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An Investigation of the Interaction of Educational Cognitive Style, Teaching Style, and Instructional Area for Selected Community College Instructors

Francis W. Crookes
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AN INVESTIGATION OF THE INTERACTION OF EDUCATIONAL COGNITIVE STYLE,
TEACHING STYLE, AND INSTRUCTIONAL AREA FOR SELECTED
COMMUNITY COLLEGE INSTRUCTORS

by

Francis W. Crookes

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Doctor of Education

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Francis W. Crookes
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TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>ix</td>
</tr>
<tr>
<td>I INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Background for the Study</td>
<td>1</td>
</tr>
<tr>
<td>Importance of the Study</td>
<td>4</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>8</td>
</tr>
<tr>
<td>Definitions of Terms</td>
<td>9</td>
</tr>
<tr>
<td>Questions to be Answered</td>
<td>13</td>
</tr>
<tr>
<td>Assumptions Underlying the Study</td>
<td>14</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>15</td>
</tr>
<tr>
<td>Organization of the Study</td>
<td>15</td>
</tr>
<tr>
<td>II REVIEW OF RELATED LITERATURE</td>
<td>17</td>
</tr>
<tr>
<td>Cognitive Style: A Psychological Perspective</td>
<td>17</td>
</tr>
<tr>
<td>Educational Cognitive Style</td>
<td>33</td>
</tr>
<tr>
<td>Teaching Style</td>
<td>46</td>
</tr>
<tr>
<td>Instructional Area</td>
<td>54</td>
</tr>
<tr>
<td>Cognitive Style and Teaching Style</td>
<td>56</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>57</td>
</tr>
<tr>
<td>III RESEARCH METHODOLOGY</td>
<td>59</td>
</tr>
<tr>
<td>Population</td>
<td>59</td>
</tr>
<tr>
<td>Sample</td>
<td>61</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>62</td>
</tr>
<tr>
<td>Validity</td>
<td>63</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>64</td>
</tr>
<tr>
<td>Data Gathering Procedures</td>
<td>65</td>
</tr>
<tr>
<td>Mapping</td>
<td>66</td>
</tr>
<tr>
<td>Methods of Analysis</td>
<td>69</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>70</td>
</tr>
<tr>
<td>IV ANALYSIS OF THE DATA</td>
<td>71</td>
</tr>
<tr>
<td>Overview</td>
<td>71</td>
</tr>
<tr>
<td>Methodology</td>
<td>71</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>109</td>
</tr>
<tr>
<td>V CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS</td>
<td>111</td>
</tr>
<tr>
<td>Overview</td>
<td>111</td>
</tr>
<tr>
<td>Conclusions</td>
<td>112</td>
</tr>
<tr>
<td>Implications for Administrators</td>
<td>118</td>
</tr>
<tr>
<td>Research Recommendations and Implications</td>
<td>120</td>
</tr>
<tr>
<td>Summary</td>
<td>124</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>126</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>133</td>
</tr>
<tr>
<td>Appendix A, Cognitive Style Map Results for the Applied Arts and Sciences</td>
<td>133</td>
</tr>
<tr>
<td>Appendix B, Cognitive Style Map Results for the Arts and Sciences</td>
<td>135</td>
</tr>
<tr>
<td>Appendix C, Teaching Style Map Results for the Applied Arts and Sciences</td>
<td>137</td>
</tr>
<tr>
<td>Appendix D, Teaching Style Map Results for the Arts and Sciences</td>
<td>139</td>
</tr>
<tr>
<td>Appendix E, Sample Cognitive Style Map</td>
<td>141</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>PAGE</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Appendix F, Cognitive Style Interest Inventory</td>
<td>143</td>
</tr>
<tr>
<td>Appendix G, Teaching Style Inventory</td>
<td>158</td>
</tr>
<tr>
<td>Appendix H, The Educational Sciences</td>
<td>163</td>
</tr>
<tr>
<td>TABLES</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>1</td>
<td>Analysis of Variance for Cognitive Style: Symbols and Their Meanings Between Applied Arts and Sciences and the Arts and Sciences Instructional Areas</td>
</tr>
<tr>
<td>2</td>
<td>Analysis of Variance for Cognitive Style: Cultural Determinants Between Applied Arts and Sciences and the Arts and Sciences</td>
</tr>
<tr>
<td>3</td>
<td>Analysis of Variance for Cognitive Style: Modalities of Inferences Between Applied Arts and Sciences and Arts and Sciences Instructional Areas</td>
</tr>
<tr>
<td>4</td>
<td>Analysis of Variance for Teaching Style: Between Applied Arts and Sciences and Arts and Sciences Instructional Areas</td>
</tr>
<tr>
<td>5</td>
<td>Common Cognitive Style Elements in Persons</td>
</tr>
<tr>
<td>6</td>
<td>Common Cognitive Style Elements in Processes</td>
</tr>
<tr>
<td>7</td>
<td>Common Cognitive Style Elements in Properties</td>
</tr>
<tr>
<td>8</td>
<td>Common Cognitive Style Elements in Theoretical Predominance</td>
</tr>
<tr>
<td>9</td>
<td>Common Cognitive Style Elements in Qualitative Predominance</td>
</tr>
<tr>
<td>10</td>
<td>Common Cognitive Style Elements in Reciprocity</td>
</tr>
<tr>
<td>11</td>
<td>Common Cognitive Style Elements in Predominant Style</td>
</tr>
<tr>
<td>12</td>
<td>Common Cognitive Style Elements in Adjustive Style</td>
</tr>
<tr>
<td>13</td>
<td>Common Cognitive Style Elements in Flexible Style</td>
</tr>
<tr>
<td>14</td>
<td>Common Cognitive Style Elements in Authoritarian Style</td>
</tr>
<tr>
<td>TABLES</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>15</td>
<td>Common Cognitive Style Elements in Permissive Style</td>
</tr>
<tr>
<td>16</td>
<td>Analysis of Similar Groups of Individuals Based in Teaching Style</td>
</tr>
</tbody>
</table>

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# List of Figures

<table>
<thead>
<tr>
<th>Figures</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cognitive Style Map</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>Teaching Style Map</td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>Means for the Educational Cognitive Style Elements: Symbols and Their Meanings for Applied Arts and Sciences and Arts and Sciences</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>Means for the Educational Cognitive Style Elements: Cultural Determinants for the Applied Arts and Sciences and the Arts and Sciences</td>
<td>78</td>
</tr>
<tr>
<td>5</td>
<td>Means for the Educational Cognitive Style Elements: Modalities of Inference for Applied Arts and Sciences and the Arts and Sciences</td>
<td>80</td>
</tr>
<tr>
<td>6</td>
<td>Means for the Teaching Style Elements of Emphasis and Symbolic Mode</td>
<td>84</td>
</tr>
<tr>
<td>7</td>
<td>Means for the Elements of Demeanor Including: Predominant, Switcher (Adjustive) and Flexible</td>
<td>85</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Background for the Study

Societal changes in the past decade have exerted unique pressures upon all segments of higher education in general and the community colleges in particular. As one of the more recent additions to the higher educational scene, the community college has developed into a mature institution with unique students, faculties, administrations, challenges, and problems.

The community college has realized an increasing share of the higher education enrollments, resulting in intense competition for the limited amount of state and federal monies available to post-secondary educational institutions (Thornton, 1972, pp. 115-136). Medsker and Tillery (1971, p. 13) report that the staff of the Carnegie Commission on Higher Education estimated that between 3.6 and 4.3 million students will be enrolled in community colleges throughout the country by 1980. This projection seems to be accurate as The Chronicle of Higher Education reports enrollments in the Fall of 1976 were 3,930,000 compared with 3,850,997 in the Fall of 1975 (Magarrell, November 22, 1976, p. 3).

In addition to the increase in community college enrollments, a diverse student population has developed creating a need for programs and offerings which emphasize life-long learning for the citizens within community college districts (Bushnell, 1973, pp. 115-136).
This diverse student population has also required an increase in occupational and career education programs.

The movement toward accountability for higher educational institutions has had impact upon the community college as well. Pressures from federal, state, and local officials have resulted in a search for new methods of performance assessment and decision-making in the community colleges (Bowen, 1974, pp. 1-3).

Rapid, and in some cases, unplanned expansion, coupled with predictions for continued growth, have created a climate of reappraisal for current administrative procedures. This reassessment leads to the conclusion that community colleges must search for viable alternatives to traditional practices (Richardson, 1972, p. 16).

The examples enumerated in the previous paragraphs by no means construct a complete picture of the current pressures upon the community college faculties and administrations. They are intended to illustrate the depth of the existing circumstances which have formed a theoretical basis for this study.

"Never before in the history of higher education has there been such an extensive effort to analyze the effects of the traditional system and to explore fresh alternatives" (Watson, 1974, p. 2). The alternatives to which Watson alludes have taken many forms in the community college, including individualized instructional methodology, electronic technology applications to administration and learning, self-directed study, management by objectives, evaluation of life experiences for credit, and open learning laboratories. In many cases these innovative practices have been implemented with little
regard for the teachers' or administrators' ability and readiness to accept a given strategy.

Scant attention has been devoted to the instructor as a functioning part of the community college system. The relationship of the individual instructor to various roles, practices, concerns, and strategies has not been clearly defined. Practitioners often question, though not necessarily overtly, the suitability of instructional strategies of their colleagues. This is often done without an adequate empirically based foundation for judgement.

Research, for the most part, has been concerned with demographic characteristics of instructors. Medsker and Tillery (1971, pp. 87-104), for example, used data collected by the American Association of Junior Colleges to construct an assortment of characteristics concerning community college instructors, considering age, educational degrees, recruitment sources, length of time employed by the institution, and community college attendance. Bushnell (1973, pp. 30-44) reported and analyzed faculty characteristics including degrees, career aspirations, and tenure. Others, including Gleazer (1967), Wilson and Gaff (1969), and Morey (1972) have also studied various forms of demographic data concerning community college instructors.

Demographic data are important to understanding community college instructors in relation to their institutions. However, these particular data do not provide information useful in relating people to instructional processes. Also these data do little to provide an understanding of intra-institutional relationships or to help supply a theoretical framework for analyzing organizational effectiveness.
It seems that, in order to provide usable information for the evaluation of instructional programs, the development of instructional tactics, and in-service educational experiences which are effective for individual faculty, personal traits more closely aligned to the instructional process need to be investigated. These personal characteristics should be assessed with particular emphasis upon the interaction with the teaching strategies employed in the teaching-learning situation (Cohen, 1973, pp. 101-119).

Thus this study is concerned with investigating educational cognitive style as it interacts with the instructor's response to the learning situation (teaching style) within the context of the community college.

Importance of the Study

From the literature it is apparent that scant attention has been devoted to the cognitive style of community college instructors. There appears to be a paucity of knowledge concerning how instructors in a community college interpret meaning from their environment and how that interpretation influences their responses to the teaching-learning situation.

The question which needs to be addressed is: How does the way in which an instructor interprets information and derives meaning, interact with and influence teaching style in the context of the teaching assignment?

The data derived from investigating this question are important for both teachers and administrators in designing and implementing
instructional techniques to meet the needs of a diverse student population. The results of this study would appear to have implications for the selection, evaluation, and placement of instructional staff as well as administrative policy development.

The limited base of information concerning the teacher in the community college setting will be expanded by investigating educational cognitive style and teaching style within the context of the institution. The data from this study would be utilized to provide direction for designing individualized staff development programs aimed at increasing the effectiveness of institutional efforts in delivering in-service education.

The information gained in this study will add to the meager amount of personal trait data which are currently available concerning the community college instructor in the context of the teaching-learning environment. It will serve to indicate to the researcher, administrator, and teacher that these are additional factors to be considered when designing instruction, evaluating personnel, or writing educational policies.

The movement of the community college into career or occupational education has often occurred with little dialogue and communication among instructors in the liberal arts areas. The relationship between the two educational areas has been discussed and debated for the past decade, yet little if any research has been accomplished to investigate similarities, compatibilities, or differences in teacher characteristics or teaching styles (Bushnell, 1973, p. 100).
The current emphasis on accountability in higher educational institutions has resulted in such practices as competency-based teacher evaluation, educational auditing, models for teacher effectiveness, and the design of performance appraisal systems. The emphasis within the new evaluation design is upon the "outputs" of the teaching-learning situation rather than descriptions of personal traits which supervisors arbitrarily established as manifestations of successful teaching (Redfern, 1973, pp. 51-63). Evaluation processes, i.e., accountability systems, must recognize that many factors affect the outcomes of any teaching-learning situation. Organizational characteristics, administrative style, teaching methodology, and community characteristics may all have varying impact upon the delivery of educational experiences for students (Kropp, 1973, pp. 77-87). The relationship of personal characteristics, such as the elements of educational cognitive style (for a definition see Chapter II, p. 33) to the process of accountability, e.g., evaluating educational outcomes, has not been clearly established either in research or practice. Perhaps the information gained from an exploratory study can assist in the formation of a theoretical foundation for more extensive investigations in this fertile area.

Organizational structures, particularly at the instructional division and departmental level in the community college, have come under close scrutiny in recent years. The advent of nontraditional learning programs, interdisciplinary course offerings, and individualized instruction has forced community colleges to assess the organization of instruction and faculty by content matter area. Tillery
(1970) in a nationwide survey of community colleges found that the traditional department structures were changing with more interest in interdisciplinary emphasis. This effort toward changing organizational structure should offer some hope of breaking the communication barriers within the conventional college framework. An examination of the interaction of educational cognitive style with occupational and liberal arts areas of the community college could provide some data applicable in assisting institutions considering reorganization of current structure. The information gained might also assist in the formation of a framework of analyzing organizational communication, particularly on an interdepartmental and interdisciplinary level.

In recent years in-service programs for community college faculties have multiplied, resulting in a potpourri of programs and experiences. In many cases they are poorly conceived and are not integrated with either the needs of the institution or the individual. O'Banion maintains that to be effective the in-service programs must be, "... integrated into the fiber of the organization" (O'Banion, 1973, p. 28). He further emphasizes the need for the integration to occur based upon individuals' specified needs. It is at this juncture that the application of the results of this study becomes potentially very important. It is apparent that the concept of educational cognitive style could be applied to in-service education and staff development. Much more information concerning the cognitive characteristics of teachers and the relationship of those characteristics to the teaching-learning environment is needed before this application can occur. The data derived from this study could provide information
which would enhance the scant knowledge now available.

Essentially, the information gained in the study of educational cognitive style and teaching style as they interact with instructional areas in the community college may be appropriately applied for the following purposes: 1) to provide a frame of reference for instructors wishing to vary instructional strategies; 2) to provide information which could assist in the design of instructional evaluation procedures, taking into account the interaction of the variables studied; 3) to provide information which might be utilized in the selection of faculty and administrators; 4) to provide a data base for the analysis of communication between instructional areas; and 5) to provide an information base for the generation of hypotheses for expanded study.

Statement of the Problem

The purpose of the study is to investigate the possible interaction of educational cognitive style, teaching style, and instructional area for a selected population of community college instructors. Operationally, the purpose of the study will be to: 1) determine the educational cognitive style of individual instructors in a specific community college within two instructional areas, Arts and Sciences and Applied Arts and Sciences; 2) identify the teaching style of individual instructors included in the sample; and 3) compare the selected components of educational cognitive style and teaching style across instructional areas.
Definitions of Terms

In order to establish mutual understanding of specialized terminology frequently cited throughout the study, it is necessary to define the terms used. It should be recognized that the definitions are intended for use in the context of this study and may not necessarily coincide with common usage of similar terms described in other research efforts.

**Applied Arts and Sciences area**

The Applied Arts and Sciences area is defined as that part of the community college which is designed primarily to promote employment upon receipt of the associate degree. Such credits earned are generally not transferred for application toward a bachelor degree program (although some credits do transfer). These programs are usually termed occupational, technical, and career programs. For this study the subject matter areas of industrial technology, business, and health technology are included in the Applied Arts and Sciences.

**Arts and Sciences area**

The Arts and Sciences area is defined as that part of the community college program which is designed primarily for the transfer of credit to four-year institutions offering bachelor degree programs. These studies are traditionally termed liberal arts. For this study, it will include three subject-matter areas: 1) language; 2) science-mathematics; and 3) social science.
**Cartesian product**

A Cartesian product is a set constructed by taking each element in a set and pairing it with every element in a second or third set. For example, if $A = \{abc\}$ and $B = \{de\}$, then $A \times B = \{(a,d), (a,e), (b,d), (b,e), (c,d), (c,e)\}$. The $\times$ does not denote any algebraic sign or numerical function but indicates that the elements from each set must be combined to determine the exact reference point of each element in the profile (Davis, 1972, p. 22). This concept is used in conjunction with educational cognitive style to explain the relationships between various elements in the three sets: symbolic orientation, cultural determinants, and modalities of inference.

**Cognitive mapping**

Cognitive mapping is a process whereby a graphic representation of an individual's cognitive style, including major and minor orientations, is constructed. The result is the development of a picture of the elements which occur in an individual's style.

**Community college**

The community college is a public two-year associate degree granting institution with a diversified curricula including technical, occupational, and liberal arts college transfer programs, designed to serve a local community or specified geographical area.

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Community college instructor

The community college instructor, within the context of this investigation, will be defined as an individual currently teaching a full load of classes (at least fourteen contact hours) in the community college. Three years experience in community college teaching is also a criterion for inclusion in the sample.

Cultural determinants

For the purpose of this study, cultural determinants refer to the relatively stable social relationships of family and associates, plus individuality which influences perceptions.

Educational cognitive style

Within the context of this study, educational cognitive style is represented by the scores of individual instructors on the Cognitive Style Interest Inventory. The scores compose the Cartesian product of three sets of elements including symbolic orientation, cultural determinants, and modalities of inference.

Instructional area

The instructional area, for the purpose of this study, refers to the area in which an instructor is assigned for the majority of his teaching responsibility with the community college.

Operationally, an instructor will be designated as being assigned to one of two areas: the Arts and Sciences area (liberal arts transfer
programs) and the Applied Arts and Sciences area (occupational/career programs).

**Modalities of inference**

Within the context of this study, modalities of inference refers to the mode of decision making which a person uses to derive meaning. There are two basic modes of inference: inductive and deductive.

**Symbolic orientation**

Within the context of the study, symbolic orientation refers to the two types of symbols people use to acquire knowledge: theoretical and qualitative. Theoretical symbols consist of words and numbers. Qualitative symbols refer to sensory and performance data.

**Teaching style**

Within the context of this study, teaching style refers to an instructor's response to the teaching-learning situation within the community college.

Operationally, it is represented by the scores of individual instructors as they responded to the items on the Teaching Style Inventory in the three generic elements: 1) demeanor, which includes the three dimensions of predominant, adjuster, or flexible style, denoted as either authoritative or permissive; 2) emphasis, which describes the level of concern the instructor has for persons, processes, and properties; and 3) symbolic mode, which indicates the preferred method of presenting instructional material including qualitative...
predominant, reciprocity, and theoretical predominance (Hill, 1969, pp. 6-7). A comprehensive discussion of the three generic elements in teaching style is presented in Chapter II on pages 52-54.

Questions to be Answered

Much of the study done in the area of educational cognitive style has been largely exploratory in nature. At this stage, the research is directed toward developing a base of information for further study. The investigator, as a result, did not attempt to test hypotheses but directed his efforts toward answering a set of questions aimed at generating areas for further study.

The investigation concerns itself with the following research questions:

Question One: Does the educational cognitive style of teachers vary between instructional areas within the community college?

This question is concerned with the degree to which the educational cognitive style of teachers varies between the two instructional areas (Arts and Sciences and Applied Arts and Sciences). The three dimensions of educational cognitive style (symbolic orientation, cultural determinants, and modalities of inference) will be analyzed in the context of the two instructional areas. Twenty-seven elements within the three dimensions will be evaluated.

Question Two: Does the teaching style of instructors vary between the instructional areas within the community college?

This question is concerned with the various components of
teaching style, namely, demeanor, theoretical, and qualitative predominance. It is concerned with persons, properties, and processes as they vary between instructional areas (Arts and Sciences and Applied Arts and Sciences) within Kellogg Community College.

Question Three: How do the dimensions of educational cognitive style and the components of teaching style interact with instructional area in the community college setting?

The dimensions of educational cognitive style and the components of teaching style will be analyzed as they interact within and between the two instructional areas (Arts and Sciences and Applied Arts and Sciences).

Assumptions Underlying the Study

The research efforts involved in the study are predicated upon the following basic assumptions:

1) Inherent in the design of the study is the assumption that the responses of the subjects to both the Cognitive Style Inventory and the Teaching Style Inventory represent their perceptions at the time.

2) It is assumed that the construct of cognitive style has a referent in the environment outside of the research setting, that it is measurable, and that it has implications for the teaching and learning of different types of subject matter.

3) It is further assumed that teaching style has a referent in the environment outside of the research setting, and that it has implications for teaching and learning.
4) The instruments used in the study measure perceptions of educational cognitive style and teaching style.

Limitations of the Study

The limitations for this research study are as follows:

1) Because of the in-depth nature of the instruments used and their length, the study was limited to one random sample of forty faculty members of a community college in the state of Michigan.

2) Community college instructors with less than three years experience and teaching a partial load of classes were excluded from this study.

3) Behavioral observations were not utilized within the context of this study.

Organization of the Study

This research report is divided into five chapters. Chapter I has served to provide a background for the study, has described the specified problem under investigation, has defined specialized terminology, has discussed the assumptions and limitations of the study, and has raised three important questions to be answered.

Chapter II contains a review of the literature relevent to cognitive style and teaching style within the community college setting.

Chapter III specifies the research procedures and methodology employed. Descriptions of the population and sample are included, as are the methods of data collection, explanations of the specific procedures used, and a discussion of the analytical techniques utilized.
Chapter IV discusses the analysis of the data involving the application of the analytical techniques and a statement of the findings for each research question.

Chapter V provides the conclusions, implications, recommendations, and questions for further research, based on the findings of this study.
CHAPTER II

REVIEW OF RELATED LITERATURE

The primary purpose of the study, as presented in Chapter I, was to investigate the possible interaction of educational cognitive style, teaching style, and instructional area for a selected population of community college instructors. This chapter will expand the theoretical framework for this study as outlined in the previous chapter by reviewing the literature pertinent to the topic. This review will be centered essentially in a discussion of five dimensions: 1) the general area of cognitive style as conceptualized by the psychologists; 2) educational cognitive style; 3) teaching style; 4) instructional area; and 5) the relationship of cognitive style and teaching style.

Cognitive Style: A Psychological Perspective

During the past twenty years psychologists have investigated the construct of cognitive style within the context of the human personality.

The concept of style

Prior to embarking upon discussion of the construct of psychological cognitive style, it would seem appropriate to comment briefly upon the concept of style. In the common usage of the English language, the word style has assumed several meanings: 1) a manner of
acting or performance; 2) a model of expression through writing, painting, or performance; and 3) a peculiarly distinctive technique or method of an individual (Webster's International Dictionary, 1966, p. 2271). The term style has also developed a common usage in regard to a standard for many personal articles such as automobiles, clothing, jewelry, and housing.

In the late 1920's, the psychologist Alfred Adler applied the concept of style to human behavior. The style of life, as Adler (1927) called it, referred to a distinctive collection of traits, interests, values, and desires which are present in every behavior a person exhibits. According to Adler, this style directs a person's behavior in terms of what will be learned, how learning will take place, and what experiences will be incorporated into an individual's personality. The style of life for an individual is unique to that person; no two styles are alike. Allport (1937), a few years later, incorporated the concept of style into his framework for human behavior. He described style as the patterns and consistencies of a variety of human behaviors. The work of both Adler and Allport has formed a theoretical basis for a modern psychological description developed by Witkin, who asserts that:

Common experience, mirrored in everyday language attests to the reality of personal styles, "that's his style", we comment about something a person says or does, and even more often, we make such an inference without being aware of it (Witkin, 1973, p. 21).

Witkin continues to define style in psychological terminology by indicating that styles are ways of characterizing people in "holistic" fashion rather than in psychological "bits and pieces."
Witkin claims that:

Because a person's style is more comprehensive, knowledge about it provides a far better basis for anticipating his behavior in other circumstances than any piece of his behavior taken by itself. Common experience also tells us that styles occur in a variety of combinations. Characterizing people on the basis of their unique patterns of styles is a way of emphasizing individuality (Witkin, 1973, p. 21).

According to Witkin, the earliest views of cognitive style were largely restricted to the cognitive domain and were conceived as self-consistent modes of functioning. Today, however, cognitive styles are conceptualized as, "... in fact manifestations, in the cognitive domain of still broader dimensions of functioning, that cut across other psychological domains including personality and social behavior" (Witkin, 1973, p. 22).

**Psychological cognitive style**

Much of the study of the construct which Witkin and others term cognitive style is rooted in the work of Jean Piaget, perhaps the most influential figure in cognitive development theory. Piaget was among the first to recognize cognitive processes in the form of a structure. In his efforts to place human growth in a systematic structured framework, he conceptualized five stages of development: sensorimotor intelligence, preconceptual thought, intuitive thought, concrete operations, and formal thought (Piaget, 1952).

Jerome Bruner (1964) utilized Piaget's research as a basis for the development of a cognitive theory which involves three progressive modes of representation: enactive, iconic, and symbolic.
Bruner's theory does not feature fixed biological stages but involves growth contingent upon the learning environment. Bruner's work has contributed significantly to the concept of cognitive style.

The discussion concerning the psychological perspective of cognitive style summarizes three distinct approaches to the construct. Although some interrelationship apparently exists between the different styles, it is apparent that each investigator has attempted to develop a relatively discrete theoretical framework.

The purpose of this summary is to provide the reader with a background of the similarities and diversities of the various psychologists involved in the conceptualization of cognitive style. It is this background that is purported to provide a developmental base for the construct of educational cognitive style utilized in this study.

Within the framework of cognitive style the investigator will discuss three distinct conceptualizations of current psychological researchers and theorists: 1) the field-dependent/independent approach as described by Witkin, Dyk, Fattison, Goodenough, and Karp (1962); 2) the cognitive controls concept as developed from the research of Gardner, Holzman, Klein, Linton, and Spence (1959); and 3) the construct of cognitive style characterized by three dimensions: analytic-descriptive, inferential-categorical, and the relational-contextual has been researched by Kagan, Moss, and Sigel (1963). The remainder of this section will briefly discuss each conceptualization in an effort to afford the reader a working knowledge of the current thinking concerning the construct as perceived by various psychologists.
Field-dependence/independence

Much of the pioneering work in cognitive style has been done by Witkin concerning a construct which he defines as field-dependence/independence. This construct is probably the most studied of any cognitive style dimension.

Witkin (1975) presents two antithetical functions, utilizing the Rod and Frame Test and Embedded Figures Test to determine an individual's tendency to be either field-dependent or field-independent.

The Rod and Frame Test utilizes a luminous square frame presented to a subject in a darkened room. The frame may be rotated about its center clockwise or counterclockwise. A luminous rod within it can also be tilted independently. The subject is asked to adjust the rod to a position which he perceives as upright regardless of the tilt. The person who is able to adjust the rod to the true vertical is considered to be field-independent. The person who adjusts the rod to the "tilt" of the frame is considered to be field-dependent.

The Embedded Figures Test involves presenting the subject with a simple figure, then asking him to extract that figure from a complex array. As in the Rod and Frame Test, the subject who can extract the figure from the context of the visual framework is considered to be field-independent. The person who has difficulty distinguishing the simple figure from the complex array is said to be field-dependent.

According to Witkin, field-independent individuals are able to perceive a component in a visual field separately from the context. The field-independent individual is viewed as more autonomous and able...
to perceive parts of a situation in an analytic way. Field-dependent people tend to view objects in relation to a visual field (context) from which they are taken (Witkin, Dyk, Fattison, Goodenough, and Karp, 1962, pp. 241-242).

In later studies the concept of field-dependence/independence was related to some well-known measures of intellectual ability. In a study accomplished in 1967, Witkin reported that the concept of field-independence is highly related to the performance subscales of the Block Design, Object Assembly, and Picture Completion of the Weschler Intelligence Scale (Witkin, 1967, pp. 233-250). Bieri, Bradburn, and Galinsky (1956, p. 11), in a study of sex differences in perceptual behavior, found significant relations between field-independence as measured by the Embedded Frame Test and mathematical aptitude as measured by the Scholastic Aptitude Test. Elkind, Koegler, and Go (1963, p. 385) found that field-independent subjects appeared to score significantly higher than field-dependent subjects on a test of perceptual concept formation.

Witkin, in a paper prepared for the Educational Testing Service under a grant from the National Institute of Mental Health and the Graduate Record Examination Board, describes his conceptualization of cognitive style:

We are dealing with a broad dimension of individual differences that extend across perceptual and intellectual activities. Because what is at issue is the characteristic approach the person brings with him to a wide range of situations, we call it his "style" and because this approach encompasses both his perceptual and intellectual activities, we speak of it as his cognitive style.

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There is now a good deal of evidence that style which we are discussing extends into other psychological domains, beyond cognition (Witkin, 1975, p. 10).

In another paper prepared for Educational Testing Service, Witkin (1973) indicates that the concept of field-dependence/independence tends to be self-consistent, extending across tasks involving sensory modalities different from the visual forms assessed in the Rod and Frame and Embedded Figures Test. These areas include an auditory embedded figures test, in which a tune must be extracted from a complex melody and a tactile test involving the discrimination of a figure from raised contours by touch.

It is Witkin's contention that the findings of many studies indicate field-dependent persons are more socially sensitive. They tend to take into account the feelings of others and are superior in remembering social types of information. These people, for example, tend to favor subject matter with a people orientation, while field-independent individuals are more likely to favor subject matter which is analytical in nature. Likewise, vocational choices are apparently related to the field-dependent/independent construct. Field-independent people tend to make choices which are based in "analytical competence," such as architect, mathematician, engineer, or statistician. Field-dependent people tend to choose careers oriented to people, such as counselor, minister, salesperson, or social science teacher (Witkin, 1975, pp. 10-13).

In addition, Witkin has done considerable work in relating the field-dependent/independent concept to the educational setting. He
states that:

Evidence is now beginning to emerge that relatively field-dependent and field-independent individuals tend to use different strategies in their learning activities (Witkin, 1975, p. 16).

He further relates that data are now being generated, indicating that teachers with different cognitive styles appear to perform differently in the classroom (Witkin, 1975, p. 16).

One of the major concerns with Witkin's concept of cognitive style is centered in the bipolar tendencies of the instrumentation, which appears to leave a wide variety of behaviors and skills unexplored. Wallach (1962, pp. 199-218) seems to verify this concern with his findings that the construct of field-dependence/independence is more relevant to non-verbal performance skills than to verbal and conceptual skills. The dichotomous nature of the construct appears to have the effect of reducing complex skills and social behaviors into two polar cells, i.e., field-dependent or field-independent.

Following a similar line of thinking, Coop and Sigel (1971, p. 160) indicate a concern with the instrumentation used by Witkin and others to measure field-dependence/independence. The Embedded Figures Test, in particular, appears to be related to a person's ability to perform specific operations rather than to a preference for selecting a particular response from an array of available responses. This limitation of choices can be viewed as a restricting factor when attempting to apply the field-dependence/independence construct to complex behavior situations.

Arbuthnot (1972, pp. 479-488) criticizes much of the more recent

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research which includes only the Rod and Frame Test, indicating that many investigators have reduced their experimentations to the single instrument or have substituted other instruments which are not purported by Witkin to measure cognitive style. This has resulted in confusing and contradictory results in the literature. The problem was exemplified by Blanton and Bullock (1973, p. 279) who had difficulty drawing conclusions from three studies investigating the relationship between cognitive style and reading. Three different instruments were used which purportedly measured field-dependence/independence. However, the instruments varied so greatly that it was difficult to determine whether the same dimensions were being investigated in each of the studies. Thus, the conclusions in these three research efforts, supposedly investigating field-dependence/independence, could not be integrated in a meaningful way.

It is important to note that most of the research accomplished by Witkin is laboratory oriented, representing relationships between measuring instruments rather than behavioral observations. Although Witkin limits himself to describing the cognitive style of field-dependency/independency, he appears to acknowledge that other cognitive style dimensions exist, referring to the "family of cognitive styles." Other members of the "family" are included in the remainder of the discussion concerning psychological cognitive style.

Cognitive controls

A second area defined within the framework of cognitive style, by some psychologists, is the concept of cognitive controls or organizing
principles that guide behavior toward goals. Cognitive controls consisting of a series of different behaviors, as defined by Klein (1954, pp. 105-122) and Gardner (1953, pp. 214-233), include the concepts of leveling and sharpening, scanning, and field articulation. Gardner and Long explain the reasoning for using the concept of cognitive control.

Recent studies of cognitive control principles such as the ones by Gardner and his colleagues have shown that individuals can be arranged along various dimensions of cognitive behavior on the basis of consistencies in responses to broad classes of adaptive requirement. These studies suggest that the Leveling-Sharpening dimension of cognitive control—representing consistent individual differences in degrees of assimilation may be important to learning and/or recall in certain situations (Gardner and Long, 1960, p. 179).

Klein (1970, p. 109) utilized the notions of leveling and sharpening to conceptualize cognitive style. He defines cognitive style as constituting an arrangement of cognitive attitudes constructing another level of personality.

"Sharpening" in Klein's study refers to the ability of the individual to make accurate judgements throughout an experiment involving the size of squares by allowing appropriately for gradual changes in size. Leveling occurs when size changes are disregarded. In essence, Klein (1970) found that the adaptive processes utilized by the leveler are different from those used by the sharpener. Sharpener are able to follow the general increase in size while the levelers do not differentiate between successive squares and also tend to lag behind the trend of increasing size (Gardner and Long, 1960, pp. 179-185). Gardner and Moriarity (1968, p. 111) assert that levelers are those people who experience a relatively great amount of interaction of
perception and memory while sharpeners display relatively little. Another study has linked leveling and sharpening with cooperation, finding that levelers tended to be more cooperative than sharpeners (Tear and Guthrie, 1955, pp. 203-208). Holzman and Gardner (1960, pp. 176-180) found that sharpeners tended to have superior verbal recall.

In a study by Gardner, Holzman, Klein, Linton, and Spence (1959, pp. 104-105), investigating field articulation and sharpening, it was found that sharpeners were more likely to perform well on the Embedded Figures Test, utilized in Witkin's field-dependence/independence style. This study represents one of the few efforts to link various concepts of cognitive style. This finding seems to indicate a relationship between cognitive control of sharpening and the field-dependence/independence construct.

Another dimension of cognitive control is scanning, which refers to, "... the number of looks at standard and comparison stimuli and a variety of other measures of scanning in a cluster of size estimation tests" (Gardner and Moriarity, 1968, p. 42). An extensive scanner is an individual who requires a greater number of "looks" at a stimuli in order to estimate size.

Another dimension of cognitive control is field-articulation. This concept is highly related to the field-dependence/independence style described by Witkin. In investigating field-articulation, Gardner, Holzman, Klein, Linton, and Spence (1959, pp. 104-105) utilized Witkin's Rod and Frame Test which measured field-dependence/independence. That construct has previously been discussed in an earlier section of this chapter.
The research in cognitive controls appears to be based in recent developments in psychoanalytical psychology in which the control principles are defined as essential attributes of personality organization. These controls guide drive expression in adaptive behaviors (Blanton and Bullock, 1973, p. 283). As in the case of the field-dependent/independent construct, most of the study has been laboratory oriented.

The research in cognitive controls appears to be directed toward the possibility of classifying individuals by such attributes as: 1) an ability to scan an environment; 2) an ability to assimilate old information into new settings; and 3) an ability to respond in a global or discrete way. Yet it seems that the conclusions derived from the research remain open to conjecture, mainly because much of the work in cognitive controls has been unclear and at times misleading (Wachtel, 1972, pp. 779-785). The lack of clarity in research findings and the discrete nature of the cognitive controls, along with the psychoanalytic structure, appear to have limited its application in educational settings. There appears to be a paucity of research linking cognitive controls to the educational environment, the possible exception being field-articulation, which is identical to the field-dependent/independent construct.

Another major concern with the area of cognitive controls seems to be the predictive ability of the instrumentation in terms of a subject's behavior. Wachtel (1972, pp. 779-785) points out that experimenters have been unable to predict how an individual will apply the characteristics measured in the laboratory when interacting with
the environment. This, of course, is a similar problem faced by other cognitive style investigators and presents further problems for educators who are pragmatically oriented.

In addition, there is some evidence to indicate that the leveling-sharpening construct needs to be more clearly defined. In a study which attempted a systematic redefinition of the construct, Vick and Jackson (1967, pp. 267-268) found that leveling and sharpening referred only to visual processes and did not seem to include responses to auditory stimulus. Therefore, they concluded that perhaps the concept needed "reformation."

The criticism seems to reflect a general problem which is woven throughout the different constructs of cognitive style concerning the relevance of the instrumentation to the actual construct being measured.

Analytical-descriptive, relational-contextual, and inferential-categorical styles

Kagan, Moss, and Sigel (1963, p. 74) have defined cognitive style as, "... a term that refers to stable individual preferences in mode of perceptual organization and conceptual categorization of the external environment." In a group of studies with children and adults at the Merrill-Palmer Institute, Kagan, Moss, and Sigel operationalized their definition by classifying responses to an exercise sorting human figures. Three basic categories of cognitive style were identified in the study: analytical-descriptive, relational-contextual, and inferential-categorical. The analytical-descriptive
individual exhibits a preference to split the environmental stimuli into parts and deal with them as separate units. The relational-contextual category is characterized by a preference for sorting objects in the environment on the basis of a functional relationship between objects. The inferential-categorical classification is illustrated by the person who forms categorizations on the basis of inferences about the stimuli he classifies together. It is important to note that Kagan, like Witkin, has chosen dichotomous constructs to describe cognitive style.

The majority of the research within cognitive style as conceptualized by Kagan appears to be centered around the analytic-descriptive construct. The measurement of this category requires a subject to differentiate and select elements of similarity shared by two or more stimuli. Generally, two stimuli have the same or similar features and must be selected from a total environment. The adult test employed by Kagan, Moss, and Sigel requires the subject to sort sets of human figures which include men, women, and children in different dress and activities. This concept is commonly thought to be related to the construct of field-dependence/independence.

Kagan, Moss, and Sigel (1963, p. 92) have determined that analytic responses appear to have stability over time. They also found that the analytic-descriptive child differentiates complex stimulus arrays to a greater degree than a non-analytic child (Kagan, Moss, and Sigel, 1963, p. 94). Additional studies appear to indicate that the analytic-descriptive style is positively correlated to performance on the Picture Arrangement and Picture Completion Sub-Tests of the
Wechsler Intelligence Scale for Children. Also indicated is the independence of analytic-descriptive concept and verbal ability (Kagan, Rosman, Kay, Albert, and Phillips, 1964, p. 6).

The person who exhibits an inferential-categorical style displays a tendency to group stimuli together on the basis of an inference concerning a partial attribute of the stimuli. This grouping is based in some conceptual label without differentiating elements in the stimuli. For example, on the stimulus array utilized for the figure sorting task, the inferential-categorical person groups people as "poor people" or "soldiers" (Kagan, Moss, and Sigel, 1963, p. 76).

People who group stimuli together because of a functional relationship between groups of stimuli are, according to Kagan, Moss, and Sigel, exhibiting a relational-contextual style. People displaying this style will often construct a story about the grouping such as "a family" or a "murder scene."

The relational style individual seems to pay little attention to the details in the array of stimuli presented. The analytic-descriptive style person seems to pay most attention to the details.

Relational concepts differ from analytic-descriptive concepts with respect to the part-whole analysis of the stimulus. In a relational concept each stimulus in the group retains its complete identity and is classified as a whole. In an analytic-descriptive concept the S selects from each stimulus a specific subelement that is similar to a subelement within another stimulus (Kagan, Moss, and Sigel, 1963, p. 77).

Another aspect of cognitive style defined by Kagan is that of reflectivity-impulsivity. This concept refers to the tendency of an
individual to, "... pause and reflect over possible solutions in a problem solving situation" (Berzonsky and Ondrako, 1974, p. 19). Essentially, some people decode the problem and select a solution hypothesis quickly with a minimal concern for the accuracy; others take considerably longer to arrive at a decision concerning the validity of their solution. The person who quickly solves a problem is said to be impulsive. The reflective individual takes longer to decide (Kagan, 1966, p. 17). The reflective-impulsivity concept seems to be most influential at the time when a hypothesis is being selected. Impulsive children do not pause to consider the probable accuracy of their cognitive products, whether the situation involves visual matching of picture or reporting words in a recall situation.

Much of the work done in regard to the analytical-descriptive, inferential-categorical, and relational-contextual constructs have involved children. There is some question of the validity of the constructs in relation to adults. Davis (1971, pp. 1447-1459) indicates that cognitive style preference, as measured by Sigel's Cognitive Style Test, did not become more pronounced with age. These findings raise questions concerning the stability of this cognitive style in adult populations.

Davis raises further questions concerning Sigel's test which has been used by Kagan and others. He indicates that, "... certain responses were found to be a function of content and organizational properties of the items, indicating a validity problem of item response elicitation" (Davis, 1971, p. 1447). If true, this finding represents a serious validity problem not only involving Sigel's test...
but also many studies which have been predicated on its use. These findings seem to accent the need for continuing research into the theoretical basis of cognitive styles, as conceptualized by Kagan.

Summary

The problem for both the psychologist and the educator is identified by Coop and Sigel, who state that, "... one of the most crucial tasks for psychological researchers is that of clarifying the existing construct of cognitive style through systematic investigation" (Coop and Sigel, 1971, p. 160). The need for research to investigate the feasibility of constructing cognitive style profiles of individual students similar to current personality profiles was also stressed. These profiles would contain the existing measures of cognitive style, as defined by the various investigators, providing a comprehensive picture of sensitive data for educators to use.

Educational Cognitive Style

Much of the research effort within the framework of educational cognitive style has attempted to develop the concept that Coop and Sigel (1971) suggest, i.e., the construction of cognitive style profiles for individuals. The construct of educational cognitive style is different from that developed and conceptualized by the psychologist, yet it is seemingly based upon the research findings of the individuals studying cognitive style from a psychological perspective (Hill, 1970).
It is important to note that educational cognitive style is currently being utilized in the community college setting to match students with instructional methodologies. Unlike psychological cognitive style, educational cognitive style was conceptualized and operationalized in the educational setting. In the community college environment, the Cognitive Style Test Battery, consisting of a variety of instruments, is used to measure twenty-seven educational cognitive styles.

The concept of educational cognitive style centers around the idea that no two people seek meaning in precisely identical ways.

An individual's cognitive style is determined by the way he takes note of his total surroundings--how he seeks meaning, how he becomes informed. Is he a listener or reader? Is he concerned only with his own viewpoint? Does he reason as a mathematician or as a social scientist, or as an automobile mechanic (Hill, 1971, p. 3).

The construct of educational cognitive style is composed of a Cartesian product consisting of three sets of variables or elements. The first set of elements involves symbolic orientations including both theoretical and qualitative symbols. The second includes cultural determinants of the meaning of symbols which are the influence of family, the influence of associates, or reliance upon self. The third set is modalities of inference, which includes four methods of inductive reasoning and one of deductive reasoning. The Cartesian product principle is utilized to describe the relationship between the elements in the three sets to give a composite picture of cognitive style for an individual.
The construct of educational cognitive style is largely a result of work done by Joseph E. Hill, currently President of Oakland Community College, Michigan. Educational cognitive style is presented by Hill (1971) as an element of a conceptual scheme termed the "Educational sciences." Hill has attempted to build a comprehensive framework and language for the field of education based in the applied sciences of psychology, physiology, sociology, engineering, and education. The framework of the "educational sciences" includes seven generic elements: 1) symbols and their meanings; 2) cultural determinants (perceptions); 3) modalities of inference; 4) memory concern; 5) cognitive style; 6) teaching, counseling, and administrative style; and 7) systematic analysis and decision-making (Hill, 1971, p. 2). The first three sets of the educational sciences define cognitive style as conceptualized within this study. Appendix H contains further information concerning this framework.

**Symbols and their meanings**

The first set of elements within the framework of educational cognitive style (as listed above) is that of symbols and their meanings. Two basic types of symbols have been identified, theoretical (words and numbers), and qualitative (sensory data). People are continuously finding meaning by utilizing one or both of the types of symbols. According to Hill, "The fundamental element of intellectual activity is the symbol" (Hill, 1971, p. 3). He continues by defining his perception of the role of symbols and meaning:
Meaning is usually associated with the theory of signs and symbolic logic. In this context, meaning is defined in terms of the lexical and grammatical aspects of linguistics and the formal and functional analyses of logic. This approach limits meaning to the realm of the theoretical symbol. Meaning in the context of the educational sciences is associated not only with the realm of the theoretical symbol but with that of the qualitative symbol as well (Hill, 1970, pp. 3-4).

Four theoretical symbols have been identified within the framework of educational cognitive style: theoretical auditory linguistics, theoretical auditory quantitative, theoretical visual linguistics, and theoretical visual quantitative.

Hill explains that the theoretical symbols:

... present to the nervous system, and then represent to it something different from that which they themselves are. For example, the spoken word "cup" is an auditory sensation which represents to the individual hearing it the physical object of a cup (Hill, 1976, p. 4).

Essentially, since this symbol represents something different than it actually is, it is termed a "theoretical auditory linguistic" symbol. If it were a visual symbol, a printed word, it would be termed a "theoretical visual linguistic" (Hill, 1976, p. 4).

Hill explains the meanings of the various elements in terms of abilities:

Theoretical Visual Linguistics - ability to find meaning from words you see. A major in this area indicates someone who reads with a better than average degree of comprehension.

Theoretical Auditory Linguistics - ability to acquire meaning through hearing spoken words.
Theoretical Visual Quantitative - ability to find meaning in terms of numerical symbols, relationships, and measurement.

Theoretical Auditory Quantitative - ability to find meaning in terms of numerical symbols, relationships, and measurements that are spoken (Hill, 1971, p. 4).

The distinction between theoretical and qualitative symbolic orientation is based in work by Nathaniel Champlin (1952) and Francis Villemain (1952).

This division of symbols and their meanings into two categories is reinforced by the work of Cantor (1953). His identification of the meaning of words into psychological and logical categories forms an additional foundation for the theoretical and qualitative elements defined by Hill. In Cantor's opinion psychological words refer to cases when the listener reacts directly to the specific object or event for which it stands. The logical meanings are used in reference to the implications or meanings of an object.

Almost all our opinions . . . represent a mixture of both the logical and psychological meanings of the signs and symbols we employ. Our feelings and sense perceptions are intermingled with ideas (Cantor, 1953, p. 43).

The qualitative symbols described by Hill derive meaning from sensory stimuli, humanly constructed games or codes, and programmatic effects of occurrences which convey an impression of a series of images or events. Witkin's (1975, p. 10) comment concerning the fact that style appears to extend beyond the level of cognition into other psychological domains would appear to add credence to Hill's organization of qualitative symbols. The qualitative symbols (codes) are
divided into three different areas: sensory; programmatic; and cultural.

The sensory codes deal with the five basic human senses:

**Qualitative Auditory Q(A)** - ability to perceive meaning through the sense of hearing. A major in this area indicates ability to distinguish between sounds, tones of music, and other purely sonic sensations.

**Qualitative Olfactory Q(O)** - ability to perceive meaning through the sense of smell.

**Qualitative Savory Q(S)** - ability to perceive meaning by the sense of taste. Chefs should have highly developed qualitative olfactory and savory abilities.

**Qualitative Tactile Q(T)** - ability to perceive meaning by the sense of touch, temperature, and pain.

**Qualitative Visual Q(V)** - ability to perceive meaning through sight (Hill, 1971, p. 4).

Programmatic tasks are those which require an individual to monitor a group of skills in a performance. Hill (1971, p. 4) defines these as proprioceptive in nature.

**Qualitative Proprioceptive Q(P)** - involves the ability to synthesize a number of symbolic media­tions into a performance which demands the monitor­ing of a complex task (Hill, 1971, p. 4).

Another dimension of qualitative symbols is that associated with cultural codes. These codes involve individual attitudes, mores, and values as they interact with other components of cognitive style.

The codes as described by Hill are listed below.

**Qualitative Code Empathetic Q(CEM)** - sensitivity to the feeling of others; ability to put yourself in another person's place and see things from his point of view.
Qualitative Code Esthetic Q(CES) - ability to enjoy the beauty of an object or an idea. Beauty in surroundings or well-turned phrase are appreciated by a person possessing a major strength in this area.

Qualitative Code Ethic Q(CET) - commitment to a set of values, a group of principles, obligations and/or duties. This commitment need not imply morality. Both a priest and a criminal may be committed to a set of values although the values may be decidedly different.

Qualitative Code Histrionic Q(CH) - ability to exhibit a deliberate behavior, or play a role to produce some particular effect on other persons. This type of person knows how to fulfill role expectations.

Qualitative Code Kinesthelic Q(CKH) - ability to perform motor skills or effect muscular coordination according to a recommended, or acceptable form (e.g., bowling according to form, or golfing).

Qualitative Code Proxemics Q(CP) - ability to judge the physical and social distance that the other person would permit between oneself and that other person.

Qualitative Code Synnoetics Q(CS) - personal knowledge of oneself.

Qualitative Code Transactional Q(CT) - ability to maintain a positive communicative interaction which significantly influences the goals of the persons involved in that interaction (e.g., salesmanship) Hill, 1971, p. 5).

Cultural determinants

The second set of educational cognitive style, as described by Hill, is that of cultural determinants of the meanings of symbols. He maintains that a person interprets the theoretical and qualitative symbols in relation to specific expectations imposed upon him by the environment.
Man's perceptions influence and are influenced by his culture. Relatively stable social relationships are, therefore, significant factors in the development of the perceptions which an individual has of his "world." In this context, the formation and transformation of the meaning of symbols in both the theoretical and the qualitative domain are influenced by culturally created rules of expression and communication (Hill, 1968, p. 6-7).

There are three elements in the cultural determinants of the meanings of symbols: 1) individuality; 2) associates; and 3) family. Essentially, according to Hill, the two types of symbols (theoretical and qualitative) are influenced in the individual by the culturally created roles of individuality, associates, and family members.

The "individuality" influence is frequently reflected by the individual's need to quote definitions or explain situations in his own words. The associates influence is frequently evidenced by an individual who understands that which is under consideration, but explains or discusses these matters mainly in the words of his associates who may be involved with him in the situation. The "family" determinant is frequently portrayed by the individual possessing it through examples one may use in explaining a situation of solving a problem (e.g., either parents, children, wife, husband, sibling, cousin, close friend, etc., are used to illustrate a situation analogous to the one under consideration) (Hill, 1976, p. 5).

Modalities of inference

The third set in the construct of educational cognitive style, modalities of inference, is concerned with the way in which a person makes decisions and arrives at conclusions. Hill classifies decisions as either inductive (which draws a probability conclusions) and deductive processes (using mathematical and symbolic logic, resulting in a chain of reasoning). Within the context of educational cognitive
style, there are four types of inductive reasoning: magnitude (M), difference (d), relationship (R), and appraisal (L) (Hill, 1976, p. 8-9).

The first element is the inference process of magnitude which involves decisions based in categorical classifications which are accepted and assumed by an individual to be true.

Magnitude (M) - a form of categorical reasoning that utilizes norms or categorical classifications as the basis for accepting or rejecting an advanced hypothesis. Persons who need to define things in order to understand them reflect this modality (Hill and Nunney, 1974, p. 5).

The second element of modalities of inference is "difference."

This concept involves the comparison of two factors when an individual is making a decision concerning the validity of an hypothesis.

Difference (D) - this pattern suggests a tendency to reason in terms of one-to-one contrasts or comparisons of selected characteristics or measurements. Artists often possess this modality as do writers and musicians (Hill and Nunney, 1974, p. 5).

The third element of inductive reasoning within the context of modalities of inference involves the preference of the individual to make reasoned decisions based upon relationships between two or more characteristics within the setting.

Relationship (R) - this modality indicates the ability to synthesize a number of dimensions or incidents into a unified meaning, or through analysis of a situation to discover its component parts. Psychiatrists frequently employ the modality of relationship in the process of psychoanalyzing a client (Hill, 1971, p. 6).

The final element of the inductive reasoning process, according to Hill, is "appraisal." The appraisal process is basically a composite of the three aspects of inductive reasoning, including
magnitude (M), difference (D), and relationship (R) in arriving at conclusions.

Appraisal (L) - is the modality of inference employed by an individual who uses all three of the modalities noted above (M, D, and R) giving equal weight to each in his reasoning process. Individuals who employ this modality tend to analyze, question, or in effect appraise that which is under consideration in the process of drawing a probability conclusion (Hill and Nunney, 1974, p. 5).

The element of deductive reasoning is often considered separately from inductive reasoning because it utilizes processes which are only occasionally utilized in the everyday living of people. It uses a process which requires a chain or mathematical logic (proof-type reasoning).

Deductive (K) - indicates deductive reasoning or the form of logical proof used in geometry or that employed in syllogistic reasoning (Hill and Nunney, 1974, p. 5).

Summary

The concept of educational cognitive style has been applied in an effort to personalize educational programs at the post-secondary level. The construct of educational cognitive style is composed of three sets: 1) symbols and their meanings; 2) cultural determinants; and 3) modalities of inference. When the elements contained in the three sets are combined, they form a cognitive style map for an individual. This "map" is a graphic representation of the variety of methods used in learning, enabling educators to consider the person an individual in the educational process.

The construct of educational cognitive style is structurally
different from psychological cognitive style. Hill emphasizes that the basis of educational cognitive style is found in the work of Kagan, Moss, and Sigel (1963), Gardner (1953), and Witkin (1950). However, given present data, the relationship seems more theoretical than empirical. There appears to be a paucity of research investigating the relationship between the constructs. The terminology which Hill has selected for the various elements of cognitive style are "investigator specific" like those of the psychological cognitive style researchers. They do not appear readily transferable to the psychological conceptualizations of cognitive style. Thus the elements of educational cognitive style are difficult to relate to the definitions of the psychologist.

Hill's concept of style was selected for use in the study because it represented an approach which was currently being implemented at the community college level and was specifically designed for educational applications.

**Cognitive style: a discussion**

Four approaches to cognitive style have been presented in the preceding discussion. The different conceptualizations vary greatly between investigators, with little commonality between definitions. Each cognitive style features instrumentation designed to measure perceptions or skills defined within the framework of that style. These differences in definitions present a series of problems which the educator and psychologist have been unable to rectify. These problems are explored in the following discussion.
The identical label of cognitive style rarely refers to the same perceptual or conceptual operations. The establishment of different tasks and concepts generally defined as cognitive style results in a confusing array of separate measures. For example, Witkin (1973) speaks of the field-dependent/independent concept measured by a perceptual instrument; Gardner (1953) and Klein (1970) define cognitive styles in patterns of cognitive control related to psychoanalytic theory; Kagan, Moss, and Sigel (1963) use a task oriented instrument to define the three styles, termed analytic-descriptive, relational-contextual, and inferential-categorical; and Hill (1976), in his conceptualization of educational cognitive style, uses a Cognitive Style Test Battery to categorize people into twenty-seven different elements.

Coop and Sigel define the problem:

The rather recent proliferation of the use of the term cognitive style to depict diverse referents has led to some confusion on the part of consumers of research literature. A number of different investigators have used this same label to represent quite different cognitive processes (Coop and Sigel, 1971, p. 153).

What has apparently occurred is the establishment of a group of "investigator specific" conceptualizations of cognitive style. Each investigator has established his own concept for the term resulting in many diverse definitions. These narrow concepts have limited the interpretation of style to a particular perception, conceptual task, or framework of elements.

There seems to be a general disagreement among the various researchers concerning the composition of the various cognitive styles. The exception to this appears to be the apparent relationship between
field-dependence/independence, field-articulation, and the analytical-descriptive styles which are reported to be similar. Even with the reported similarities in these styles, the investigators measure different skills, i.e., Witkin's subjects are asked to indicate right answers to a perceptual exercise, and Kagan's subjects are asked to group and sort objects from a cognitive array. The disagreements in the definition and measurement of cognitive styles have resulted in a confusing and sometimes contradictory picture of the concept (Coop and Sigel, 1971, p. 154).

There are several basic differences between educational cognitive style and psychological cognitive style.

First, the psychologists have selected a relatively small sample of human behavior and inferred relationships to broad social settings. Hill (1971) has taken a broad dimension of human functioning and defined twenty-seven elements relating to various abilities used in the learning environment.

Secondly, the concept of educational cognitive style has been conceptualized in the operational framework of the community college. Psychological cognitive style has developed in the laboratory setting and has been applied to the "other contexts" primarily through relationships with other instruments.

Third, the instrumentation for psychological cognitive style tends to be bipolar in nature with the respondent being classified toward either pole. The educational cognitive style instrumentation measures twenty-seven categories relating to various abilities.

There are certainly advantages and shortcomings with each of the
approaches to cognitive style. The narrowly defined, task oriented areas of psychological cognitive style offer the advantage of being relatively easy to handle in a research setting. Yet, they are more difficult to apply in a complex social setting. The twenty-seven areas of educational cognitive style encompass a wide range of abilities, yet are difficult to apply in a research setting. The bipolar nature of the psychologist's interpretation of style tends to measure only two ends of a continuum, ignoring what might be a broad spectrum of intermediary ability levels. The multiple ability classification scheme developed by Hill tends to present an interpretation problem.

The relationship between educational cognitive style and psychological cognitive style appears to be primarily theoretical in nature. There is a paucity of research concerning an empirically based relationship. However, logically it would appear that the two are interrelated. Much more research is needed in this area.

Teaching Style

Teaching style like cognitive style has been characterized in many ways by psychologists, educators, and lay people. The following description will summarize some of the approaches which have been utilized in the research and literature in the past several decades. An effort is also made to define the concept of teaching style utilized within the context of this study.

Early interpretations of teaching style seemingly were centered around specific teaching methodology used by teachers within the classroom setting. Lecturing, for example, has been studied by a multitude
of researchers in the past thirty years. Remmers (1933) investigated the lecture in relation to small group discussions, finding that the differences in achievement were insignificant between the two methods. Spence (1928, pp. 454-462) had similar findings in an earlier study. Bane (1925, pp. 300-302) found there was little difference between the lecture and discussion method on immediate recall items, but found that recall on material after a period of time had elapsed as significantly greater than those in the discussion group. More recent research reported by Ruja (1953, pp. 321-341), Eglash (1954, pp. 257-267), and Dawson (1956, pp. 395-404) have resulted in conflicting and basically inconclusive evidence.

Haines and McKeachie (1967, pp. 386-390) have researched competitive and cooperative teaching styles in the higher educational environment. They found that competition tends to result in decreased achievement and less satisfaction than cooperative style.

Another early conceptualization of teaching style was the student-centered/instructor-centered approach. This concept (also called teacher-centered/learner-centered, directive-nondirective, employer-centered/employee-centered, therapist-centered/client-centered) is based in the authoritarian-democratic dichotomy developed and researched by Lewin, Lippitt, and White (1939, pp. 271-299). Since that time many individuals have studied the concept. Guetzkow, Kelley, and McKeachie (1954, pp. 193-209), for example, studied student performance in recitation and tutorial methodology. They discovered that students in teacher-centered groups showed slight superiority in achievement. Duffey (1974) studied the authoritarian-democratic dichotomy, finding
conflicting impact upon achievement in learning.

Some researchers have reported that the learner-centered methods are superior. Faw (1949) indicated that non-directive groups learned more in psychology classes than directive. Thompson and Tom (1957, pp. 666-678) reported that students in learner-centered groups learn more initially and retain more. Newman (1957, pp. 328-333) found that students who learned lists of words using their own techniques performed better on recall tests than students using a psychology developed learning technique.

A number of investigators also found no difference in the student-centered methods most appropriate to effect learning. Burke (1956), Husband (1951, pp. 297-300), and Ward (1956, pp. 197-210) have indicated superior learning in instructor-centered groups.

The results of the studies concerning the authoritarian versus the democratic approach appear to be somewhat confusing and inconclusive. The shortcomings of the dichotomous concept presented by this approach are discussed by Anderson (1959, pp. 201-215). He maintains that the complexity of leadership does not fit within the "ill defined" and simplistic terms of authoritarian and democratic. The terminology simply does not accurately describe the behaviors actually exhibited by the teacher. Essentially, Anderson states that the use of simplifying labels tends to limit our thinking about leadership.

The authoritarian-democratic construct provides an inadequate conceptualization of leadership behavior. When a satisfactory body of knowledge about learning in social situations is available it will then be possible to describe the behaviors which a teacher can exhibit to achieve a given learning outcome (Anderson, 1959, p. 212).
Much of the research, conceptualization, and writing concerning teaching style attempts to simplify the construct as described in the few preceding paragraphs. The creation of such dichotomies as lecture versus discussion, teacher-centered/student centered, authoritarian versus democratic, cooperative versus competitive, traditional versus modern, and direct versus non-direct has obvious advantages for the researcher in simplifying the complexities of the real world. However, such definitions are not likely to bring the nature of teaching style and methodology into focus for the practitioner.

This practice of categorizing all teacher behaviors in terms of ill-defined dichotomies is not likely to lead to further progress in the evaluation of teaching styles (Bennett and Jordin, 1975, p. 20).

An early attempt at categorizing teaching styles into broader and more comprehensive categories was developed by Joseph Adelson (1961, pp. 395-401). He drew analogies between primitive modes of healing and styles of teaching. His first category of teacher behavior involved the "teacher as a shaman," which described a narcissistic orientation. With this orientation the teacher attempts to keep the attention of the audience focused upon himself. Adelson describes this person as having a strong impression but is generally transient in effect. "He moves us, but the spell does not survive the moment. We admire him as we admire a great performer" (Adelson, 1961, p. 398). The second category described by Adelson is the teacher as a "priest," who envisions his power not through his own personality, but through his position, "... he is the agent of an omnipotent authority" (Adelson, 1961, p. 399). He emphasizes the
strength of authority and visualizes his role as preparing the student for the events he will endure, administering examinations and designing activities that will "initiate" the person to the culture.

The third category developed by Adelson (the one he seems to prefer) is "the teacher as mystic healer." This type of teacher concentrates upon the student working with the individual to determine potential and effect movement toward it.

This mode of teaching demands great acumen, great sensitivity—the ability to vary one's attack according to the phase of teaching and to the students—now lenient—now stern, now encouraging, now critical (Adelson, 1961, p. 401).

Although this approach to teaching style is interesting and somewhat picturesque, it fails to provide a framework which describes the styles, providing us only with a glimpse of the dynamics of teaching.

Richard Mann (1970, p. 1-19), several years later, described six basic teaching styles: the teacher as an expert; the teacher as formal authority; the teacher as a socializing agent; the teacher as a facilitator; the teacher as an ego ideal; and the teacher as a person. The teacher as an expert emphasizes the disparity between the student and the teacher within defined subject matter areas, with the teacher being viewed as the expert within the defined area of knowledge. The teacher as a formal authority views the teacher not only as an agent of instruction but also of control and evaluation. Basically, the instructor is responsible for maintaining a group of standards. The teacher as a socializing agent is seen as representing his vocational or academic field and is the guardian of the values and assumptions of that field, possessing the power to pass or fail people who desire...
entrance to the field. The teacher as a facilitator is less concerned with expertise than the skills and goals of the student. The teacher as an ego ideal encourages students to use the expertise of the instructor for conceptualizing goals and ideals. The teacher as a person attempts to involve the student in a "mutually validating relationship" with both parties in the learning-teaching environment sharing ideas and reactions.

Axelrod identifies three different types of teaching styles: the subject matter-oriented style, the instructor-centered style, and the student-centered. In the subject-oriented style the student is expected to adjust to the content of the course or instructional experience. The second style, instructor-centered, involves the individual instructor whose frame of reference is centered around the shaping of the individual student and subject matter by the instructor. In essence, the student must adjust to "what the instructor is." The third dimension of teaching style is that of student-centered style which focuses upon the student shaping subject matter to fit the needs and desires of the learner (Axelrod, 1973, pp. 10-13).

It is evident that the description of teaching style in terms of subject matter, personality traits, dichotomous behaviors, or broadly defined categories provides a less than adequate definition of such a complex concept. The isolation of teaching style factors serves to ignore the complexity of the "real world" by simplifying the concept to such a degree that contextualism is diminished.

A more comprehensive approach to teaching style has been selected for this study. The approach is similar in nature to the concept of
educational cognitive style defined earlier in this chapter. A series of components is delineated and defined concerning the instructor's response to the teaching-learning situation. This method of defining teaching necessarily includes many of the components of teaching style which have just been discussed in isolation.

Teaching style within the context of this study is conceptualized as a classification mainly based upon the consistency of the teacher's response to the teaching situation. Its conceptualization is based in the work of many educators including Lewin, Lippitt, and White (1939), Allport (1937), and others. The concept like educational cognitive style utilizes the Cartesian product to combine three sets of elements which have been originally described by Hill (1968, p. 15): demeanor, concern, and symbolic orientation.

**Demeanor**

The set termed "demeanor" includes three basic components: predominance, adjustive, and flexible behavior. These three classifications may occur as either a major or a minor orientation. In addition, each of these elements is generally subscripted with either authoritarian or permissive tendencies.

Instructors who tend to utilize a relatively fixed style of teaching are said to be predominant in that style. The teacher who tends to use the student's cognitive style as a point from which instruction commences, moving the student in directions that will enable him to learn in the teaching style of the instructor, is said to be adjustive. Employing a style whereby the instructor utilizes
the instructional methods which best fit the student's learning patterns (cognitive style) is classified as flexible (Hill, 1968, p. 16).

An authoritarian style instructor is one who

... respects the wishes and desires of persons in superordinate positions relative to his own and expects his wishes and decisions to be respected when he assumes the superordinate role, such as his position as the teacher in the classroom environment (Hill, 1976, p. 7).

In the same context, an individual instructor is said to be permissive when he does not exercise the "respect for decisions" and does not expect it to be exercised by others concerning his role (Hill, 1976, p. 7).

**Emphasis**

The emphasis set in teaching style has three components: concern for persons, concern for processes, and concern for properties. The concern for persons indicates that an instructor sets a priority upon the feelings, attitudes, and needs of individual students. The concern for processes is illustrated by an instructor who emphasizes the methods of instruction employed, the delivery of material, and the goals and objectives of instruction. A concern for properties includes a high priority upon materials, storage space, bulletin boards, and other physical objects within the learning setting.

**Symbolic orientation**

The set of symbolic orientation includes three basic components:
qualitative predominance, reciprocity, and theoretical predominance. The qualitative predominant dimension centers around an approach to instruction which emphasizes performance such as role playing, tuning an automobile or walking a balance beam. The theoretical predominant approach to instruction refers to an emphasis upon the theoretical symbolic meanings and is characterized by the lecture or reading methodology. The third dimension of reciprocity gives equal weight in terms of instructional time, methods, and emphasis to lecture, and performance factors (Hill, 1971, p. 7).

In summary, the conceptualization of teaching style chosen within the context of this study is necessarily broad, covering three sets of specifically defined information concerning the teaching-learning processes. These include the instructor's tendency to be flexible, predominant, or adjustive within the framework of authoritarian or permissive behavior; the individual's concern with persons, processes, and properties; and the amount of emphasis placed upon symbolic orientation (theoretical, performance, or reciprocity) within the classroom setting.

Instructional Area

The community college offers a curricular arrangement which serves to reconcile conflicting needs of constituent populations: 1) students who plan on transferring to institutions offering bachelor's degrees; 2) the expectations of the colleges accepting students; and 3) those students who do not want to transfer. Thornton (1972, pp. 175-243) utilized the broad areas of occupational education and transfer
education as a basis for the discussion of the community college curriculum. Subject matter areas defined within the occupational education experiences include engineering technology, trades and industry, secretarial and business, and technical assistants in the health field. This definition is similar in nature to the definition of the Applied Arts and Sciences instructional area defined within this study. Thornton indicates that these courses are generally designed to prepare students for immediate employment and includes specialized training preparing graduates to progress to a position of responsibility. Also inherent is the high level of cooperation with labor and management advisory committees.

The general education and transfer programs coincide with the Arts and Sciences instructional area defined within this study. These areas are designed to prepare students for participating in free society and further study beyond the lower division classes. These include subject matter areas of English, speech, journalism, foreign language, social sciences, sciences, and mathematics.

Monroe also uses the concepts of transfer education and occupational education in discussing curriculum. He describes the transfer courses in terms of their similarity to the lower division courses in the four year institutions (Monroe, 1972, pp. 69-102). Occupational courses are described as designed to, "... prepare students for immediate entry, after leaving the community college, into middle level vocations or to upgrade the skills of people already employed" (Monroe, 1972, p. 82).

Essentially, the preparation of students for immediate entry into
occupations and for entrance into colleges offering bachelor's degrees is the main thrust in the community college. The concept of instructional area (Arts and Sciences and Applied Arts and Sciences) is based upon these two major thrusts in this study.

Cognitive Style and Teaching Style

Research on the relationship between cognitive style and teaching style is in an emerging state. Witkin (1975, p. 16) reports that data are currently evolving which indicate that teachers with different cognitive styles perform differently in the classroom.

In an audio tape prepared by the American Educational Research Association (1974), Witkin discusses the impact of cognitive style upon teaching style. He views it as a four step process with cognitive style forming the basis for teaching styles, affecting teaching performance, which in turn impacts upon student performance.

Several studies involving educational cognitive style have related the construct to various dimensions of the classroom. Blanzy (1970) and Schroeder (1969) found that a match in cognitive style between teachers and the student resulted in a more favorable rating of the teacher by the student. The students whose cognitive styles were different from the instructor rated the teachers less favorably. These findings were strengthened by the results of studies by Wasser (1969) and Fragale (1969), who discovered students with educational cognitive styles that matched with teachers received higher grades than those unmatched. Fragale (1969) used the community college as a setting for his study.
Campbell (1974), using the Matching Familiar Figures Test and the Embedded Figures Test, came to a similar conclusion concerning grading practices of instructors whose cognitive styles were matched with students. He found significant differences in interaction between students matched with teachers and those not matched according to cognitive style. In another study of teacher behavior, Moore (1973) found that teaching patterns or styles may relate to several variables including cognitive abilities. Her findings indicated that analytic ability was particularly related. Although these studies do not directly involve the concept of teaching style, they do tend to establish a relationship between the teaching processes and teacher cognitive style.

The theoretical linkage between cognitive style and teaching style needs to be the subject of further investigation (Witkin, 1974). The relationship at this point in time does not appear to be firmly established. However, data is emerging which indicates that cognitive style does appear to influence the behavior of the teacher.

Chapter Summary

This chapter has attempted to review many of the different types of cognitive style constructs which are currently being researched and described by psychologists and educators. Educational cognitive style was chosen for use in this study, largely because of its comprehensive nature and application in the community college setting.

Also described were several different conceptualizations of teaching style used by the current writers, researchers, and educators.
Again, a comprehensive form of teaching style, as described within the construct of the educational sciences, was chosen for inclusion in this study.

A brief discussion of the relationship between cognitive style and teaching style was presented. Data are emerging which seem to establish a relationship between the two constructs. This relationship appears to have theoretical implications for this study.
CHAPTER III
RESEARCH METHODOLOGY

This chapter presents a description of the procedures used in the design of the study and the analysis of the data.

Population

The population for the study consisted of instructors currently teaching within the community college setting. A single institution, Kellogg Community College, was used for the study. This community college is located in a semi-urban environment, serving students from both the metropolitan area of Battle Creek, Michigan, and the rural areas of Calhoun, Branch, and Barry Counties. The characteristics of Kellogg Community College are similar to many other public community colleges throughout the state of Michigan and the United States.

In 1975, the headcount enrollment of 5706 students placed Kellogg Community College twelfth among the twenty-nine Michigan public community colleges (Directory of Michigan Community Colleges, 1975, p. 1). The instructional program, like that of all Michigan community colleges, is designed to provide both terminal occupational experiences and programs which will fully or partially transfer to four year institutions (Directory of Michigan Institutions of Higher Education, 1975).

Kellogg Community College, like 266 community colleges throughout
the U. S. and twenty-six in Michigan, has a collective bargaining agreement with the faculty.

The college has 102 full-time faculty members. Comparing the characteristics of these faculty members with the findings of Project Focus (Bushnell, 1973) requires some projection, but it serves to establish a relationship between Kellogg Community College and a national norm (provided by the only recent national community college study available). Project Focus determined that in 1973, in 1971 community colleges throughout the nation, 75% of the faculty members had master's degrees, 5.5% had doctorates, 13.9% had bachelor's degrees, and 5.6% had less than a bachelor's degree. In 1976, at Kellogg Community College, 85.4% had master's degrees, 1.8% had doctorates, 7.8% had bachelor's degrees, and 4.9% had less than bachelor's degrees.

If the reader will keep in mind the general stability of teaching faculties in community colleges over the last four years, a projection of the data gathered in Project Focus would closely resemble Kellogg Community College's profile (perhaps with the exception of the percentage of instructors holding doctorates).

In 1973, Project Focus determined that 31.9% of the instructors in community colleges in the United States had less than five years experience, 38.6% had between six and ten years experience, 17.7% had taught between eleven and fifteen years, 8.9% had between sixteen and twenty years experience, and 12.9% had over twenty years experience. In 1976, Kellogg Community College instructors with less than five years experience made up 12.7% of the faculty, between six and ten years experience composed 24.5%, 34% had between eleven and fifteen years experience.
years experience, 20.5% had between sixteen and twenty years, while 7.8% had over twenty years. Again, reminding the reader to keep in mind the stability of the faculty with the college over the past four years, a projection of the 1973 data would indicate that Kellogg Community College is close to the national statistics.

Sample

The sample for this study consisted of forty community college instructors currently teaching full time and possessing at least three years teaching experience, drawn from the population of 102. The selection of the sample was accomplished in a random, stratified manner. The table of 5000 random digits (Glass and Stanley, 1970, pp. 510-512) was used to select instructors from the two instructional areas. Instructors were assigned a number at random, within each instructional area. The twenty lowest numbers in each group were selected for inclusion in the study. Each instructor selected was personally contacted and asked to participate. In return for their participation in the study each person was promised an interpretation of the cognitive map which resulted from the administration of the instrument.

Thirty-eight of the original subjects agreed to participate in the study; two refused. The individuals who refused to participate were replaced in the study by persons with the next highest random number.

This randomly selected sample from the two instructional areas consisted of thirty males and ten females. The group averaged 12.95
years teaching experience in both secondary and post-secondary levels
with a mean of 9.68 years at Kellogg Community College.

Instrumentation

The instrumentation for the study consisted of two self-report
inventories designed to gather information concerning an individual's
educational cognitive style and teaching style.

The Cognitive Style Interest Inventory developed at Oakland Com-
munity College was utilized to determine the individual educational
cognitive style of each of the participants. The instrument asks the
individual to respond to items concerning personal preferences and
attributes which are designed to elicit orientations toward twenty-
seven different elements of educational cognitive style.

The instrument has 216 items measuring responses in the twenty-
seven elements. It has been used as a diagnostic instrument to map
(construct a profile) over 2000 students in several post-secondary
schools across the country.

The Cognitive Style Interest Inventory was selected for use be-
cause it is thought to be more useful with persons of advanced edu-
cational levels than the Educational Cognitive Style Test Battery,
which is usually administered to undergraduate students. The entire
battery consists of aptitude, achievement, and interest inventories
requiring up to eight hours for administration. It is felt that this
battery would not discriminate effectively the cognitive style of a
well-educated individual. In addition, the administration time for
the entire battery prohibits its use with faculty members with busy
schedules and a multitude of commitments. The Cognitive Style Interest Inventory was completed by most of the participants in less than two hours.

The Teaching Style Inventory, developed by Barbara Stuart, was modified for use in this study. It was designed to gather data concerning the perceptions of individuals toward certain teaching behaviors, attitudes, and procedures.

The inventory was designed primarily for use with secondary school teachers. Some modification in language and content was necessary to adapt it to the post-secondary situation. The instrument has sixty-two items which measure ten different dimensions of teaching style. It is reported that the completion of the instrument took approximately thirty minutes.

Validity

The validity of the cognitive mapping process and the Cognitive Style Interest Inventory has been established primarily on the concept of construct validity. Essentially it includes the dimensions of predictive, concurrent, and content validity. Joseph E. Hill, in a personal interview on July 7, 1975, indicated the construct validity for the instrument has been developed over an extended period and involves many approaches including dissertations, studies at Oakland Community College, interested researchers, and individuals using the mapping process.

In an effort to establish the validity of the instrument for use in this study, it was necessary to establish content validity for this
population. A sample of five instructors was taken from the population. Each person in the sample was asked to select an "expert" who would have a knowledge of his cognitive style. In most cases this person was a spouse; in one case a roommate. Each "expert" indicated his perceptions of the educational cognitive style of his selector, by answering items on the Cognitive Style Interest Inventory. A Pearson Product-Moment Correlation was run on each element of educational cognitive style as measured by the instrument. The correlations ranged from a low of .69 to a high of .92 with a mean correlation of .83.

A similar process was utilized to determine the validity of the Teaching Style Inventory for use in this study. A sample of five instructors who were participants in the study was taken for establishing content validity of the inventory. In the sixth week of classes, thirty-five students indicated their perceptions of the five instructors' teaching styles by responding to the Teaching Style Inventory. A mean in each element was derived and correlated via the Pearson Product-Moment procedure. The correlations between the student and teacher perceptions varied from a low of .36 to a high of .96. A mean correlation of .64 was computed.

Reliability

The method used to determine reliability based on rational equivalence was developed by Kuder and Richardson (1937, pp. 151-160). Essentially, this technique results in a coefficient of stability. Kerlinger (1973, p. 443) uses stability as a synonym for reliability.
By using the experimental instrument and a hypothetical equivalent form, a reliability coefficient based on internal consistency was established.

Reliability coefficients were calculated for each of the cognitive style elements within the Cognitive Style Interest Inventory. They range from .51 to .82, with an overall reliability of .69.

The Teaching Style Inventory reliability was calculated using the same technique as stated for the cognitive style instrumentation. A coefficient was computed for each element in the inventory, ranging from .64 to .91, with an overall reliability of .76.

Data Gathering Procedures

The sample having been taken on a random stratified basis, the Cognitive Style Interest Inventory and the Teaching Style Inventory were administered to each participant. Administration was individual in nature, with a set of identical directions given to the subjects. The participants reported that the time taken to complete the two instruments ranged from one hour to one hour and forty-five minutes.

Participants were requested to respond to the 216 items of the Cognitive Style Interest Inventory in one of three categories: usually, sometimes, or rarely. In the analysis of the data, a numerical value was attached to the responses.

The responses to the Teaching Style Inventory were made in a similar manner. Participants were requested to rate their preference in demeanor by choosing between polar statements intended to determine authoritative or permissive direction. Next, they were asked to
establish priorities on three statements in each of five items (fifteen responses in total). In the "Concerns" section the subjects were instructed to rate each of the fifteen items on a scale of zero to nine. On the section dealing with predominance, the participants were asked to make a first, second, and third preference between three approaches to instruction: theoretical predominance, qualitative predominance, and reciprocity. Nine different teaching situations were presented to the subject.

Mapping

A profile in the form of a "cognitive map" was developed for each participant in the study. A compilation of the results of the mapping process is given in Chapter IV.

In the mapping process, the instructors were assigned major, minor, or negligible orientations on the basis of the percentile rank of their score. This was done for each of the twenty-seven elements in cognitive style and nine of the elements in teaching style.

Major orientations were assigned in elements where the individual scored at the 73rd percentile rank or above. Major orientations were characterized by individuals who responded with a majority of "usually" answers.

Minor orientations in the elements were given to people who scored between the 26th and 72nd percentile levels. Individuals in this category tended to respond to a majority of the items with a "sometimes" answer.

Negligible orientations consisted of responses primarily in the
"rarely" category. These answers resulted in a score below the 26th percentile level.

The process of mapping as conceptualized by Hill (1970) is represented by the Cartesian product of the three cognitive style sets: symbols, cultural determinants, and modalities of inference. In the mapping process these three elements or sets are represented by { } braces. This concept is fundamental to the mapping process and results in a graphic representation of an individual or group attribute.

An example of a cognitive map is shown on page 68 (Figure 1). The map displays a cognitive style which includes a major orientation in theoretical visual linguistics T(VL) and qualitative code empathetic Q(CEM) in the symbols set. Also included in that set is a minor orientation in theoretical audio linguistics T(AL). The cultural determinants set includes a major in associates (A) and a minor in individuality (I). The element of appraisal (L) is present as a major orientation in the modalities of inference set.

This map characterizes an individual who derives meaning through written and spoken words. In addition, he displays a sensitivity to the feelings of others. He involves associates in his learning but also expresses individuality. In making inferences he tends to use the appraisal processes.

A similar process is used for teaching style in the identification of major, minor, and negligible orientations. An example of a teaching style map is also shown on page 68 (Figure 2). This map depicts an individual as having a major orientation in the flexible (B)
Figure 1
Cognitive Style Map

Figure 2
Teaching Style Map

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and permissive (P) elements in the demeanor set. In the emphasis set this person has a major orientation in persons (PN) and a minor in processes (PC). A major in reciprocity (RP) is present in the set of symbolic orientation. This individual displays a preference for a flexible and permissive approach to teaching with high concern for people and some concern for the processes involved. Also, there is a preference to use teaching methods which stress both theoretical and qualitative symbols.

It is important to note that an individual may have major orientations in many elements of both cognitive style and teaching style.

Methods of Analysis

The cognitive style elements represent individual and discrete components of the total cognitive style map with wide differences between them. Therefore, the one-way analysis of variance was selected to examine the data in the first two questions. Separate analyses were run on each element of cognitive style and teaching style in order to determine if significant differences between the two instructional areas exist.

The third question was measured by qualitative methods. The data were approached from two directions. The first was to determine the number of people who had scored major orientations in the various teaching style elements. This was done in accordance with the mapping process. Second, by using the 73% criteria (Flanagan, 1939), major elements of cognitive style were identified. For example, there are thirty-six people with major orientations in the persons (PN) element
of teaching style (nineteen in the Applied Arts and Sciences and seventeen in Arts and Sciences). A cognitive style element was considered present when at least 73% of each group had major orientations in that element (fourteen in the Applied Arts and Sciences and thirteen in the Arts and Sciences). The cognitive style elements were then compared across the teaching styles.

The second analysis of the data in this question involved the development of groups with common teaching style profiles (each group displaying the same teaching style elements). Groups of individuals with common teaching style elements were established and common cognitive style major orientations identified (a cognitive style element was considered present when five members of the group displayed major orientations).

Chapter Summary

This chapter details procedures used in this study. The sample was drawn from a population of community college instructors. The Cognitive Style Interest Inventory was utilized to measure educational cognitive style. Teaching style was measured by the Teaching Style Inventory. Validity and reliability figures were established and an analysis of variance was selected to examine data in the first two questions. A technique utilized by Flanagan (1939) was used as a basis for analysis of the third question.
CHAPTER IV

ANALYSIS OF THE DATA

Overview

Two methods of data analysis were employed in answering the three research questions of this study. Questions One and Two were aimed at defining significant differences in the educational cognitive styles and teaching styles of people in the two identified instructional areas. One-way analysis of variance was applied with these two questions. The third research question involved the interaction of educational cognitive style and teaching style with instructional areas in the community college. The data for this question were analyzed by comparing the cognitive style elements for the individuals who scored major orientations in the various components of teaching style. A comparison was made for each component of teaching style, and the cognitive style elements were grouped together in a collective cognitive style for that teaching style. Also, common groupings of teaching style were identified and the common cognitive style elements were determined for the groupings.

Methodology

Question One: Does the educational cognitive style of instructors vary between instructional areas within the community college?

A one-way analysis of variance was utilized to analyze the data gathered to answer this question. Analysis of variance (one-way) was
selected because of the discrete nature of the twenty-seven educational cognitive style elements. The Cognitive Style Interest Inventory measures perceptions in three areas or sets of educational cognitive style: symbols and their meanings; cultural determinants; and modalities of inference. Table 1 contains data for the first set of educational cognitive style, symbols, and their meanings. The second set of educational cognitive style, cultural determinants, is shown in Table 2. The data for the third set, modalities of inference, are presented in Table 3.

Table 1, displayed on page 73, presents the data for symbols and their meanings. It illustrates that there were three areas of significant differences between the Applied Arts and Sciences and the Arts and Sciences. The element of proprioceptiveness Q(P) was significantly different between the two instructional areas. Proprioceptiveness is the ability to synthesize a number of symbolic mediations into a performance of a task or skill. An example of this would be playing a musical instrument or typewriting. The qualitative visual Q(V) element was significantly different at the .05 level of confidence. Qualitative visual refers to the ability to perceive meaning through sight. The element of qualitative code proxemics Q(CP) or the ability to judge social or physical distance was also significantly different in the two instructional areas. All other differences were not significant at the .05 level of confidence.

In summary, there were three areas of difference where the F-ratio was significant at the .05 level of confidence: proprioceptiveness; qualitative visual; and qualitative code proxemics. This is
TABLE 1

Analysis of Variance for Cognitive Style: Symbols and Their Meanings Between Applied Arts and Sciences and Arts and Sciences Instructional Areas.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T(AL) Theoretical Auditory Linguistics</td>
<td>23.00</td>
<td>22.20</td>
<td>.004</td>
<td>NS</td>
</tr>
<tr>
<td>T(VL) Theoretical Visual Linguistics</td>
<td>28.30</td>
<td>27.20</td>
<td>3.406</td>
<td>NS</td>
</tr>
<tr>
<td>T(AQ) Theoretical Auditory Quantitative</td>
<td>18.60</td>
<td>20.90</td>
<td>1.762</td>
<td>NS</td>
</tr>
<tr>
<td>T(VQ) Theoretical Visual Quantitative</td>
<td>28.30</td>
<td>27.20</td>
<td>1.990</td>
<td>NS</td>
</tr>
<tr>
<td>Q(A) Qualitative Auditory</td>
<td>31.40</td>
<td>30.65</td>
<td>.278</td>
<td>NS</td>
</tr>
<tr>
<td>Q(O) Qualitative Olfactory</td>
<td>29.20</td>
<td>27.90</td>
<td>.574</td>
<td>NS</td>
</tr>
<tr>
<td>Q(S) Qualitative Savory</td>
<td>31.50</td>
<td>29.70</td>
<td>2.259</td>
<td>NS</td>
</tr>
<tr>
<td>Q(T) Qualitative Tactile</td>
<td>36.40</td>
<td>35.60</td>
<td>.714</td>
<td>NS</td>
</tr>
<tr>
<td>Q(P) Qualitative Proprioceptive</td>
<td>29.10</td>
<td>26.70</td>
<td>4.326</td>
<td>S</td>
</tr>
<tr>
<td>Q(V) Qualitative Visual</td>
<td>31.80</td>
<td>29.00</td>
<td>8.889</td>
<td>S</td>
</tr>
<tr>
<td>Q(CEM) Qualitative Code Empathic</td>
<td>32.50</td>
<td>32.30</td>
<td>.004</td>
<td>NS</td>
</tr>
<tr>
<td>Q(CES) Qualitative Code Esthetic</td>
<td>32.50</td>
<td>35.50</td>
<td>1.956</td>
<td>NS</td>
</tr>
<tr>
<td>Q(CET) Qualitative Code Ethic</td>
<td>33.80</td>
<td>31.80</td>
<td>3.025</td>
<td>NS</td>
</tr>
<tr>
<td>Q(CH) Qualitative Code Histronics</td>
<td>25.20</td>
<td>24.10</td>
<td>.428</td>
<td>NS</td>
</tr>
<tr>
<td>Q(CK) Qualitative Code Kinesics</td>
<td>28.30</td>
<td>25.80</td>
<td>1.926</td>
<td>NS</td>
</tr>
<tr>
<td>Q(CKH) Qualitative Code Kinesthesics</td>
<td>29.20</td>
<td>25.70</td>
<td>1.251</td>
<td>NS</td>
</tr>
<tr>
<td>Q(CP) Qualitative Code Proxemics</td>
<td>30.60</td>
<td>27.90</td>
<td>4.771</td>
<td>S</td>
</tr>
<tr>
<td>A(CS) Qualitative Code Synnoetics</td>
<td>35.50</td>
<td>33.70</td>
<td>1.650</td>
<td>NS</td>
</tr>
<tr>
<td>Q(CT) Qualitative Code Transactional</td>
<td>29.90</td>
<td>27.20</td>
<td>2.717</td>
<td>NS</td>
</tr>
</tbody>
</table>

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slightly less than one would expect to find by chance. Essentially, the two instructional areas are similar in their educational cognitive styles.

As illustrated by the bar graph in Figure 3, on pages 75-76, the means for virtually all of the educational cognitive style elements were in the upper areas of the possible range. Seventeen of the eighteen means in the symbols and their meanings set were above 24.00. The distribution of means was skewed toward the high end of the possible range. This would indicate that both groups in general perceived themselves as having relatively high degrees of each element in the symbols and their meanings set.

The analysis of variance data for the set of cultural determinants is shown in Table 2. Cultural determinants are those factors, interpreted in terms of social relationships, which affect the ways people interpret meaning.

TABLE 2

Analysis of Variance for Cognitive Style: Cultural Determinants Between Applied Arts and Sciences and Arts and Sciences Instructional Areas.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I Individuality</td>
<td>30.3</td>
<td>31.80</td>
<td>1.403</td>
<td>NS</td>
</tr>
<tr>
<td>A Associates</td>
<td>25.8</td>
<td>21.80</td>
<td>4.181</td>
<td>S</td>
</tr>
<tr>
<td>F Family</td>
<td>32.5</td>
<td>29.70</td>
<td>3.400</td>
<td>NS</td>
</tr>
</tbody>
</table>

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Figure 3
Means for the Educational Cognitive Style Elements: Symbols and Their Meanings for Applied Arts and Sciences and The Arts and Sciences

KEY

<table>
<thead>
<tr>
<th></th>
<th>Applied Arts and Science</th>
<th>Arts and Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>T(UL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T(VL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T(AQ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T(VQ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(O)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(T)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(P)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(V)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(CEM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q(CES)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Educational Cognitive Style Elements

Scores
Figure 3 (continued)

Means for the Educational Cognitive Style Elements: Symbols and Their Meanings for Applied Arts and Sciences and The Arts and Science

KEY
- Applied Arts and Science
- Arts and Science

Educational Cognitive Style Elements

Q(CET) Q(CH) Q(CK) Q(CKH) Q(CP) Q(CS) Q(CT)
As illustrated in Table 2, the associates element of cultural determinants is shown to be significantly different between the Applied Arts and Sciences and Arts and Sciences instructional areas. The element of associates refers to an individual who is influenced to a great extent by the people surrounding him in a given situation. Essentially, the significant difference indicates that instructors in the Applied Arts and Sciences areas appear to perceive that they rely more upon the opinions and ideas of associates than those in the Arts and Sciences.

The bar graph in Figure 4, on page 78, depicts the level of the means for the cultural determinants set in relation to the possible range of scores. It is important to note that the means are at the upper end of the range, indicating that the distribution is skewed toward the high end. The positive nature of the distribution demonstrates the generally high level of the three elements: individuality, associates and cultural determinants. The strength of the two means in individuality and family would indicate that faculty in the two instructional areas perceive they are influenced by those two elements more than associates.

The set of modalities of inference was also analyzed by utilizing an analysis of variance (one-way). This dimension of educational cognitive style is concerned with the way in which a person makes decisions and arrives at conclusions. This set includes five elements: four pertaining to inductive reasoning (magnitude, difference, relationship, and appraisal); one concerning deductive reasoning.
Figure 4

Means for the Educational Cognitive Style Elements: Cultural Determinants for Applied Arts and Sciences and The Arts and Sciences

Possible Range

I  A  F

Educational Cognitive Style Elements: Cultural Determinants

KEY

Applied Arts and Science

Arts and Science
The data for the analysis of the modalities of inference set are presented in Table 3.

**TABLE 3**

Analysis of Variance for Cognitive Style: Modalities of Inference Between Applied Arts and Sciences and Arts and Sciences Instructional Areas.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M Magnitude</td>
<td>31.40</td>
<td>29.20</td>
<td>2.366</td>
<td>NS</td>
</tr>
<tr>
<td>D Difference</td>
<td>29.20</td>
<td>28.10</td>
<td>.581</td>
<td>NS</td>
</tr>
<tr>
<td>R Relationship</td>
<td>32.00</td>
<td>31.50</td>
<td>.189</td>
<td>NS</td>
</tr>
<tr>
<td>L Appraisal</td>
<td>32.00</td>
<td>32.00</td>
<td>.000</td>
<td>NS</td>
</tr>
<tr>
<td>K Deductive</td>
<td>26.90</td>
<td>26.90</td>
<td>.000</td>
<td>NS</td>
</tr>
</tbody>
</table>

As Table 3 illustrates there were no significant differences at .05 level of confidence. This would indicate that there is little difference in the way the two groups perceive that they make decisions.

Figure 5 (p. 80) depicts the relation between the means and the possible range. As in the other two sets of educational cognitive style, the means are all at the upper end of the possible range. This would indicate a generally high level in terms of the presence of each of the elements. The means for both groups were higher in the inductive reasoning elements than in the deductive reasoning element. This seems to indicate a preference to rely on inductive approaches.
In making decisions.

In summary, Question One dealt with the differences in educational cognitive style among instructors in two instructional areas in the community college (Applied Arts and Sciences and Arts and Sciences). Using an analysis of variance, differences were found in three areas of set one, symbols and their meanings: proprioceptiveness; qualitative visual; and qualitative code proxemics. The finding in the area of proprioceptiveness is primarily what one would expect to observe. Many of the instructors in the Applied Arts and Sciences are involved to some degree with teaching tasks or skills of a programmatic nature. The instructors in the Arts and Sciences seldom, if ever, teach toward the attainment of programmatic skills.

The significant difference in the qualitative visual element indicates that the Applied Arts and Sciences instructors perceived themselves learning through the use of media such as charts, graphs, schematics, and drawings to a greater degree than the Arts and Sciences instructors. The difference in the ability to judge social and physical distances was not expected. The only area of difference in the second set, cultural determinants, was the element of associates. This difference indicates that the instructors in the Applied Arts and Sciences perceive that they rely more upon the opinions and ideas of associates than do those in the Arts and Sciences. The third set, modalities of inference, contained no significant differences between the two instructional areas.

Throughout the analysis of the symbols and their meanings, it is apparent that the means appeared in the upper area of the possible
range. This indicates that both groups tended to have highly perceived orientations in the various elements of educational cognitive style.

**Question Two:** Does the teaching style of instructors vary between instructional areas in the community college?

A one-way analysis of variance was used to analyze the data gathered to answer this question. The analysis was applied to the ten elements of teaching style and is displayed in Table 4.

**TABLE 4**

Analysis of Variance for Teaching Style Between Applied Arts and Sciences and the Arts and Sciences Instructional Area.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Mean Ap. Arts &amp; Sci.</th>
<th>Mean Arts &amp; Sci.</th>
<th>F</th>
<th>Significance .05</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN Persons</td>
<td>36.65</td>
<td>33.39</td>
<td>2.290</td>
<td>NS</td>
</tr>
<tr>
<td>PT Properties</td>
<td>30.70</td>
<td>31.60</td>
<td>.084</td>
<td>NS</td>
</tr>
<tr>
<td>PC Processes</td>
<td>31.25</td>
<td>32.50</td>
<td>.240</td>
<td>NS</td>
</tr>
<tr>
<td>TP Theoretical Predominance</td>
<td>20.00</td>
<td>22.05</td>
<td>.859</td>
<td>NS</td>
</tr>
<tr>
<td>QP Qualitative Predominance</td>
<td>24.10</td>
<td>23.80</td>
<td>.022</td>
<td>NS</td>
</tr>
<tr>
<td>RP Preciprocitity</td>
<td>33.50</td>
<td>35.30</td>
<td>.771</td>
<td>NS</td>
</tr>
<tr>
<td>P Predominant</td>
<td>11.35</td>
<td>10.30</td>
<td>.456</td>
<td>NS</td>
</tr>
<tr>
<td>S Switcher</td>
<td>16.60</td>
<td>15.20</td>
<td>1.708</td>
<td>NS</td>
</tr>
<tr>
<td>B Flexible</td>
<td>16.85</td>
<td>17.95</td>
<td>1.176</td>
<td>NS</td>
</tr>
<tr>
<td>Demeanor Authoritarian/Permissive</td>
<td>19.00</td>
<td>26.00</td>
<td>4.702</td>
<td>S</td>
</tr>
</tbody>
</table>
As Table 4 illustrates, one area of teaching style was determined to be significantly different between the two instructional areas. That area was the authoritarian/permissive component of the demeanor set. An authoritarian individual respects the wishes of superordinates and expects subordinates to respect his own wishes. The permissive instructor does not expect his subordinates to "respect" his wishes nor does he expect superordinates to impose their wishes upon him. In the teaching style inventory the perceived relationship between the teacher and student is measured. Only that dimension is presented in this study. In this dimension of teaching style the higher values were attached to the permissive style. The possible scores ranged from a value of ten for authoritarian perceptions to a value of forty which represented a permissive attitude. The findings indicate that the Arts and Sciences instructors perceived themselves to be significantly more permissive than the Applied Arts and Sciences instructors. There were no other significant differences in teaching style, as analyzed by the analysis of variance technique.

Figure 6 (p. 84) is a bar graph representing the means for the sets of Emphasis and Symbolic Mode. Figure 7 (p. 85) presents a bar graph of the means for the demeanor elements of predominant, adjustive, and flexible. Both Figure 6 and 7 demonstrate a generally high level for the means in relation to the possible range. Both groups were high in concerns for persons, properties, and processes. The highest area in the symbolic modes were reciprocity, indicating that instructors exhibited a preference to use both theoretical and qualitative techniques when the situation demands it, rather than maintaining a given
Figure 6

Means for the Teaching Style Elements of Emphasis and Symbolic Mode

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Possible Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN</td>
<td>30</td>
</tr>
<tr>
<td>PT</td>
<td>25</td>
</tr>
<tr>
<td>PC</td>
<td>20</td>
</tr>
<tr>
<td>TP</td>
<td>15</td>
</tr>
<tr>
<td>QP</td>
<td>10</td>
</tr>
<tr>
<td>RP</td>
<td>5</td>
</tr>
</tbody>
</table>

KEY
- Applied Arts and Science
- Arts and Science
Means for the Teaching Style Elements Demeanor
Including: Predominant, Adjustive and Flexible

Figure 7

Key:
- Applied Arts and Science
- Arts and Science

Note: The term switcher and adjustive are used synonymously.
approach regardless of the situation.

In Figure 7, the flexible and adjustable elements were somewhat higher than the predominant element.

To summarize, the demeanor element (authoritative-permissive) was significant at the .05 level of confidence. This would indicate that the Arts and Sciences instructors perceived themselves to be more permissive than the instructors in the Applied Arts and Sciences. The means in teaching style, for the most part, fell at the upper end of the possible range indicating a positively skewed distribution.

Question Three: How do the dimensions of educational cognitive style and the elements of teaching style interact with instructional area in the community college setting?

The instrument utilized in this study to measure the instructor preferences in educational cognitive style, the Cognitive Style Inventory, is intended primarily as a diagnostic tool for determining an individual profile. It has been used in over 2,000 instances on an individual basis to assist people in identifying characteristics of their cognitive style. Because of the individual nature of the profile, with the possibility of several hundred combinations, an individual approach to the analysis of interaction between the two groups is appropriate.

Two methods were utilized to analyze the data in this question. The first involved the identification of common educational cognitive style elements for each of the teaching style elements. In the second method a profile of common teaching style elements was constructed.
and the common cognitive style characteristics determined for each profile.

Comparison of teaching style elements and educational cognitive style elements.

Individual cognitive style maps were constructed for each participant in the study. Major, minor, and negligible orientations were designated for each element in accordance with the scoring instructions for the instrument (see Appendix A for a chart depicting the individual maps). Teaching style profiles were also developed with major, minor, and negligible orientations assigned in accordance with instructions for scoring.

Only major orientations were used in the comparison between teaching style and educational cognitive style. The number of cognitive style majors present in those individuals who had major orientations in each teaching style element was calculated. In accordance with a technique employed by Flanagan (1939), common cognitive style elements were identified between the Applied Arts and Sciences and the Arts and Sciences instructors. Flanagan used the findings of Kelley (1939), which indicated that the upper and lower 27% of the scores on a test item were useful in estimating success or failure on a test item. In this study the upper 27% level was used to indicate the presence of a major orientation. When over 73% of the cases in either instructional area displayed majors in an element it was considered a major group orientation. When both instructional areas contained majors in an element it was considered a common element.
The following tables with descriptive information depict the common cognitive style elements present in the two instructional areas for the major in each teaching style component.

**Persons.** As illustrated in Table 5, thirty-six participants in the study had major orientations in the persons element of teaching style. Nineteen of these majors occurred in the Applied Arts and Sciences area and seventeen occurred in the Arts and Sciences.

**TABLE 5**
Common Cognitive Style Elements in Persons.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN Persons</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td></td>
<td>Q(A) Qualitative Auditory</td>
</tr>
<tr>
<td>36 majors</td>
<td>Q(S) Qualitative Savory</td>
</tr>
<tr>
<td>Applied Arts and Sciences=19</td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td>Arts and Sciences=17</td>
<td>Q(CES) Qualitative Code Esthetic</td>
</tr>
<tr>
<td></td>
<td>Q(CET) Qualitative Code Ethic</td>
</tr>
<tr>
<td></td>
<td>Q(CS) Qualitative Code Synnoetics</td>
</tr>
<tr>
<td></td>
<td>L Appraisal</td>
</tr>
<tr>
<td></td>
<td>M Magnitude</td>
</tr>
<tr>
<td></td>
<td>R Relationship</td>
</tr>
</tbody>
</table>

The common cognitive style elements present in the individuals who displayed a major orientation in "persons" indicate that they had a preference for gaining information through the written word T(VL). In addition, major orientations in this element indicate that they preferred to derive meaning through sonic sensations such as music Q(A), the sense of taste Q(S), and the sense of touch A(T). The capacity...
to enjoy the beauty of an object Q(CES) was also present. People with major orientations in persons also displayed a major orientation in maintaining a commitment to a set of principles or values Q(CET). Qualitative code synnoetics Q(CS) was also a common major orientation. This indicates that individuals have the perception that they know themselves and their capabilities. Three dimensions of inductive reasoning were present in people with major orientations from both instructional areas including the preference to categorize (M), synthesize (R), and use appraisal (L). No cultural determinants were present as major orientations.

Processes. Table 6 presents the data for the concerns for process.

**TABLE 6**

Common Cognitive Style Elements in Processes.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC Processes</td>
<td>T(VL) Theoretical Visual Linguistics Q(A) Qualitative Auditory Q(T) Qualitative Tactile Q(V) Qualitative Visual</td>
</tr>
<tr>
<td>35 majors Applied Arts</td>
<td>Q(CEM) Qualitative Code Empathic Q(CES) Qualitative Code Esthetic Q(CET) Qualitative Code Ethic Q(CS) Qualitative Code Synnoetics</td>
</tr>
<tr>
<td>and Sciences=18</td>
<td></td>
</tr>
<tr>
<td>Arts and Sciences=17</td>
<td></td>
</tr>
</tbody>
</table>

As in the element of "persons," the preference to derive meaning through written language T(VL) was a major orientation. Also present
are the qualitative elements of auditory Q(A), tactile Q(T), and visual Q(V) (the ability to derive meaning from visual stimuli such as graphs, charts, and pictures). The qualitative codes of empathic Q(CEM), esthetic Q(CES), and ethic Q(CET) are all present in this element. This indicates a perceived concern for others, for the enjoyment of objects of beauty, and adherence to a standard or value. A major orientation in qualitative code synnoetics Q(CS) denoting a high degree of perceived self-knowledge was also present. No majors in either cultural determinants or modalities of inference appeared common to both instructional areas.

In the processes element, there were a total of thirty-five individuals with major orientations; eighteen occurred in the Applied Arts and Sciences and seventeen occurred in the Arts and Sciences.

Properties. There were twenty-five major orientations in the properties element, with twelve occurring in the Applied Arts and Sciences and thirteen in the Arts and Sciences.

**TABLE 7**

Common Cognitive Style Elements in Properties.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT Properties</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td></td>
<td>Q(A) Qualitative Auditory</td>
</tr>
<tr>
<td>25 majors</td>
<td>Q(S) Qualitative Savory</td>
</tr>
<tr>
<td>Applied Arts</td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td>and Sciences=12</td>
<td>Q(CES) Qualitative Code Esthetic</td>
</tr>
<tr>
<td>Arts and Sciences=13</td>
<td>Q(CET) Qualitative Code Ethic</td>
</tr>
<tr>
<td></td>
<td>Q(CS) Qualitative Code Synnoetics</td>
</tr>
</tbody>
</table>

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TABLE 7 (continued)

Common Cognitive Style Elements in Properties.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Family</td>
</tr>
<tr>
<td>I</td>
<td>Individuality</td>
</tr>
<tr>
<td>R</td>
<td>Relationship</td>
</tr>
<tr>
<td>L</td>
<td>Appraisal</td>
</tr>
</tbody>
</table>

Again, theoretical visual linguistics T(VL) was present, as were the qualitative elements of auditory Q(A), savory Q(S), and tactile Q(T). Also, as in the concerns for persons and processes, qualitative code esthetic Q(CES) and qualitative code ethic Q(CET) were major orientations. The ability to judge social and physical distance Q(CP) was prominent in the properties element. All of the cultural determinant elements, individuality (I) and family (F), were major orientations. In the modalities of inference set relationship (R) and appraisal (L) were present.

Theoretical predominance. There were a total of eight majors in this element of teaching style, two in the Applied Arts and Sciences and six in Arts and Sciences.
### TABLE 8

Common Cognitive Style Elements in Theoretical Predominance.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
</table>
| TP Theoretical Predominance | T(VL)  Theoretical Visual Linguistics  
|                          | Q(A)  Qualitative Auditory  
|                          | Q(O)  Qualitative Olfactory  
| Majors = 8               | Q(S)  Qualitative Savory  
| Applied Arts             | Q(T)  Qualitative Tactile  
| and Sciences=2           | Q(CEM)  Qualitative Code Empathic  
| Arts and Sciences=6      | Q(CET)  Qualitative Code Ethic  
|                          | Q(CKH)  Qualitative Code Kinesthetic  
|                          | Q(CS)  Qualitative Code Synnoetics  
|                          | I  Individuality  
|                          | L  Appraisal  
|                          | R  Relationship  
|                          | K  Deductive  

This element had the greatest quantity of common educational cognitive style elements (thirteen). The individuals with major orientations in this element of teaching style demonstrated a preference for deriving meaning through the written word T(VL). The qualitative codings included empathic Q(CEM), ethics Q(CET), kinesthetics Q(CKH), and synnoetics Q(CS). In terms of sensory characteristics, auditory Q(A) and tactile Q(T) were major orientations. Both inductive (appraisal-L and relationship-R) and deductive (K) elements were present in this element. A reliance upon individuality (I) also occurred as a major. Qualitative code kinesthetics Q(CKH) in the theoretical predominance teaching style element is unexpected, since this teaching style element is generally associated with teaching methods.
not used in the instruction of motor skills.

**Qualitative predominance.** Instructors with a major orientation tended to emphasize performance within their instructional strategies. There were a total of eight majors in this teaching style element, three majors in the Applied Arts and Sciences and five in the Arts and Sciences.

**TABLE 9**

Common Cognitive Style Elements in Qualitative Predominance.

<table>
<thead>
<tr>
<th>Teaching Style Element</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>QP Qualitative Predominance</td>
<td>T(VL) Theoretical Visual Linguistics Q(A) Qualitative Auditory Q(S) Qualitative Savory</td>
</tr>
<tr>
<td>Majors = 8</td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td>Applied Arts and Sciences=3</td>
<td>Q(CES) Qualitative Code Esthetic Q(CET) Qualitative Code Ethic</td>
</tr>
<tr>
<td>and Sciences=5</td>
<td>Q(CS) Qualitative Code Synnoetics Q(CT) Qualitative Code Transactional</td>
</tr>
<tr>
<td>I Individuality</td>
<td>L Appraisal</td>
</tr>
<tr>
<td>R Relationship</td>
<td></td>
</tr>
</tbody>
</table>

Major orientations in this area were characterized by a preference for written language T(VL) and the qualitative codes dealing with esthetic Q(CES), commitment to a standard Q(CET), self-knowledge Q(CS), and the ability to maintain a positive communication to influence another person's goals Q(CT). The senses of hearing Q(A), taste Q(S), and touch Q(T) were also perceived as important to people with major orientations in this teaching style element. Individuality (I)
appeared as a major orientation element in qualitative predominance, as did the modalities of inference elements of appraisal and relationship.

Reciprocity involves the use of theoretical and qualitative approaches to teaching, in approximately equal proportion to the instructional process.

**TABLE 10**

Common Cognitive Style Elements in Reciprocity.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP Reciprocity</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td>Majors=36</td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td>Applied Arts and Sciences=19</td>
<td>Q(O) Qualitative Olfactory</td>
</tr>
<tr>
<td>Arts and Sciences=17</td>
<td>Q(CES) Qualitative Code Esthetic</td>
</tr>
<tr>
<td></td>
<td>Q(CS) Qualitative Code Synnoetics</td>
</tr>
<tr>
<td></td>
<td>I Individuality</td>
</tr>
<tr>
<td></td>
<td>L Appraisal</td>
</tr>
</tbody>
</table>

There were thirty-six major orientations in the reciprocity element; nineteen major orientations occurred in the Applied Arts and Sciences and seventeen majors occurred in the Arts and Sciences.

The profile of educational cognitive style elements for this teaching element included an emphasis on the written language T(VL) and major orientations in the senses of touch Q(A) and smell Q(O). The qualitative codes found to be majors included esthetics Q(CES) and self-knowledge Q(CS). One cultural determinant element, individ-
uality (I), and one modality of inference were present (appraisal-L).

**Predominant** is an element of teaching style which indicates that an instructor has chosen to operate in terms of his classroom strategy within a relatively fixed style regarding structure, methods, rapport, and testing methods.

**TABLE 11**

Common Cognitive Style Elements in Predominant Style.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Predominant</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td></td>
<td>Q(CP) Qualitative Proprioceptiveness</td>
</tr>
<tr>
<td>Majors=7</td>
<td>Q(CEM) Qualitative Code Empathic</td>
</tr>
<tr>
<td>Applied Arts and Sciences=3</td>
<td>Q(CP) Qualitative Code Proxemics</td>
</tr>
<tr>
<td></td>
<td>I Individuality</td>
</tr>
<tr>
<td></td>
<td>L Appraisal</td>
</tr>
<tr>
<td></td>
<td>M Magnitude</td>
</tr>
<tr>
<td></td>
<td>R Relationship</td>
</tr>
</tbody>
</table>

There were a total of seven instructors who demonstrated majors in the element of predominant; three were in the Applied Arts and Sciences and four in the Arts and Sciences. Instructors in this category were characterized in the educational cognitive style profile by a preference for the written word T(VL) with the qualitative codes of proprioceptiveness Q(P), empathy Q(CEM), and proxemics Q(CP) present. A perceived reliance upon one's own feelings and opinions was also present as a major orientation in the educational cognitive style set of cultural determinants termed, individuality (I). Three areas of
modalities of inference were present as major orientations, including magnitude (M), relationship (R), and appraisal (L).

Adjustive. The adjustive element refers to an instructional approach in which the teacher moves the student to learn via teaching style, and uses the student's cognitive style as a point of departure. There were twenty-one major orientations in the adjustive teaching style element; twelve occurred in the Applied Arts and Sciences and nine in the Arts and Sciences.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>S Adjustive</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td></td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td>Majors = 21</td>
<td>Q(S) Qualitative Savory</td>
</tr>
<tr>
<td>Applied Arts and Sciences=12</td>
<td>Q(CEM) Qualitative Code Empathic</td>
</tr>
<tr>
<td></td>
<td>Q(CES) Qualitative Code Esthetic</td>
</tr>
<tr>
<td></td>
<td>Q(CET) Qualitative Code Ethic</td>
</tr>
<tr>
<td></td>
<td>Q(CKH) Qualitative Code Kinesthesitics</td>
</tr>
<tr>
<td></td>
<td>Q(CS) Qualitative Code Synnoetics</td>
</tr>
<tr>
<td></td>
<td>I Individuality</td>
</tr>
<tr>
<td></td>
<td>L Appraisal</td>
</tr>
<tr>
<td></td>
<td>M Magnitude</td>
</tr>
<tr>
<td></td>
<td>R Relationship</td>
</tr>
</tbody>
</table>

Common cognitive style elements in this dimension included theoretical visual linguistics (the preference to derive information from written language) T(VL); the senses of taste Q(S) and touch Q(T); and majors in empathy Q(CEM), esthetics Q(CES), and ethic Q(CET). The
ability to perform motor skills $Q(CKH)$, and the knowledge of self $Q(CS)$, were also prominent in the adjustive element. Individuality (I) was the only educational cognitive style element of cultural determinants present as a major orientation. Three elements of the modalities of inference were present: appraisal (L), magnitude (M), and relationship (R).

**Flexible.** The flexible approach to teaching style represents an effort on the part of the instructor to fit the teaching methodology utilized in the classroom to the cognitive style of the student. There were thirty-two major orientations in this style; fifteen occurred in the Applied Arts and Sciences and seventeen in the Arts and Sciences.

**TABLE 13**

Common Cognitive Style Elements in Flexible Style.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences and Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Flexible Majors = 32</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td>Applied Arts and Sciences=15</td>
<td>Q(A) Qualitative Auditory</td>
</tr>
<tr>
<td>Arts and Sciences=17</td>
<td>Q(S) Qualitative Savory</td>
</tr>
<tr>
<td></td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td></td>
<td>Q(CEM) Qualitative Code Empathic</td>
</tr>
<tr>
<td></td>
<td>Q(CES) Qualitative Code Esthetics</td>
</tr>
<tr>
<td></td>
<td>Q(CET) Qualitative Code Ethic</td>
</tr>
</tbody>
</table>

The major orientations in the flexible element had common educational cognitive style elements which indicate that the teachers viewed
themselves as empathetic Q(CEM), yet committed to a set of values and standards Q(CET), and appreciative of objects of beauty Q(CES). Also present were theoretical visual linguistics T(VL), qualitative auditory Q(A), qualitative savory Q(S), and qualitative tactile Q(T). There were no elements of either cultural determinants or modalities of inference present in the flexible element.

**Authoritarian.** Table 14 illustrates the authoritarian element which refers to an individual who respects the wishes of a superior and expects subordinates to do the same.

**TABLE 14**
Common Cognitive Style Elements in Authoritarian Style.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Applied Arts and Sciences Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authoritarian</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td>Majors = 25</td>
<td>Q(A) Qualitative Auditory</td>
</tr>
<tr>
<td>Applied Arts and Sciences = 15</td>
<td>Q(S) Qualitative Savory</td>
</tr>
<tr>
<td>Applied Arts</td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td>and Sciences = 10</td>
<td>Q(V) Qualitative Visual</td>
</tr>
<tr>
<td>Sciences = 10</td>
<td>Q(CES) Qualitative Code Esthetic</td>
</tr>
<tr>
<td></td>
<td>Q(CP) Qualitative Code Proxemics</td>
</tr>
<tr>
<td></td>
<td>Q(CS) Qualitative Code Synnoetics</td>
</tr>
<tr>
<td></td>
<td>F Family</td>
</tr>
<tr>
<td></td>
<td>I Individuality</td>
</tr>
<tr>
<td></td>
<td>L Appraisal</td>
</tr>
<tr>
<td></td>
<td>M Magnitude</td>
</tr>
</tbody>
</table>

A preference for written language T(VL) was common to majors in this area. The emphasis upon the senses was heavy in this element with taste Q(S), auditory Q(A), tactile Q(T), and sight Q(V) occurring as
major orientations. Qualitative code esthetic Q(CES), proxemics Q(CP), and synnoetics Q(CS) were also present. Family (F) and individuality (I) were perceived as influential in this element. Also included as common major orientations were appraisal (A) and magnitude (M).

There were twenty-five major orientations in this element, fifteen in the Applied Arts and Sciences and ten in the Arts and Sciences.

**Permissive.** This element refers to the individual who does not exercise "respect" with subordinates and does not expect it to be exercised by superordinates. There were fifteen major orientations in this element, five in the Applied Arts and Sciences and ten in the Arts and Sciences.

**TABLE 15**
Common Cognitive Style Elements in Permissive Style.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Common Cognitive Style Elements Present in Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissive</td>
<td>T(VL) Theoretical Visual Linguistics</td>
</tr>
<tr>
<td></td>
<td>Q(A) Qualitative Auditory</td>
</tr>
<tr>
<td>Majors = 15</td>
<td>Q(S) Qualitative Savory</td>
</tr>
<tr>
<td>Applied Arts and</td>
<td>Q(T) Qualitative Tactile</td>
</tr>
<tr>
<td>Sciences=5</td>
<td>Q(CEM) Qualitative Code Empathic</td>
</tr>
<tr>
<td>Arts and Sciences=10</td>
<td>Q(CES) Qualitative Code Esthetic</td>
</tr>
<tr>
<td></td>
<td>Q(CS) Qualitative Code Synnoetics</td>
</tr>
</tbody>
</table>

Again, theoretical visual linguistics T(VL) was a common major cognitive style element. Also common were the senses of hearing Q(A), taste Q(S), and touch Q(T). Empathy Q(CEM), esthetics Q(CES), and

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self-knowledge Q(CS) were common in the permissive element. There were no cultural determinants or modalities of inference major orientations in this teaching style.

In summary, there was one educational cognitive style element common to all of the teaching style elements: that of theoretical visual linguistics T(VL). This would indicate that, throughout the sample, written language is perceived as an important factor in how community college instructors tend to derive meaning. There were several elements which were present in over 50% of the teaching style elements. Four of the qualitative codes were present as major orientations in more than 50% of the elements, including qualitative code empathic Q(CEM), qualitative code esthetic Q(CES), qualitative code ethic Q(CET), and qualitative code synnoetics Q(CS). Qualitative code empathic Q(CEM) refers to the capacity to put oneself in another person's place and view things from that perspective. It would be expected that empathy should be a perceived major orientation regardless of the instructional area; the results indicate that the expectation is accurate.

Qualitative code esthetic Q(CES) concerns the sensitivity to objects of beauty. The results in this instance indicate that the instructors in both the Applied Arts and Sciences and the Arts and Sciences perceive themselves as sensitive to beauty in objects, despite the fact that they operate in areas of differing levels of pragmatism in subject matter within the classroom.

Qualitative code ethic Q(CET) refers to the level of commitment which an individual has for a standard, value, or duty. One would
expect instructors in both areas to perceive a commitment to values whether they be standards of performance, ethical or moral values, or academic standards.

Qualitative code synnoetics Q(CS) refers to the perception which a person has concerning his self-knowledge. It would be expected that a group of educators would perceive themselves as having an accurate knowledge of self. This was supported by the fact that both instructional areas scored majors in qualitative code synnoetics.

The element of appraisal (L) which is the highest order of inductive reasoning was common in eight of the eleven teaching style elements. This result indicates that instructors perceive that they use methods of problem solving which include categorizing, delving into relationships, synthesizing information, and appraising, regardless of instructional area.

Individuality (I) was present as a major orientation in seven of the eleven teaching style elements for both instructional areas. This would indicate that instructors in both instructional areas demonstrated a preference to rely on their own ideas, perceptions, and feelings when problem solving.

There were two teaching styles with the greatest number of majors: persons and reciprocity, both with thirty-two.

The three concerns, persons, processes, and properties, had a relatively high number of majors: persons (32), processes (35), and properties (25).

The predominant style had the fewest number of major orientations, seven, which is approximately 15% of the sample of forty participants.
Theoretical and qualitative predominance were also low, with eight major orientations or only 20% of the total sample.

In keeping with the significant differences found in the first two questions, one would expect to find more permissive major orientations in the Arts and Sciences than in the Applied Arts and Sciences. This is precisely what occurred. The Arts and Sciences had five more permissive major orientations than Applied Arts and Sciences.

Neither qualitative Code proprioceptive Q(CP) or qualitative code visual Q(V), which were found to be significantly different in the two instructional areas, was common in more than one instance in teaching styles. In the cultural determinants set, associates (A) (also not significant) was not common in a single instance.

The number of common major orientations, 238 out of a possible 440, would tend to corroborate the earlier findings that the level of means for most of the elements of educational cognitive style tended to be at the upper end of the possible range.

A comparison of common cognitive style elements for groups with similar teaching style profiles.

In the second analysis concerning the interaction of educational cognitive style and teaching style, the participants were grouped according to a profile of common teaching style elements. Common educational cognitive style elements were identified for each group. In this instance an element had to occur in five out of six cases (when N=6) and four out of five cases (when the N=5) to be considered present.
as a common cognitive style element.

The common groupings are shown in Table 16 (pp. 103-104). Three groups were identified as having common teaching style elements. Group 1 consisted of instructors having a preferred teaching style characterized by the flexible element (teaching toward the individual student's cognitive style), the concerns of persons, processes, and properties, and the symbolic mode of reciprocity (emphasizing both theoretical and performance in instructional strategy). There were six individuals with this teaching style profile within the sample, all from the Arts and Sciences.

TABLE 16

Analysis of Similar Groups of Individuals Based in Teaching Style.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Cognitive Style Elements</th>
<th>Instructional Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1  N=6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PN Persons</td>
<td>T(VL) Theoretical Visual</td>
<td>All 6 members</td>
</tr>
<tr>
<td>PC Processes</td>
<td>Linguistics</td>
<td>of this group</td>
</tr>
<tr>
<td>PT Properties</td>
<td>T(VQ) Theoretical Visual</td>
<td>were in the</td>
</tr>
<tr>
<td>RP Reciprocity</td>
<td>Quantitative</td>
<td>Arts and</td>
</tr>
<tr>
<td>B Flexible</td>
<td>Q(O) Qualitative Olfactory</td>
<td>Sciences.</td>
</tr>
<tr>
<td></td>
<td>Q(T) Qualitative Tactile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q(CEM) Qualitative Code Empathic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q(CES) Qualitative Code Esthetic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q(CET) Qualitative Code Synnoetics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q(CP) Qualitative Code Proxemics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F Family</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I Individuality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M Magnitude</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A Appraisal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R Relationship</td>
<td></td>
</tr>
</tbody>
</table>

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TABLE 16 (continued)

Analysis of Similar Groups of Individuals Based in Teaching Style.

<table>
<thead>
<tr>
<th>Teaching Style Elements</th>
<th>Cognitive Style Elements</th>
<th>Instructional Area</th>
</tr>
</thead>
</table>

**Group 2 N=6**

| PN Persons | T(VL) Theoretical Visual | 3 members |
| PC Processes | Linguistics | from the |
| PT Properties | Q(A) Qualitative Visual | Arts and |
| RP Reciprocity | Q(O) Qualitative Olfactory | Sciences. |
| S Adjustive | Q(T) Qualitative Tactile | |
| B Flexible | Q(CEM) Qualitative Code Empathic | 3 members |
| | Q(CES) Qualitative Code Esthetic | from the |
| | Q(CET) Qualitative Code Ethic | Applied Arts |
| | Q(CS) Qualitative Code Synnoetics | and Sciences. |
| R Relationship | | |
| L Appraisal | | |

**Group 3 N=5**

| PN Persons | T(VL) Theoretical Visual | 3 members |
| PC Processes | Linguistics | from the |
| PT Properties | Q(A) Qualitative Auditory | Arts and |
| RP Reciprocity | Q(S) Qualitative Savory | Sciences. |
| S Adjustive | Q(T) Qualitative Tactile | |
| | Q(V) Qualitative Visual | 2 members |
| | Q(CEM) Qualitative Code Empathic | from the |
| | Q(CES) Qualitative Code Esthetic | Applied Arts |
| | Q(CET) Qualitative Code Ethic | and Sciences. |
| | Q(CK) Qualitative Code Kinesics | |
| | Q(CS) Qualitative Code Synnoetics | |
| | Q(CT) Qualitative Code Transactional | |
| M Magnitude | | |
| R Relationship | | |
| K Deductive | | |

Group 2 was comprised of three members from each instructional area and perceived themselves using a teaching style characterized by both the adjustive and flexible elements as well as the concerns for...
persons, processes, and properties, and the symbolic mode of reciprocity. Group 3 consisted of instructors with a preferred teaching style characterized by the adjustive element, concerns for persons, processes, and properties, and the symbolic mode of reciprocity. There were five members in this group; three from the Arts and Sciences and two from the Applied Arts and Sciences.

It is important to note that all three of the groups had, as characteristics, the elements of persons, processes, properties, and reciprocity. Essentially, the only differences in teaching style were the perceptions which the group members had concerning the preference to approach the teaching-learning situation from the direction of the student's cognitive style, moving him toward the instructor's teaching style; or utilizing the student's cognitive style in patterning instruction.

Group 1, which was characterized by the flexible style of teaching, consisted of six individuals all from the Arts and Sciences. Theoretical visual linguistics T(VL), the preference to derive meaning from written language, was present in all of the teaching style elements discussed previously in the chapter (see Tables 5-15). Because of this frequency, it was expected that this educational cognitive style element would be present in each of the similar teaching style groups (Table 16). Theoretical auditory quantitative T(AQ) (which is the preference to acquire meaning in terms of numbers via hearing) was not present as a major orientation in any of the teaching style elements previously discussed (illustrated in Tables 5-15). However, it did appear in this group. The qualitative codes including
empathic Q(CEM), esthetics Q(CES), ethics Q(CET), synnoetics Q(CS), and proxemics were all present, as were the qualitative sensory elements of olfactory Q(O) and tactile Q(T). Perceived as influential in the problem solving process for individuals were the modalities of inference elements of magnitude (M), relationships (R), and appraisal (L). Family (F) and the individual's own feelings, individuality (I), were the two cultural determinants which influenced people with this teaching style.

Group 2 consisted of those individuals with similar teaching styles except that both the adjustive and flexible styles were present in each individual. Theoretical visual linguistics T(VL) was present as an educational cognitive style element, as one would expect. Also as expected empathic Q(CEM), esthetics Q(CES), and synnoetics Q(CS) were present. Qualitative code proxemics Q(CP) was absent from the profile for adjustive-flexible teaching style (it was present in Group 1, flexible style). Several qualitative sensory elements were present in this style including auditory Q(A), olfactory Q(O), and tactile Q(T). No influence from cultural determinants was indicated as being present for this group. Only two elements of the modalities of inference were present: relationship (R) and appraisal (L).

Group 3 contained virtually the identical elements of cognitive style as Groups 1 and 2, with the exception that instructors perceived themselves as utilizing an adjustive technique; that is, the instructor used the student's cognitive style as a point of reference in adapting him to a teaching style. There were five people in the
adjustive group. Again, theoretical visual linguistics T(VL) was a factor in the educational cognitive style profile. The qualitative sensory elements present were auditory Q(A), savory Q(S), and visual Q(V). The qualitative codes of empathic Q(CEM), esthetics Q(CES), ethics Q(CET), and synnoetics Q(CS) were present. The qualitative code of kinesics Q(CK) (the perceived ability to understand and communicate non-linguistic forms of actions) and transactional Q(CT) (perceived ability to influence another person's goal) were not present in the educational cognitive style profiles of the first two teaching styles but did occur in this group. No cultural determinants were present in the profiles. The modalities of inference magnitude (M), relationship (R), and deductive reasoning (K) were all present in the educational cognitive style profiles for the adjustive style.

In summary, the three teaching style groups differed only in one teaching style element, dealing with the approach to how students were treated in relation to their educational cognitive style. Instructors in the first group tended to perceive that they used a flexible style which takes into account the cognitive style of the student when designing their instructional procedures. In Group 2, instructors indicated that they preferred to operate in a style which uses both the flexible and the adjustive techniques. The third group perceived that they used an adjustive style, in which the instructor utilizes the student's cognitive style to move toward the instructor's teaching style. The three were similar in the persons, properties, processes, and reciprocity elements of teaching style.

The three groups (styles) were similar also in several educational
cognitive style elements. Theoretical visual linguistics T(VL) (a preference for written material in acquiring meaning) was common to all three groups. Also common to all three styles were the qualitative codes of empathic Q(CEM), esthetic Q(CES), and ethic Q(CET), indicating that feelings for others, appreciation of beauty, and a commitment to standards and principles were important. Furthermore, the common element of qualitative synnoetics Q(CS) (or a perceived knowledge of one's personal abilities and needs) was found in the three groups. There were no cultural determinants found to be common in the three style groups. The only decision-making factor (modalities of inference) present was relationship (R), which alludes to an ability to synthesize a number of dimensions into a single meaningful concept.

There were a number of basic differences in educational cognitive style noted between the three groups. Group 1 (flexible style) contained theoretical visual quantitative T(VQ) as a contributing element. This element refers to the ability to obtain meaning from written or graphic forms in terms of numbers. In addition, it would appear that these people perceive that they are influenced by their family relationships and their own ideas and opinions to a greater degree than members of the other two groups. In the decision-making process they have a tendency to classify items (magnitude-M) and use appraisal (L) processes in arriving at conclusions.

In Group 2 (adjustive-flexible) the differences from the other two groups were minimal. In fact, all of the elements in this style were found in at least one of the other groups.
Group 3 had several elements which were not present in the other two styles. Qualitative code kinesics Q(CK), or the ability to communicate by non-language means, was found here but not in the other styles. The qualitative code transactional Q(CT) (the ability to influence another person's goals) likewise was not found in either of the other styles.

It is interesting to note that in Group 1 all of the members came from the Arts and Sciences. This is true despite the fact that few significant differences between the teaching style or cognitive style elements were found.

Chapter Summary

The data analysis in this chapter was divided in three areas. The first research question was answered by presenting data in tables designed to show the results of the analysis of variance for the elements of educational cognitive style between the Applied Arts and Sciences and the Arts and Sciences Instructional areas. Four areas of educational cognitive style were shown to differ between the two instructional areas: qualitative proprioceptiveness Q(P), qualitative visual Q(V), qualitative code proxemics Q(CP), and associates (A). No significant differences were found between instructional areas in twenty-three of the twenty-seven elements of educational cognitive style.

The second research question pertaining to teaching style was answered by presenting data in tables for an analysis of variance between the Applied Arts and Sciences and the Arts and Sciences instruc-
tional areas. One area of teaching style was found to differ significantly between the two instructional areas: permissive/authoritarian. No significant differences were found between instructional areas in nine of the ten teaching style elements.

The third question was approached in two different yet highly related ways. First, common elements for each area of teaching style were identified and presented in a table. One area of cognitive style, theoretical visual linguistics T(VL), was found to be present in all the teaching style areas. Six cognitive style elements were present in over 50% of the teaching style elements. Second, participants in the study were grouped according to common teaching style elements, resulting in three classifications (or style groups): flexible, adjustive, and flexible/adjustive. Common educational cognitive style elements were identified within each style and presented in an appropriate table for the reader's inspection.
CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Overview

This study was conceptualized, designed, and implemented as a result of the investigator's interest in the construct of educational cognitive style, teaching style, and instructional area in the community college.

The concept of educational cognitive style is currently in an exploratory stage of development. Therefore, the study was directed toward providing information useful in designing future research by answering three specific questions. These questions are stated below.

1) Does the educational cognitive style of teachers vary between instructional areas within the community college?

2) Does the teaching style of instructors vary between the instructional areas within the community college?

3) How do the dimensions of educational cognitive style and the elements of teaching style interact with instructional area in the community college setting?

The data gathered to answer these questions were formed by the responses of faculty from two instructional areas to the Cognitive Style Interest Inventory and the Teaching Style Inventory. Given the exploratory nature of the study, both inferential and descriptive
statistical methods were employed to analyze the data.

The reader is reminded that several cautions should be observed when reading the conclusions presented in this chapter. First, the sample and population were drawn from one community college in Michigan. Although this institution is believed to be similar in many respects to others in Michigan and the United States, individual institutional idiosyncrasies require that great care be exercised when generalizing the results. Second, the sample size was limited to forty community college instructors. Third, the conclusions should be considered as an entry point for further research concerning cognitive style and teaching style. Fourth, the instruments utilized in this study measure perceptions of the instructors and are not based in observational data.

Conclusions

This section will present conclusions which have been derived from the research. They are based on information gathered in both the review of the related literature and the data analysis.

Cognitive style as an "investigator specific" construct

The construct of cognitive style has evolved as a series of independent investigator defined concepts, largely defined in isolation from each other. This appears to be true for both psychological and educational cognitive style and seemingly has created some confusion among researchers concerning the factors which make up the construct. This has resulted in a number of studies which have reported con-
flicting and unclear findings. It has also created interpretation difficulties for educators and others attempting to develop practical applications for cognitive style data. The relationship between the various constructs is often difficult, if not impossible, to discern. This is apparently due, at least in part, to basic disagreements concerning the definition of cognitive style and the differences in the instrumentation used to measure various defined styles.

The validity and compatibility of the instrumentation

The literature reveals that the instruments utilized to measure cognitive style, as defined by the various investigators, are open to questions of validity. Although validation is apparently being attempted on a continuing basis, there remains a concern for predictive validity among the researchers. This is especially evident as the instruments relate to the environment outside of the laboratory. The absence of data which strongly relate the cognitive style measurement tools to observed human behavior raises questions concerning the validity of the instruments and creates a void in the interpretation of the research.

The bipolar nature of the instrumentation in the psychological construct appears to have the effect of relating complex social situations and behaviors to the two cell matrices of field-dependence/independence, sharpening versus leveling, or analytic-descriptive. It seems somewhat unrealistic to expect a two dimensional instrument to explain a complex multivariate social construct.

Educational cognitive style utilizes instruments which classify...
individuals according to twenty-seven elements in terms of major, minor, and negligible orientations. These elements are defined by items in a cognitive style battery or an interest inventory (the latter ascertains perceptions). These items represent the continuum of variables which is not present in psychological cognitive style. The bipolar instruments of the psychologist tend to measure cognitive style in terms which are considered to be independent and at opposite ends of a continuum. People are classified into one of two different areas. Educational cognitive style with the twenty-seven different elements offers the advantage of describing variables and components which the bipolar instruments seemingly are unable to identify. However, the quantity of elements measured in educational cognitive style presents an interpretation problem for the researcher. As a result, many of the studies are of an exploratory nature.

**Psychological cognitive style as a primarily laboratory oriented construct**

The literature concerning the psychological constructs of cognitive style indicates that most of the experimentation in the area has occurred in the laboratory setting. The vast majority of the studies in this area have been concerned with the relationship between a cognitive style construct and other instruments such as personality inventories, creativity tests, aptitude tests, attitude inventories, and intelligence measures.

**Educational cognitive style in the context of the community college**

Growing out of an attitude of pragmatism, the construct of
educational cognitive style has developed largely in the environment of the community college. It is intended to provide a framework and a process for personalizing instruction by mapping students and matching them with styles of instruction which are best fitted to their learning patterns. As a result, the construct does not appear to be as well suited to laboratory research as does psychological cognitive style. Much of the research has been accomplished in the field, comparing educational cognitive styles to behavioral observations, grades, academic achievement, or student-teacher ratings.

**Minimal differences in the perceived educational cognitive styles between the two instructional areas**

The findings suggest there is little difference in the perceived educational cognitive styles of instructors assigned to the Arts and Sciences and the Applied Arts and Sciences instructional areas. As a result, instructional area appeared to have little impact upon the educational cognitive style of faculty members.

The evidence further indicates that the instructional staff perceived themselves as having a relatively high level of ability in many of the educational cognitive style elements. There were several areas where differences did occur between the instructors in the two areas.

It was apparent that Applied Arts and Sciences instructors perceived themselves as relying more upon the opinions, feelings, and ideas of respected colleagues than did the Arts and Sciences faculty.
The evidence further suggests that Applied Arts and Sciences in­
tors perceived they learn through the visual media such as charts,
graphs, schematics, and drawings to a greater degree than the Arts
and Sciences faculty. Further, the data indicate that instructors
in the Applied Arts and Sciences perceived themselves having greater
ability to develop a number of symbolic mediations into a performance,
such as dancing, typewriting, or skiing. In addition, the findings
reveal that Applied Arts and Sciences instructors perceived them­
selves as being more able to judge social and physical distance than
the Arts and Sciences faculty.

The only difference in teaching style elements between the two areas:
the permissive/authoritarian dimension

The data indicate that Arts and Sciences instructors perceived
themselves as more permissive than the Applied Arts and Sciences in­
structors. This indicates that they saw themselves as imposing less
rigid behavioral expectations and standards on students and allowing
more freedom in the selection of class projects. It further suggests
they perceived that they place less emphasis on the superordinate-
subordinate relationship and encourage more student involvement in the
selection of subject matter to be learned.

Other than the permissive/authoritarian dimension, the faculty in
the two areas appeared to perceive their teaching style similarly.
This finding serves to indicate that instructional area, as defined
within this study, appears to have a limited impact upon the teaching
style of faculty. There are further indications that instructors in
both areas perceived that they had a high degree of concern for the human factors, classroom processes, and materials within the teaching-learning setting. It is also apparent that a teaching strategy which stresses both theoretical and performance factors is preferred by faculty assigned to both instructional areas.

The importance of theoretical visual linguistics in faculty cognitive style

The findings suggest that one element of educational cognitive style was present in each teaching style element. Theoretical visual linguistics was apparently perceived by faculty in both instructional areas as being important to their learning processes. This would indicate that the written language is a preferred learning style by the community college instructors in the population studied.

Three teaching style groups emerged

The evidence suggests that community college instructors may be grouped by common teaching style elements resulting in definition of style groups. Three such groups emerged in this study, all with common teaching style elements, except in regard to the approach taken by the instructor concerning the student's learning patterns. The first group perceived that they taught toward a student's cognitive style. A second group saw themselves using the student's cognitive style to move toward a given teaching style. A third group perceived themselves as utilizing both styles, apparently as the situation demanded. A group of common cognitive style elements may also be iden-
Limitations of the data

Beyond the conclusions stated, the data failed to establish a clear direction. Therefore, any further conclusions based on the analysis of the data would be conjectural. However, the review of the literature and the data did provide implications which led the investigator to develop a series of recommendations. These are presented in two categories: implications for administrators, and research recommendations and implications.

Implications for Administrators

As a direct result of this research the following implications for community college administrators evolved.

Teaching style groups and instructional innovation

The emergence of three teaching style groups leads to the implication that administrators could utilize teaching style as a basis for identifying pools of instructors. These instructors might demonstrate a willingness to experiment, field test, or develop new strategies within the context of their styles. The effectiveness of different teaching methodologies could be established with different style groups. This information could perhaps be used in future planning to predict the receptivity and success of an instructional strategy given an individual's teaching style.

The voluntary mapping of instructors might provide an information

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base useful in identifying an audience for testing new ideas presented by faculty; evaluation teams for both faculty and instructional programs; and a source from which innovative ideas for instruction could be generated.

Organizational structure

It is urged that caution be used by administrative personnel when applying cognitive style to the design of organizational structures. The data do not clearly give a direction nor do they indicate an organizational pattern which might be more effective than any other. In essence the data indicate that assigned instructional area seems to have little impact upon the cognitive style or teaching style of individual faculty members. The data do not appear to support the use of cognitive style in defining patterns of organization such as departments or divisions. Until more conclusive data are available, it would appear that factors other than cognitive style should receive priority in the design of organizational structure.

Administrative-instructor relationships

Although this study did not directly deal with the administrator-instructor relationship, one finding may have implications which deserves some discussion. The significant difference that occurred between the two instructional areas in the permissive/authoritarian dimension might indicate that a difference in attitude toward leadership style exists. It is possible that faculty might view the appropriate administrative style in their instructional area as being con-
gruent with their philosophical approach to students in the classroom. The concept needs additional research and exploration, answering such questions as: "What is the relationship between job satisfaction, teaching style, and administrative style?"

**In-service education**

Administrators responsible for staff development and in-service education for instructional personnel are encouraged to use a wide variety of methodologies in designing experiences. Activities of an individualized nature, centered in a broad selection of educational cognitive style elements, would appear to have greater acceptance and more probability of success than programs designed around narrowly defined methods.

Programs using written formats including programmed material, instructional packets, journal articles, and other print media would probably achieve wide acceptance among a large number of the faculty encompassed by both instructional areas.

In-service programs which feature presentations by colleagues would probably receive more acceptance in the Applied Arts and Sciences. Also, programs or communications which feature charts, drawings, schematics, or other visual material would seemingly be perceived as more worthwhile in the Applied Arts and Sciences than the Arts and Sciences.

**Research Recommendations and Implications**

It is recommended that investigators interested in researching
various aspects of cognitive style concern themselves with several areas of need. The recommendations and implications discussed in this section are based on the results of the study, both in the data and the literature review. It is suggested that the following areas be considered for future research.

**Relationship between cognitive style constructs**

It is recommended that further efforts in researching cognitive style include exploring and defining the relationship between the various constructs. This should occur within the psychological cognitive style constructs, where a multitude of instruments and "investigator specific" terminology has resulted in apparent confusion. Research efforts should also be directed toward investigating the relationship between educational cognitive style and psychological cognitive style. These investigations should have the goal of identifying common theorems and definitions for the purpose of ultimately establishing a common ground and theoretical base for all cognitive styles.

Research which attempts to establish a point of convergence for the two cognitive style areas would feasibly result in a group of common empirically-based, testable hypotheses, thus providing a more meaningful basis for future research.

**Instrumentation**

The relationship between the various instruments which have been utilized to measure cognitive style needs research attention. The number of instruments currently utilized in the various constructs
appear to measure different skills, concepts, and abilities in many diverse ways. Newer instruments have been developed, some with questionable validity. Yet, they have been used with regularity and continue to be applied in research efforts. The relationship between the instrumentation used in educational cognitive style and the psychological construct must be explored. A satisfactory middle ground needs to be established between the bipolar instrumentation of the psychologist and the multifaceted instruments of educational cognitive style. This compromise could establish an instrument which would be theoretically sound for use both in the psychologist's laboratory and the educator's classroom.

**Validity of the instruments**

Several investigators cited in the study raised questions concerning the validity of the instruments in the various constructs of cognitive style research. Much study needs to be done in regard to the validity of the measurement devices used in determining cognitive style. This is particularly true for the psychologist or educator attempting to relate his research to the "real world."

The predictive validity of the instruments should be placed under close scrutiny of the researcher. The ability of the various cognitive style instruments to predict behavior in the complex social settings to which inferences are being made should be a high priority in future studies.
The laboratory nature of psychological cognitive style.

There appears to be a need for researchers of psychological cognitive style to move from the confines of the laboratory setting to the classroom environment. The research to date in the psychological area has largely been laboratory oriented and has often dealt with the relationship between two instruments. Seldom have the tools of behavioral observation been utilized to validate cognitive style in a social setting.

As mentioned previously, the bipolar nature of the instrumentation appears to present a problem when applied to complex social settings, such as the classroom. Critics of the psychological cognitive style construct maintain that the two dimensional nature cannot account for many of the variables in the complexities of human interactions. It would seem that a research effort, directed toward developing instruments and techniques which will relate the variables of the social situation to the dimensions of cognitive style, would be a worthwhile endeavor.

The impact of learning and maturity upon cognitive style

The stability of cognitive style as it relates to human learning continues to need investigation. The ability to modify the cognitive style of the individual through the educational process should remain a concern to researchers. Specifically the impact of various instructional approaches, methods, and styles on cognitive style is in need of continued research effort. The effect of learning upon cognitive
style appears to be a productive area for study.

The role of maturity as it relates to cognitive style needs to be clarified particularly as it interacts with stability and susceptibility to change. Information derived from study in this area has great significance for the community college, since it serves a diverse population of all ages.

The need for continued investigation of the relationship between cognitive style and teaching style

The data which have emerged to date have not established a clear relationship between cognitive style and teaching style. However, several investigators have reported that an empirical base for establishing this relationship is developing. There is a continuing need to research the impact of cognitive style upon teaching behavior. It is through such study that factors in the learning environment may be directly linked to teacher behavior, which in turn can be analyzed in terms of student performance.

Summary

This chapter has presented conclusions and implications which were derived from information obtained from the review of the literature and the analysis of the data. The construct of cognitive style appears to have implications for administrators and individuals interested in educational research. However, before many of the ramifications can be adequately assessed or applied, the construct needs to be clarified by empirical investigation. A great deal of work remains in this
fertile area, particularly in terms of investigating cognitive style and teaching style as they relate to instruction and management in the community college.
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APPENDIX A

Cognitive Style Map Results for the Applied Arts and Sciences
Cognitive Style Map Results for the Applied Arts and Sciences

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+ = Major = Raw Score Range 28-40
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N = Negligible = Raw Score Range 0-13
APPENDIX B

Cognitive Style Map Results for
the Arts and Sciences
### COGNITIVE STYLE MAP RESULTS FOR THE ARTS AND SCIENCES

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+= Major = Raw Score Range 28-40  
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APPENDIX C

Teaching Style Map Results for the Applied Arts and Sciences
Teaching Style: P, S, B
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Teaching Style Map Results for Applied Arts and Sciences

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Teaching Style: PN, PC, PT, TP, QP, RP
+ = Major = Raw Score Range 29-45
0 = Minor = Raw Score Range 15-28
N = Negligible = Raw Score Range 0-14

Teaching Style: P, S, B
+ = Major = Raw Score Range 17-25
0 = Minor = Raw Score Range 10-16
N = Negligible = Raw Score Range 0-9
APPENDIX E

Sample Cognitive Style Map
APPENDIX F

Cognitive Style Interest Inventory
attempt to establish the same rapport with all students.
allow students to establish initial rapport until they seem
comfortable with that which I refer.
I attempt to establish rapport varies with individual students.
classes would be surprised if I suddenly used a different style of
style of teaching is constantly changing in accordance with student
style of teaching sometimes changes when students have difficulty
accommodating to my preferred style.
the following statements on a scale of 0-9 as it applies to you
never usually

VERBAL a set routine should be followed in the classroom, so students know
FOR ME to expect.
RESPONSE special care in organizing materials, storage space, and bulletin
RARELY in my classroom.

goals and objectives clearly stated in my mind for each unit presented.
special care in the maintenance of materials in my classroom so they
remain useful to me as well as others.

ware of a student who is having a bad day, and will adjust my
actions for him accordingly.
it is necessary to have regulations and guidelines established and
put my methods of motivation to rest the needs of individual students.
students should turn in assignments that are neat and well organized.
proper guides and textbooks are necessary to good teaching.
encourage students' originality; of ideas, assignments, projects, etc.
it irritating when a situation arises that necessitates a change in my
plans because I must reschedule the lesson.
APPENDIX H

The Educational Sciences
A discussion of the construct of the "educational sciences" is necessary to provide a framework for the concepts of educational cognitive style and teaching style as utilized within this study.

Approximately a decade ago, Joseph E. Hill of Wayne State University, developed a scheme for viewing the disciplines of education in scientific fashion.

Fundamental disciplines are bodies of knowledge generated by communities of scholars that produce pure and distinctive forms of information about phenomena which they study. Biology, history, art, psychology, and mathematics are examples of fundamental disciplines.

Fundamental discipline must be either a science or an art, it cannot be both. Sciences as bodies of information must recognize the principles of completeness and that of closure. The arts (e.g., history, a synoptic art, and art, an esthetic art) do not need to recognize these two principles (Hill, 1971, p. 2).

The fundamental disciplines in Hill's conceptual scheme are complemented by the applied or derivative fields of knowledge. These applied bodies of information have been developed by practitioners concerned with the practical considerations of human condition. Included in the derivative fields would be medicine, pharmacy, engineering and law. Hill continues by explaining that the applied fields consist of both arts and sciences.

The applied fields are composed of terms and methods of inquiry borrowed from the fundamental disciplines. Their practitioners are not concerned with producing pure and distinctive forms of information. In this context, the applied fields are composed of both sciences and arts that are designed to explain phenomena and solve problems in the practical aspects of the human situation. For example, the applied
field of knowledge called medicine is composed of the medical sciences and the medical arts. Engineering, of the engineering sciences and the engineering arts (Hill, 1971, p. 2).

In Hill's perception the knowledge generated within a given field by professionals and researchers is often beyond the understanding of people outside of the specific field. The construct of the educational sciences is attempting to "provide a framework and scientific language for the applied field of knowledge called education (Hill, 1971, p. 2). A theoretical basis for approaching education as a science is established by Conant:

Teachers, like physicians, think in terms of predictive generalizations as well as arguments derived from general principles. Some people would like to combine these two modes of thought and speak of single, all embracing science of education. The question is whether it is useful to try to cover with the word "science" a vast field of human activity directed toward practical ends. I have come to the conclusion that it is not . . . I prefer not to speak of the science of engineering but of the engineering sciences. I doubt that there is or ever will be a science of medicine, yet I am sure enormous strides forward have been made in the medical sciences. Therefore, I think it would be better to discuss . . . (what) might be called educational sciences or educational disciplines rather than the science or the discipline of education (Conant, 1960, p. 120).

Following the thinking of Conant in regard to the "educational sciences," seven "strata" or "sciences" have been conceptualized by Hill:

1) Symbols and their meanings
2) Cultural determinants of the meanings of symbols
3) Modalities of inference
4) Biochemical and electrophysical aspect of memory concern
5) Cognitive style

6) Teaching style, administrative style, and counseling style

7) Systemic analysis decision-making.

Several of the elements of the "educational sciences" have already been discussed earlier in this chapter, i.e., symbols and their meanings, cultural determinants of the meanings of symbols, modalities of inference, cognitive style, and teaching style. Memory concern is one of the elements which has not been described.

Memory concern or educational memory, as it is sometimes referred to, pertains to: 1) the memory function; 2) concern components (persons, processes, properties); and 3) the conditions (assimilation, accommodation, attendance, and repression). The conditions relate primarily to the Piagetian conditions. This construct is very much in the developmental stages and is being investigated largely by the biochemists and psychobiologists. Essentially, the investigator considered this dimension as outside of the scope and concern of this study.

Other dimensions of the "educational sciences" not emphasized within the scope of the study are administrative style and counseling style. Both of these elements relate highly to teaching style but differ in the area of emphasis. Administrative style has four elements of demeanor: dominant; adjustive; cooperative; and passive adjustive custodial. The concerns of persons, processes, and properties are also considered within the context of administrative style. Also included are the symbolic orientation elements of qualitative predominance, theoretical predominance and reciprocity.
The construct of systemic decision-making and analysis is defined in terms of "determining how well the goals of a system are being met within the constraints of the inputs of the system, combined with considerations of its mission and the main functions (design criteria) around which the system is designed" (Hill, 1976, p. 7). To meet this definition, goals must be stated in terms of the tasks to be accomplished, conditions of the tasks, and minimum successful performance.

The ultimate objective of systemic analysis is that of deriving optimal decisions, i.e., decisions that are "best" for all elements included in the decision. It should be noted that optimal decisions are not always "perfect" for each of the elements affected by the system (Hill, 1976, p. 9).

The construct of educational cognitive style is a vital component of the "educational sciences" as defined by Hill. Three of the cognitive style components, i.e., symbolic orientation, cultural determinants, and modalities of inference used in this study are elements within the "sciences." The construct of cognitive style would appear to be of fundamental importance to the teaching-learning situation, yet by itself it does not adequately define the situation. Teaching style is used by Hill to describe another dimension in the educative process involving the actions of the instructor in the teacher setting.

As important as these elements are to the "educational sciences" and the instructional process, very little attention has been focused upon the interaction between the two factors in the teaching-learning setting. Teachers continue to instruct students with little idea of
how their own cognitive style might impact their teaching style. Organizations continue to plan and implement in-service education programs for instructors with little idea of how faculty members relate to the processes used. Administrators evaluate instructors with little knowledge concerning the impact of their own cognitive style upon the evaluation process.