thank you for your assistance.

Sincerely,

Robert D. Barr	Margaret A. Soukup	H. James Burton
Dean	Project Co-Director	Project Co-Director

APPENDIX E

Dear Colleague:

About three weeks ago I wrote to you seeking your opinion on the importance of specific tasks required in conducting and utilizing educational research. Your responses will be used to help shape and update curriculum in educational research at Oregon State University. As of today I have not yet received your completed questionnaire.

I am writing to you again because of the significance each questionnaire has to the usefulness of this study. Your name was drawn through a scientific sampling process in which every secondary counselor, State Department of Education professional, and state college and university instructors in Oregon had an equal chance of being selected. In order for the results of this study to be truly representative of the opinions of these groups of educators it is essential that each person in the sample return the questionnaire.

If you have already completed and returned your questionnaire, please accept my sincere thanks. In the event that you did not receive a questionnaire, or it got misplaced, I have enclosed another questionnaire and an addressed, stamped envelope for your use. Please complete it today and mail it back to me tomorrow.

Your contribution to the success of this study is greatly appreciated.

Sincerely,

Margaret A. Soukup
Project Co-Director

Enclosures (2)