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# The development of a model for classifying educational institutions in Hawaii on the basis of school climate

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# THE DEVELOPMENT OF A MODEL FOR CLASSIFYING EDUCATIONAL INSTITUTIONS IN HAWAII ON THE BASIS OF SCHOOL CLIMATE

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Efforts to improve a school's climate may begin with an assessment of what a school is presently like or it can begin at an even earlier stage, by ascertaining the ingredients which blend together to produce an institution with positive school climate. It was for this latter purpose that this dissertation was initiated.

Many individuals who provided technical assistance, encouragement, guidance, and constructive criticism need to be acknowledged as their advice and support made it possible for me to complete this study. Foremost amongst these is Dr. John A. Thompson, the chairman of my doctoral committee, whose experience, wisdom and helpfulness provided me with clear direction, useful methodology, and valuable suggestions. Over the years, I have learned much from this mentor and academician and am grateful for all he has taught me. I am also indebted to the other members of the committee who were invaluable sources of support and encouragement.

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# ABSTRACT

Is it possible to identify variables that are able to differentiate higher and lower climate in schools? Are there combinations of factors which can predict school climate? Can a prediction equation be found to include those variables which may determine with some degree of accuracy, schools in Hawaii that would be likely to have higher or lower climate? These questions were examined in this study.

Though school climate has been studied throughout the world, very few empirical studies have been done in Hawaii. A study of the effects of a large number of variables, extracted from data from Department of Education files, would add to the pool of educational research available to school based, district level and state office educators. This would be especially beneficial because of the uniqueness of Hawaii's single statewide school district.

The population to which this study sought to generalize consisted of the 121 elementary schools in six of the public school sub-districts in Hawaii. In the spring of 1987, the CFK Ltd., School Climate Assessment Scale was administered in three of the public sub-school districts to approximately 1200 parents, administrators, teachers, parents, support staff and community members. The study utilized a purposive sample of 41 elementary

schools, out of a total of 52, which had participated in this climate survey. These particular 41 schools were included in the sample because the same principal remained as the administrator of the school at the time the survey was conducted and also in the following school year, 1987-88. For consistency, the data which were collected for this study, consisting of eighty-eight parent/community-related, teacher-related, principal-related, school-related, and student-related variables, also consisted of information contained in Department of Education files on the sample schools for the 1987-88 school year.

Chi square analysis was performed to verify that the sample schools were statistically similar in characteristics to the schools in the population to which the study sought to generalize. The findings verified that the sample and respective populations were comparable.

The study utilized a criterion-group ex post facto design in which two criterion groups were identified as the criterion variable, higher and lower climate schools. In order to obtain a general picture of the predictor variables, descriptive data was generated on each of the 88 variables. To determine the range of scores for higher and for lower climate schools, a frequency distribution was run of the 41 climate scores. From the frequency distribution, three clusters of scores were delineated: a higher climate group of 17 schools, a lower climate group of 17 schools,

and a group of seven schools left "Unclassified." This third group was later used to test the classification equation. A t-test of means was performed and it was found that the lower and the higher climate groups represented different populations beyond the p = < .05 level.

Three preliminary hypotheses were examined, from which twenty-four variables were identified as significant discriminators. These results were used to test the fourth hypothesis which examined the question, Can a set of multiple predictors be identified that can be used to discriminate between higher and lower climate schools. Using a series of stepwise discriminant function analysis procedures, a set of eleven predictors were identified. Seven of these variables predicted positive, or higher climate classifications. These were Percent of Teachers Age 35 or Younger and Age 56 or Older, Percent of Caucasian Teachers, Percent of Chinese Students, Creativity and Co-workers of Principals, and Number of Crisis Suspensions. The variables which produced negative relationships, or lower climate relationships, were Families with Federal Connections, Percent of Teachers of Other Minorities, Total Number of Teachers, and Average Daily Absence of Students.

The eigenvalue for the fourth hypothesis was a robust 4.29. Classification results were also very strong as 96.97 of the cases were correctly classified into higher or

lower school climate based on these discriminators.

Having identified this set of eleven significant discriminators of higher and lower climate, the final hypothesis was posed. Hypothesis 5 examined the question, is there a significant difference in the values obtained for higher and lower climate schools for each of the variables identified as multiple classification predictors? One-way analysis of variance was employed to test this hypothesis in which seven variables were identified as significant individual predictors.

The positive contributors were identified as Percent of Chinese Students, Creativity and Co-workers of the Principal, and Percent of Teachers Age 56 and Older. The Number of Teachers in the School and the Average Daily Absence of the school, were identified as negative contributors to school climate. In testing for homogeneity of variance using Bartlett's Box F statistic, the variable, Number of Reported Crisis Suspensions, which was initially found to have a positive standard canonical coefficient, was identified as having a violation of homogeneity of variance. Consequently, caution should be taken when making conclusions about this variable.

Two ancillary questions were also examined in relation to these hypotheses. The first asked whether the eleven variables identified as significant multiple discriminators in the first four hypotheses could be used to accurately

classify the seven schools which were included in the Unclassified group of climate scores into higher or lower climate groups. Stepwise discriminant function analysis was used to test the accuracy of the classification model. The results showed that 100 percent of the schools which were tested were correctly classified using the classification model.

The final ancillary question asked whether an equation could be generated from the predictor variables which would predict the climate scores of other elementary schools in Hawaii. The data indicated that this was indeed possible. Using stepwise multiple regression analyses, five variables were identified in the prediction equation. These were the two principal variables of Creativity and Activity, (which predicted 24 percent and 13 percent of the variance respectively), the school's Average Daily Absence, (which accounted for 17 percent of the variance), and the Percent of Chinese Teachers and Percent of Teachers Age 35 or Younger, (which accounted for about 5.6 percent and 6.7 percent of the variance respectively). Hence, in this analysis, these five variables accounted for a very respectable total of 66.4 percent of the total variance.

In a second stepwise multiple regression analysis, the principal's 21 Minnesota Satisfaction Questionnaire variables were eliminated, while the other 67 predictor variables were run with school climate scores. This second

statistical analysis was employed because the principal's MSQ scores may not readily be available in all schools. In this run, a prediction equation identified the school's Average Daily Absence (.19.6 percent), Number of Crisis Suspensions (.11.8 percent), and Percent Japanese Students (8.1 percent), as negative contributors to school climate. In this equation, these three variables accounted for 39.5 percent of the weight of the prediction equation.

First, discriminant function analysis can be used to differentiate higher or lower school climate and to describe the multiple relationships between variables relating to climate in Hawaii's elementary schools. Second, a large number of easily attainable demographic variables were utilized in this study. Therefore, replication of the process and statistical analyses performed on these variables, would be relatively easy. Third, student-achievement and other factors such as per pupil expenditure and median family income were not found to be a significant predictor of school climate in this study as they have been in others. Average daily absence was found to be an important negative predictor of school climate, therefore, administrators would do well to keep accurate records and a watchful eye on trends of growing student absence.

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# CHAPTER I

## STATEMENT OF THE PROBLEM

**"Climate provides a reading of how things are going in the school on the one hand and a basis for predicting school consequences and outcomes on the other."**

**--Thomas J. Sergiovanni, 1988**

### INTRODUCTION

Chapter I begins with an overview and a rationale for the study of school climate. The importance of school climate as a construct for identifying effective schools is described. This is followed by an explanation of why the Getzels and Guba model was selected as the theoretical framework of this dissertation. The research questions and hypotheses which were examined are then presented along with a discussion of the operational definitions which were used. Finally, limitations and assumptions are presented.

## OVERVIEW

Recent newspaper articles and professional educational journals alike continue to sound the call for the improvement of schools and the educational process. Policy makers and experts in the field of academic research who have scrutinized the schools and their outcomes have asked why students are not doing better and schools are not more effective.[1] The place called school has been examined from the front door to the teachers' parking lot, from the library to the cafeteria, from the gymnasium to the science laboratories, and even the conditions in the rest rooms and the dispensary. Investigations have studied the effect of various structured aspects which have ranged from collective bargaining, length of school day, minutes on task, to cost per pupil and cross town bussing policies. Yet the questions of quality continue to be raised by a host of public spirited citizens.

School is a coat of many colors, shapes, and designs with many descriptors which conjure up both nostalgic memories of what was, as well as many ideas of how it should be. Every layman feels he knows how to make schools better and more effective because everyone has been a student and feels he can rely on past experiences to improve this important entity called school. The press, the legislature, and the public at large are demanding better schools and are prescribing the panaceas and formulas to attain this end.

Concerned about this state of affairs, Glines noted in his report of the kinds of schools which will survive into the 21st century, that "too many leaders--as people on the planet, as educators in the schools, and as politicians in the communities--are still hoping that somehow yesterday will get better."[2] Everything from school-based management to rebates and vouchers has been prescribed as a cure-all for the symptoms of an educational system which everyone agrees requires amelioration.

This on-going search for quality in education, has impelled another area of investigation which is concerned with the affective aspects of the place called school. Halpin has called this distinctive embodiment of the school, its "personality", the **feeling** that makes one school unique and different from another.[3] This feeling and personality of the school is its social environment, or school climate. Climate is a descriptor of varied aspects such as the morale of students and teachers, the job satisfaction of a school's administrators, staff and members, and the extent to which the community and parents are content with school programs and student test scores. It is the entire milieu of norms, attitudes, expectations, beliefs, practices, conditions, and events which operate within the school that affect the way groups **feel** about and toward the school.

The public clamor for better and more effective schools and the beliefs among individuals that they have the cure-

alls for the ills of the schools, need to be put into perspective. Not all schools require complete overhauls; some may need only minor, if any, repairs. The time honored adage of not fixing things unless they are broken may still provide a lesson. Because the school's climate pervades every entity of the school building, its personnel and its publics, it is a likely place to begin a probe to determine which of the schools need "fixing." Therefore, it is the purpose of this study to provide a means to identify those characteristics which may predict higher and lower climate in schools with the intent of improving the place called school.

## RATIONALE FOR THE STUDY

While researchers and practitioners do not always agree on a specific methodology to analyze school climate, there is consensus that some school climates are good and some are not.[4] Phi Delta Kappa and other research groups have identified some schools as being more effective than others and in their investigations of these "very" effective schools, have found that these institutions tend to have positive school climates. In fact, a number of empirical studies have identified school climate as one of the primary variables and determinants of effective schools.[5] There is also agreement that efforts to assess and improve school climate are both consequential and necessary.

The climate of the school is an important construct and it has been the focal point of numerous research studies. Scott D. Thomson, Executive Director of the National Association of Secondary School Principals, noted that school climate is perhaps the single most important expression of educational leadership. Pointing to a monumental British study which included 15,000 hours of research, Thomson noted that "the differences from school to school according to this study, center upon the principal's ability to build a supportive, challenging, and positive school climate. Schools can make a difference in the present and future lives of students--and this difference is caused by the quality of climate."[6]

Anderson has listed over 200 references to models, theories, methodologies, and related variables which have been used in assessing the relationship of school climate to such variables as achievement, self-concept, affects on staff and students, and a multitude of others.[7] In what ways does the climate of a school affect the achievement level of its students, its ability to effectively acquire a body of knowledge, and other factors?

In McDill's and Rigsby's study in 1973 of over 20,000 high school students, school climate was shown to be significantly related to student achievement and student aspirations.[8] When McPartland and Epstein studied over 6000 students in 23 elementary schools in 1975, they found that

"open" climates were positively related to achievement for high socio-economic students and negatively related to low socio-economic students.[9] In Rutter's longitudinal study in which 3,500 students in twelve inner-city schools in London were tracked for five years, school climate was found to be the "most important resource a school possesses".[10] In this "fifteen thousand hour" study, all of the schools had pupils with relatively similar socio-economic status and physical facilities, but they produced very different outcomes in terms of academic attainment on exams, student behavior in school, attendance, and delinquency. The one significant factor which differed amongst the students appeared to be simply that they attended different schools. Consequently, Rutter attributed the norms and values which fostered high success-orientation and achievement to the school's "ethos" or the style and quality of the school life which he called its "climate."[11]

In chapter two, a review of the literature on school climate reinforces the fact that research on this construct has been a serious undertaking for many school districts, universities, and educational associations. Though studies on school climate in other states have examined a number of demographic variables and their relationship to this construct, few if any studies have been carried out in Hawaii. Even fewer studies have been done nationally using powerful statistical measurements such as discriminant

function analysis to differentiate levels of school climate. Consequently, a need does exist for such an empirical study of school climate in Hawaii.

Another important rationale for a study of this kind involves the consideration of diagnosis and prognosis. As higher climate schools have been recognized as correlating positively with effective schools, would it not be both logical and resourceful to try to find a classification model for higher climate schools? Likewise, schools that are diagnosed as having lower climates, perhaps could become more effective by implementing an improvement plan which might include altering the factors within the school which have been identified as negative predictors. The development of a prediction equation of this kind would be of paramount importance to education.

A study of the effects of school climate, especially one which examined a large number of variables which were extracted from data which is already available in the Department of Education (DOE) files and computer information systems, would benefit administrators at the school, district, and state levels. A research study of this type would not only add general knowledge to the field of educational administration but would benefit Hawaii's educational system. Because of its uniqueness, ie. a single school district, a very homogeneous principal population, standardized selection, and training procedures for

prospective administrators who have generally come through the teaching ranks of the DOE, a dual certification system allowing candidates to become principals in either elementary or secondary schools, a low turnover of teachers and administrators, and fairly standard facilities, faculty and resources, a classification model which would allow administrators to "identify principals who exhibit the variables which are related to climate might facilitate optimal distribution of human resources."[12]

In 1989, Kenworthy measured three dependent variables (selected psychological characteristics of principals, visionary leadership, and level of satisfaction of principals) against the independent variable (three levels of school climate as assessed on the CFK, Ltd., School Climate Assessment Scale) to study the effects of idiographic and demographic characteristics of elementary school principals on school climate. Six demographic variables of the principals, age, sex, ethnicity, administrative tenure, school tenure, and level of education were used as moderators.

The results of this study challenged "the position which is widely held in the literature that principal characteristics...are related significantly to different levels of school climate."[13] None of the demographic variables of the principals were shown to significantly predict school climate. Neither were the four

psychological characteristics nor the visionary leadership scores found to be significant predictors. Kenworthy concluded that,

> those who write in the area of climate may be making generalizations about certain idiographic dimensions of the principal vis-a-vis school climate that have come from indirect observations or small samples which may not stand under systematic empirical study, or second, that at least on these measures, the principals in three districts in the state of Hawaii differ greatly from the generalizations made by such writers.[14]

It would seem judicious, therefore, that a study using the same sample and other variables which may effect school climate be undertaken. Tuckman noted that one of the important characteristics of research is its process and procedure which is transmittable and enables others to replicate and to assess their validity.[15] This study, consequently, was intended to explore other variables which may impact on school climate in Hawaii.

## THEORETICAL FRAMEWORK

Herbert Feigl defined theory as "a set of assumptions from which can be derived, by purely logico-mathematical procedures, a larger set of empirical laws".[16] In this context, theory provides direction for research, focus on

specific aspects, and models and constructs upon which hypotheses may be created and tested. For the educational administrator, theory can be used in conjunction with experience to assist the educator in focusing on what ought to and can be, to review processes, ideas, ideals, and patterns in conceptual terms before making decisions, and to predict or prognosticate outcomes rather than deal with chance. In short, theory permits the school administrator to escape to another vantage point so that both the forests and the trees can be seen, understood and, at least in some cases, controlled.

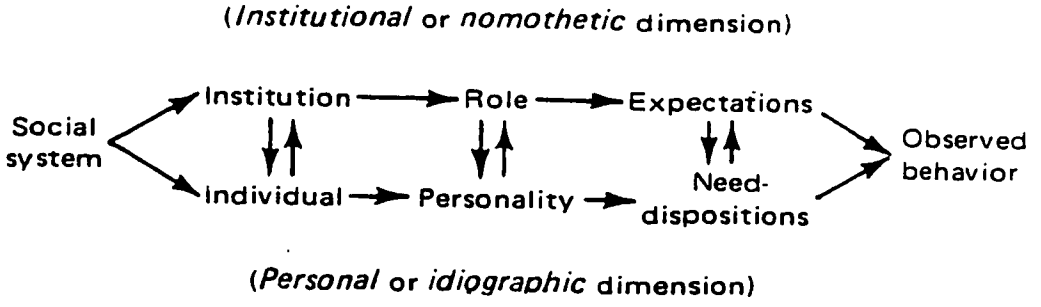
One theory has been often quoted and utilized in educational research studies. This is the Social System theory conceived by Jacob W. Getzels and Egon C. Guba, which views administration as a social process and thus, the school, as a social system. Preceded by the ideas and sociological traditions of Pareto, Merton, Homans and especially Parsons, the Getzels and Guba model asserts that "social behavior may be understood as a function of these major elements: institution, role and expectation..."[17] Because of the proximity of this model to the "real" world of the school, it is appropriate that this theoretical framework be employed to bridge the abstract and the practical in this study.

In the Getzels and Guba model, the social system is conceptualized as having two independent but interrelated

dimensions. In Figure 1, the model illustrates the relationship of the two dimensions, the nomothetic (or institutional) portion and the idiographic (or personal) aspect.

**Figure 1**

**Social Systems Model by Getzels and Guba**




**Source: J. W. Getzels, "Administration as a Social Process," in Andrew Halpin, ed., Administrative Theory in Education, (Chicago: Midwest Administration Center, The University of Chicago, 1958), 156.**

The nomothetic dimension defines the designated roles and expected norms of the institution which will fulfill the system's goals or objectives. The idiographic dimension concerns the individual's personal attitudes, values, personality and needs. Within the organization, the observed behavior is the interaction between the

individual's personality and personal needs and the needs and expected behaviors of the institution or society at large. Consequently, how a person acts or reacts to a situation depends on both the nomothetic and the idiographic dimensions. In the Getzels and Guba model, the individual has the choice of coping or reacting to expectations consistent or inconsistent with the demands of the institution or society in the social system. He may choose either to accommodate his own needs or that of the institution.

Downey has modified and applied the Getzels and Guba model to school administration and climate. Building his conceptual model on the premise that most learning in schools takes place in group situations, Downey noted that group norms and the social climate of the school influence the process of education.

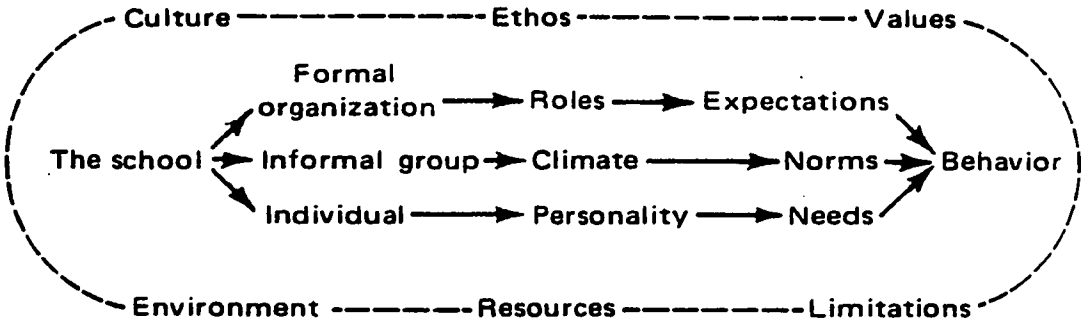
> The educative process may be conceived of as having three basic dimensions: the **substantive** dimension, or the things to be taught; the **behavioral** dimension, or the human dynamics of the teaching-learning act; and the **environmental** dimension, or the physical setting in which learning takes place and the facilities and technologies through which learning is facilitated. Each dimension has a number of identifiable components: the substantive dimension includes both the content and the strategies of inquiry of the various fields of

study. The procedural dimension includes the individual individual learner's quest for self realization, the climate or norms established by the group of learners, and the interference or influence of the teacher. The environmental dimension includes the organizational structure imposed on students and staff, the physical conditions and facilities at hand, and the technological devices that may be employed.[18]

In Figure 2, climate is seen as a central factor within the system while environmental and cultural aspects are also accommodated. The individual or group is seen as part of the system **within** a setting consisting of values, ethos, culture, limitations, resources and the environment.

**Figure 2**

**Downey's Model of the Social Systems of the School Environment**




Source: Lawrence.W. Downey, The Secondary Phase of Education, (New York: Blaisdell Publishing Co., 1965). 125.

Downey's conceptual model utilizes and accommodates the various categories of variables (teacher-related, parent/community-related, principal-related, student achievement-related and school- related) which are being examined in this study in conjunction with the climate of the school. It also provides a perspective of how these categories of variables relate within the social system as a network of interactions and relationships between the idiographic (individual) and the nomothetic (institution). In this respect, educational administration is seen as a function of the interaction between the institutional and personal dimensions. As stated by Guba,

> The unique task of the administrator can now be understood as that of mediating between two sets of behavior-eliciting forces, that is, the nomothetic and the idiographic, so as to produce behavior which is at once organizationally useful as well as individually satisfying.[19]

This model is especially useful in this study as this social systems model represents a theoretical framework from which one can derive a conceptualization of the climate of a school as well as the behavioral characteristics of the principals, the component in the process of learning which Downey sees as an important factor in making the whole system work.[20] The school is focused upon as a formal social system wherein students, staff, teachers, and

administrators interact as organizational members. Parents and community also indirectly or directly interact in and within this social system.

With this brief review, this researcher has attempted to establish the value and compatibility of the Getzels and Guba framework as modified by the Downey model as the theoretical underpinning of this study. In this sense the hypotheses that will be examined need not be directly linked to the model, but it should and does allow for the fitting of the hypotheses into a hypo-deductive model appropriate to education.

## QUESTIONS ADDRESSED BY THIS STUDY

This study has been conducted to determine the effects of eighty-eight principal-, teacher-, parent/community-, school- and student achievement-related variables on school climate. Because of the large number of variables and the impossibility of running all of them together in a single discriminate function analysis run, a systems model separating the variables into Input, Institutional and Output variables was devised.

Of the infinite number of principal, teacher, student, parent/community and school variables which may influence the climate of elementary schools in Hawaii, is it possible to ascertain which of these variables can best classify schools on the basis of higher and lower climate? This

study sought to identify these discriminating variables.

If such variables were found, this study would then ask and seek to answer the question, is there a significant difference in the mean values of selected individual variables which were previously run in concert and were found to be successful in classifying lower and higher school climates?

Other related questions were addressed. Are there factors which, when combined, may predict school climate? If these combined variables could be identified, could a sample be tested using this combination of predictor variables to ascertain how well the variables could discriminate between higher and lower climate schools? Could a prediction equation be generated to include the predictor variables which may determine potentially higher climate situations? These questions were addressed by testing the following hypotheses and ancillary questions.

## HYPOTHESES

The following hypotheses were tested in this study:

1. There is no discrete set of input variables that will produce a non-chance classification of schools into categories of either higher or lower climate.

2. There is no discrete set of institutional variables that will produce a non-chance classification of schools into categories of either higher or lower climate.

3. There is no discrete set of output variables that will produce a non-chance classification of schools into either higher or lower climate.

4. There is no discrete set of multiple predictors from input, institutional and output variables that can be used to discriminate between higher and lower climate schools.

5. On a univariate basis, there is no significant difference in the values obtained for higher and lower climate schools for each of the variables identified as multiple classification predictors.

## ANCILLARY QUESTIONS

The following ancillary questions were also examined:

1. Could the seven schools in the sample which were not used in the first run be tested using the predictor variables to ascertain the accuracy of the model in discriminating between higher and lower climate schools?

2. Could a prediction equation be generated to include the variables which may determine potentially higher climate situations?

## DEFINITION OF TERMS

School Climate Scores - the sum of the parent, teacher, and classified staff sub-scale scores of the CFK

Ltd. School Climate Assessment Scale administered in the spring semester of 1987.

Input Variables - those characteristics that a student brings with him from his home and community (such as: ethnicity, federal connection, public assistance, participation in free-reduced lunch, number of high school graduates in community, number of college level graduates in community, unemployment rate of community, family size, median income, single parent children).

Institutional Variables - those characteristics associated directly with the formal education of students, including such school-related characteristics as: sick-leave days taken by teachers, total number of teachers in a school, total student enrollment, per pupil expenditure, number of students in special education, number of students enrolled in Second Language English Proficiency (SLEP) programs, student transient percentage, district exceptions in and out, average daily student absence, number of regular and crisis suspensions, number of reported class A, B, or C incidents; teacher-related characteristics including: ethnicity, years of experience and age; and Principal-related characteristics including: sex, age, ethnicity, years as school administrator, school tenure, educational level, and the satisfaction factors of the Minnesota Satisfaction Questionnaire noted in chapter three.

Output Variables - the product of the Inputs and the Institutional variables including: Stanford Achievement Reading and Mathematics student achievement scores for school year 1987-88.

## LIMITATIONS

This study focuses on school climate, how it can be identified and classified, and how it may be predicted.

The sample in this study was not randomly selected. It included a convenience group of the 41 schools in the three DOE districts where the CFK, Ltd. School Profile Assessment Scale was administered and where the same principal had been at the school during the Spring semester of 1987 when the instrument was administered through the following school year when the demographic data were gathered.

## ASSUMPTIONS

Educational environments are generally stable and do not change markedly over short time periods. Consequently, measuring the environment of schools at any particular time, should result in an assessment of climate which is relatively durable absent major changes in the milieu.

## SUMMARY

Chapter I has provided a description of school climate and has shown that research studies have found a significant relationship between school climate and effective schools. A rationale for this study, including the benefits such a study would bring to educational administration in Hawaii was also presented. An explanation for using the theoretical framework of the Getzels and Guba Social System model and a modification of that model by Downey followed. Seven research questions were posed relating to the five hypotheses and two ancillary questions which were examined in this study. Operational definitions of the key variables were delineated. Finally, limitations and assumptions were noted.

## NOTES FOR CHAPTER I

1.The 1988 Gallup Poll indicated that the public's ratings of the public schools has fluctuated little in the past four years. Forty per cent of the public gave A and B ratings to their public schools while forty-five per cent said their public schools deserve ratings of C, D, or F. This information is presented in Alec M. Gallup, "The 20th Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," Phi Delta Kappan, 70, 1 (September 1988): 33-46.

2.Don Glines, "Can Schools of Today Survive Very Far into the 21st Century?", NASSP Bulletin 73, 514 (February 1989), 49.

3.Andrew W. Halpin and Don B. Croft, The Organizational Climate of Schools (Chicago: University of Chicago, 1963) 1.

4.Edgar A. Kelley, Improving School Climate, (Reston, VA.: National Association of Secondary School Principals, 1980) 17, from ERIC Clearinghouse on Educational Management, Research Action Brief, "School Climate," 4 (February 1978).

5.Why Do Some Urban Schools Succeed? The Phi Delta Kappa Study of Exceptional Urban Elementary Schools. (Bloomington, IN.: Phi Delta Kappa, 1980), David A. Squires, William G. Huitt, and John K. Segars, Effective Schools and Classrooms: A Research-Based Perspective, (Alexandria, VA.: Association for Supervision and Curriculum Development, 1983), and Herbert J. Walberg (ed.), Educational Environments and Effects, (Berkeley, CA.: McCutchan Publishing Corporation, 1979) are but a few of many educational studies which have identified school climate as a primary determinant of effective schools.

6.Scott D. Thomson, in Kelley, v-vii.

7.Carolyn S. Anderson, "The Search for School Climate: A Review of the Research." Review of Educational Research 3 (1982): 368-393.

8.E. L. McDill and L. C. Rigsby, Structure and Process in Secondary Schools: The Academic Impact of Educational Climates, (Baltimore, MD.: Johns Hopkins University Press, 1973).

9.J. M. Mcpartland and J. L. Epstein, Social Class Differences in the Effects of Open Schools on Student Achievement, (Baltimore, MD,: Johns Hopkins University, Center for the Study of Social Organization of Schools, (April 1975). ERIC ED 106 435.

10.David A. Squires, William G. Huitt, and John K. Segars, Effective Schools and Classrooms: A Research-Based Perspective, (Alexandria, VA.: Association for Supervision and Curriculum Development, 1983) 56.

11.Ibid., 55-57.

12.John A. Thompson, "The Principal and School Climate," An unpublished report prepared for the Hawaii L.E.A.D. Project, (June 1989) 31.

13.Sue P. Kenworthy, "The Effects of Idiographic and Demographic Characteristics of Elementary School Principals upon Varying Levels of School Climate," (Unpublished diss., University of Hawaii, 1989) 181.

14.Ibid., 184.

15.Bruce W. Tuckman, Conducting Educational Research, 2d. ed. (New York: Harcourt Brace Jovanovich, Inc., 1978) 12.

16.Herbert Feigl, "Principles and Problems of Theory Construction in Psychology," in Current Trends in Psychological Theory, (Pittsburgh: University of Pittsburgh Press, 1951) 182.

17.Jacob W. Getzels, "Administration As a Social Process", in Andrew W. Halpin (ed.), Administrative Theory in Education, (New York: Macmillan Publishing Co., Inc., 1967) 152.

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# CHAPTER II

## REVIEW OF THE LITERATURE

**"School climate research is clearly the stepchild of both organizational climate research and school effects research, having inherited instruments, theory, and methods from both research paradigms."**

**--Carolyn S. Anderson, 1982**

When one reviews the literature on school climate, the foregoing quote is an obvious verity. The purpose of this chapter is to conceptualize school climate as an operational term by relating the history of school climate research, reviewing the methodology which has been utilized in these studies, and summarizing conclusions which researchers of school climate have found in their studies. In addition, because of their relevance to this study, a review of the literature of studies using the CFK, Ltd. School Profile Assessment Scale and studies utilizing multivariate statistical analyses such as discriminant function analysis are included.

## DEFINING SCHOOL CLIMATE

The search for information on school climate began three and a half decades ago, when Halpin and Croft first identified the need to address the "personality" or

"climate" of the work place as an important construct in the study of organizations.[1] As the theory and administration of the business world began to impact on the academic scene, it was inevitable that the school would become a focal point for climate studies. The interest in climate studies has been so popular that a number of taxonomies focusing on its definitions have been created. Climate, and its synonyms, ie, social system, open or closed environment, "press", atmosphere, "feel", culture, milieu, personality, etc. have been investigated and explored in hundreds of research studies.[2]

A Harvard specialist in personal perception and organizational behavior, Renato Tagiuri, has offered a practical definition of **climate** as a particular configuration of enduring characteristics of the **ecology** (physical and material aspects), **milieu** (social dimensions of groups and individuals), **social system** (patterned relationships of groups and individuals), and **culture** (dimensions related to belief systems, values, language).[3] But Tagiuri was concerned when the adjective "organizational" was placed before the word "climate", since he believed that this definition of organizational climate may have been too narrow. In his review of related research which defined organizational climate, Tagiuri examined various typologies developed by Hemphill, Argyris, Fiedler, Likert, Litwin and others and concluded that each definition

was insufficient in some facet. Consequently, he developed a more general definition of organizational climate as,

> **a relatively enduring quality of the internal environment of an organization that (a) is experienced by its members, (b) influences their behavior, and (c) can be described in terms of the values of a particular set of characteristics (or attributes) of the organization.**[4]

Another researcher, Rudolf Moos of the Social Ecology Laboratory at Stanford University, has spent twenty-five years studying organizational climate. Moos and his associates have developed 12 climate diagnostic instruments known collectively as the Social Climate Scales. Two of the tools, the Work Environment Scale and the Classroom Environment Scale, have been used widely in diagnosing school climate. The scales were constructed on the premise that **climate is a product of the interaction of a person with the physical and social dimensions of an environment.** Believing that people and environments reciprocally influence and interact with each other, Moos has developed an integrative conceptual framework which he has called "socio-ecological" to emphasize both the environmental system (physical setting, organizational factors, human aggregate, and social climate) and the personal system (sociodemographic variables, expectations, attitudes, roles, personality factors, coping skills) which act upon a

student while he goes through the process of education. In Evaluating Educational Environments, Moos cited more than fifty empirical studies utilizing this framework and variables from both the personal system and the environmental system.[5] While the literature abounds with both simple and complicated definitions for school climate, the one which will be used in this study is in the researcher's opinion, both comprehensive and operative. Kelley refers to climate as,

> **prevailing or normative conditions which are relatively enduring over time and which can be used to distinguish one environment from another. Climate conditions, as perceived by persons who work within or know a particular environment, serve as the basis for establishing expectations and interpreting events or activities which occur within that that environment.**[6]

In this context, school climate can be perceived as a function of an individual's personality, physical abilities, need-dispositions, attitudes, and beliefs, (idiographic dimension variables) and society's or the schools' norms, roles, and expected behaviors (nomothetic dimension variables) as depicted in the Getzels and Guba social systems model.

## HISTORY OF SCHOOL CLIMATE RESEARCH

The history of school climate research began with the study of the role of the environment in the learning process and the identification of learning environments which were effective.

"Since the time of Plato and Aristotle, educational thinking about the role of the environment in learning has occasionally swung toward extremes."[7] Still the nature vs. nurture debate continues and study after study confirms that a definitive solution is not likely. In 1966, Coleman, et al, in the widely read and publicized, Equality of Educational Opportunity, and in 1972, Jencks and associates concluded that differences among schools have relatively little impact on student achievement. Soon after, challenges from practitioners and educational researchers such as Weber, Brookover et al, Rutter, Goodlad, and the Phi Delta Kappa Study of Exceptional Urban Elementary Schools disputed the conclusions and suggested, on the contrary, that some schools have powerful effects upon their students and consequently, schools do make a difference.[8]

The Coleman report showed that in 1966 most children still attended segregated schools and there were significant differences in educational resources available to children in public schools. But instead of providing remedies for these inequalities, the survey had an opposite effect. Consequently, the media published extensive accounts of how

the home environment variables, not the variables associated with school facilities or curriculum, were most important in explaining variance in achievement levels for all racial and regional groups. Thus, the message heard across the country was that the home, not the school, was the element that made a difference in learning.

In the seventies, as a counter effect, researchers set out to test the null hypothesis that schools make no difference by exploring questions such as, "can schooling compensate for differences in race and background?", and "can schooling be effective for minority and for poor children?" From that point, demographic variables such as socio-economic status, race, parent's education level, and background, etc. began to be examined in relation to achievement and the environment.[9]

At about the same time, organizational climate was being studied by psychology and business departments in leading universities such as Ohio State and Harvard. Soon after, instruments designed to measure climate in industrial and business organizations were revised or redesigned to be implemented in the school or classroom.

> Underpinning the vast bulk of research that has been conducted ...is the acceptance that schools (and educational systems) are **formal organizations.** As such, they behave in some ways similar to most social groupings in that they have goals...rules, roles, an

hierarchy of authority, reward systems, forms of compliance, coordination activities and communication patterns."[10]

Eventually, the value of assessing school climate became so apparent that instruments were designed to specifically measure the climate in schools. The amalgamation of school climate assessment, the question of the environment and learning, and the effective schools research movement has evolved out of a natural bonding of the central focus of this whole phenomena, the need to identify the primary factors (social, cultural, demographic, physical, ecological) which make learning effective.

## THEORETICAL APPROACHES TO THE STUDY OF SCHOOL CLIMATE

There are at least three theoretical perspectives in the study of school climate. Each of these approaches has its own research perspective. The Input-Output Systems Model views the school as a firm that receives inputs and converts them into outputs. In this model, inadequate output necessitates changes in inputs (facilities, money, personnel, teaching methodology, time, etc.). With this approach, the combination of inputs creates the climate. This model has been criticized as "holding a simplistic "black box" view which does not adequately deal either with the complexities of school influences on outcomes or with interactions of school and student inputs."[11] Averich,

Coleman et al. and Jencks et al. used this conceptual approach in their studies.

The second approach views the school in sociological terms. The school is seen as a cultural system of social relationships among students, teachers, administrators, peers, families, etc. and considers how these relationships act to meet the goals of the school. "Student behavior is seen as a function of the social process of the school: its norms, expectations, evaluation, and relationships. To the extent that schools differ in their social environments, they will differ in learning outcomes."[12] When sociological climate studies were first conducted, they were defined in terms of average characteristics of participants using variables such as ability, socioeconomic status, or race. At the present time, the trend of this approach is to measure climate by social system and cultural variables, separated from the personal characteristics of the participants. Brookover et al., Rutter et al., Weber, and the Phi Delta Kappa study of exceptional urban schools utilized this orientation.

The third approach employs a modified input-output and ecological model. In this model, the concern for the social processes and culture of the environment is combined with the ecological elements of the input-output model and its concern for the creation, maintenance, and distribution of resources, and the relationship of time and the physical

environment. This approach encompasses the function of the entire system and "views all variables as potentially modifiable for the benefit of student outcomes."[13] Goodlad and, Moos et al., followed this approach. The theoretical model of L.W. Downey, discussed in Chapter I, which adopts the Getzels and Guba Social Systems Model to educational administration clearly illustrates this socio-ecological approach of viewing school climate.

## GENERAL FINDINGS

The literature on school climate studies is extensive. Because of this fact, these studies were classified into the five categories of variables examined in this dissertation. These are the student-related, faculty-related (including teachers and support staff), parent/community-related, principal-related and school-related (including size, attendance, resources, etc) variables which have been examined in relation to school climate.

## STUDIES USING STUDENT-RELATED VARIABLES

In 1980, Mortimore and Sammons began a longitudinal study with 200 randomly selected seven-year olds from a random sample of 50 elementary schools from a total population of 636 schools in London. The study sought to answer three questions: Are some schools more effective than others in promoting students' learning and development,

when student background is controlled? Are some schools more effective than others when controlling for age, social class, student sex, or race? If some schools are more effective than others, what factors contributed to the positive effects? The informative findings were reported in 1987.

Strong relationships were found between background factors, especially age, sex, social class, race, academic attainment, and social development of students. In the area of reading progress, the variables within the schools were found to be six times more important in predicting growth in reading than background variables. For mathematics and writing, the difference was tenfold. It was further found that though some schools are advantaged in terms of status, size, environment and staff stability, these characteristics did not in themselves insure effectiveness.

Policies and processes within the control of teachers and principals tended to promote student progress and development. For example, in schools where the principal was involved in curriculum and where teachers consistently followed guidelines and policies, there were significant differences in effectiveness. "Schools in which teachers were consulted on policy issues as well as issues affecting them directly appeared to be more successful."[14] Teachers who enjoyed teaching and communicated this to their students created a climate characterized by "happy, well-behaved

students who were friendly toward each other and outsiders and by the absence of graffiti around the school."[15]

Lastly, 12 key factors of effectiveness were identified in this study. These were: purposeful leadership of the staff by the principal, involvement of the assistant principal in policy decision making, involvement of teachers on issues affecting them directly, consistency among teachers, intellectually challenging teaching, limited focus within sessions, maximum communication between teachers and students, good record keeping, parental involvement, and positive school climate.[16]

In 1975, Brookover and Schneider used observations and questionnaires in surveying 114 teachers, 24 principals and 3,072 students in a random sample of 24 outlier (unusually effective) elementary schools in Michigan. Student and teacher climate dimensions, race, SES, and community location were the independent variables while school achievement and student futility (sense of being able to control one's destiny) were the dependent variables. In this study, student futility and teacher expectations accounted for most of the achievement variance and high and low achieving schools differed on climate when composition and community were controlled.[17]

In 1965, Herr used the High School Characteristics Index (HSCI) developed by Stern to measure "press" in high school. Seven hundred twenty-five secondary students in a

northern New Jersey school were surveyed. Independent variables included grade level, sex, achievement, ability, background and involvement while the dependent variables were the climate dimensions. Herr found significant differences in climate perception between grade levels, levels of achievement, sex, ability, family background and involvement.[18]

McDill and Rigsby, in 1973, used the HSCI as the basis for student and staff questionnaires which they developed for this large study of 20,345 students and 1,029 teachers in 20 secondary schools in areas deliberately selected for diversity in seven U.S. geographical regions. Climate dimensions, school social structure, student background, student SES, and student sex were the independent variables and student aspirations and achievement were the dependent variables. Results indicated that climate related to significant variance in student achievement and aspirations with student background controlled while climate differences existed for the variable of student sex. Findings also showed that social structure variables (peer values, parent involvement, instructional program, and teacher education) were found to affect achievement and aspirations.[17]

In 1975, McPartland and Epstein administered questionnaires to 6,185 students from 23 elementary, 10 middle, and 6 high schools in suburban Maryland. Open and closed climate and student socioeconomic status were

independent variables and student achievement was the dependent variable. School openness was found to account for little variance in achievement when socioeconomic status was controlled. The study also found that open climates tended to be positively related to achievement for high SES students and negatively related to low SES students.[18]

Rutter et al., the final student-related study to be reviewed in this section, tracked the performance of 3,485 students aged 10 and 14, for five years, from a deliberate sample of 12 schools in south London. The study controlled for SES and evaluated the independent variables of student background, school organization, school processes and school composition. Student behavior, attendance, achievement and delinquency were dependent variables. The results of this thorough and much acclaimed study suggested that "formation and maintenance of a social group, with norms and values that support the purposes of the school, may be the most important resource a school possesses."[19] He called this style and quality of the school life, its "ethos" or "climate." Interestingly, all twelve schools had relatively similar students but produced very different outcomes in terms of academic attainment on exams, student behavior in school, attendance and delinquency. Rutter therefore hypothesized that certain school processes including each school's unique climate influenced these significant differences.

## STUDIES USING TEACHER-RELATED VARIABLES

In a study on leadership characteristics of principals in Hawaii, Araki asked the question, "How do teachers in Hawaii's schools perceive the organization of their schools and the leadership behavior of their principals?"[20] An eight point Likert-type rating scale with ranges from "A Very Little Extent" to "A Very Great Extent" was used to survey a sample of 3,081 public school teachers and 187 private school teachers. Teacher perception of organizational climate and leadership characteristics in relation to Likert's Management Systems Model were examined. The findings indicated that,

> Both public and private school teachers in Hawaii perceive the organizational climate of their schools and the leadership behavior of their principals as consultative, or Systems 3 on the Likert scale. They see themselves functioning as subordinates rather than as partners in the educational enterprise, but subordinates in a relaxed atmosphere of openness and guarded trust.[21]

In 1979, Brookover and Lezotte used questionnaires and interviews of all staff members in a deliberate sample of 8 elementary schools in Michigan in their study. Staff

attitudes, instructional programs, parent involvement, and principal leadership were the independent variables tested while school achievement (improving/declining) was used as the dependent variable. Findings indicated that student futility and teacher expectations accounted for most of the achievement variance. Also significant was the fact that high- and low-achieving schools differed on climate when composition and community were controlled.[22]

Kimpston and Sonnabend administered questionnaires to a stratified random sample of 1,134 teachers in 20 secondary schools in Minnesota to measure school climate. The independent variables of staff characteristic (age, experience, position, sex and education level) and instructional program (innovative and non-innovative) were factored with climate, the dependent variable. Climate was found to be related to staff characteristics, with women, with principals, older and more experienced staff, and more educated staff holding more positive views. It was also found that teachers are more positive at innovative schools.[23]

In his doctoral study, Miller administered Halpin and Croft's Organizational Climate Description Questionnaire (OCDQ) to approximately 400 teachers from 29 elementary schools in Minnesota. Using open and closed climate type and teacher and principal dimensions as independent variables, school achievement was examined as the dependent

variable with ability and SES controlled. Miller found that climate type was related to school achievement, with teacher dimensions more important than principal dimensions.[24]

## STUDIES USING PARENT/COMMUNITY-RELATED VARIABLES

In 1987, Hoover-Dempsey, Basslet and Brissie tested their hypothesis that levels of parent involvement would be related to school climate, school SES, teacher degree level, grade level, class size, teachers' sense of efficacy, principal perceptions of teacher efficacy, organizational rigidity and instructional coordination. The sample consisted of 1,003 teachers and 66 principals in 66 elementary schools in a large mid-Southern state. Stepwise multiple regression analyses resulted in identifying various combinations of predictors which accounted for significant portions of the variance in all parent involvement outcomes: parent conferences (52%), parent volunteers (27%), and teacher perception of parent support (41%). Variables most consistently involved in outcomes were teacher efficacy and school socioeconomic status.[25]

Another study involving the factors of parents and community utilized case histories, observations, interviews and surveys of very high achieving elementary schools in America. The Phi Delta Kappa study of 1980 sought to answer the question, Why do some urban schools succeed? An

analysis of the case study literature on each of the exemplary schools, an analysis of the research development and evaluation reports of the eight schools, and evidence from experts employed to analyze all of the data was painstakingly reviewed to conclude with a list of factors associated with successful urban elementary schools. A conclusion relating to this topic stated that, "Successful urban schools and programs are characterized by high levels of parental contact with the school and parental involvement with school activities."[26]

## STUDIES USING PRINCIPAL-RELATED VARIABLES

In nearly all of the effective schools studies and in most of the empirical studies involving principals and school climate factors, there is a strong relationship between the principal and the climate of the school. The Phi Delta Kappa study of high achieving schools concluded that two factors related to the principal were associated with success in urban elementary schools. "The behavior of the designated school or program leader is crucial in determining school success." and "The leader's attitude toward, or philosophy of, urban education and expectations for school or program success determine the impact of the leader in exceptional schools."[27]

In Weber's study of 4 inner city schools deliberately selected from 17 schools in 7 large cities, student

background instructional program, staff characteristics, facilities and equipment, and school processes served as independent variables and school achievement level was the dependent variable. Results demonstrated that high-achieving schools have principals who are leaders, high expectations for students, academic time which is allocated wisely, good discipline, and regular student evaluation. Weber found that strong administrative leadership in instruction was associated with student academic success.[26] A similar conclusion was found in the Brookover and Lezotte study mentioned earlier.

In Wiggins' 1972 study where the OCDQ was administered to 715 teachers and principals from 35 randomly selected schools in a large southern California urban district, staff position and principal characteristics were examined in relation to climate type. The findings showed that teacher and principal perceptions of climate were relatively independent. Furthermore, principal behavior was not related to climate type, which remained stable with principal turnover.[27]

Ellett and Walberg used The School Survey, which measures teacher morale or satisfaction within the work environment, and the My School Inventory, the elementary student version of the Learning Environment Inventory (LEI). The LEI, which was developed by Walberg, was also used with high school age students in this study. The survey included

6,963 students and 1,200 teachers in Georgia schools. In this 1979 study, climate dimensions, principal performance and participant position were the independent variables while school achievement, climate dimensions and principal performance were used as dependent variables. The researchers found that the teacher's perceptions were the best predictors of principal performance. It was also found that principal performance affects achievement through the mediating influence of school climate.[28]

Climate type was found to be related to school size, teacher turnover and principal characteristics, in Flagg's 1964 study of 6th grade teachers in 10 elementary schools in Newark, New Jersey. School size, teacher turnover and principal characteristics were used as independent variables while student achievement and climate type were the dependent variables. Flagg also found in this study, that principal characteristics were not related to student achievement, unlike some of the other studies reviewed here.[29]

One of the larger studies utilizing questionnaires was conducted by Brookover, et al. in 1979. Brookover used staff and students in 3 random samples and 1 matched sample of Michigan elementary schools. A state sample of 68 schools which included 8,078 students, 327 teachers, and one principal, a black sample of 30 schools with 4,737 students, 177 teachers and 1 principal, a white sample of 61 schools

with 6,729 students and 276 teachers, and 1 principal, and a sample of 4 schools matched on SES and race were examined. School compositions such as race and SES, school social structure, staff characteristics, and climate dimensions were used as independent variables while school achievement, student self-concept, and student self-reliance were studied as dependent variables. Brookover et al. found that teachers and principals in higher achieving schools expressed the belief that students can master their academic work, and that they are expected to do so. Contrastingly, lower level achieving schools were characterized by students' feelings of futility in matters concerning academics.[30]

## STUDIES USING SCHOOL-RELATED VARIABLES

School-related variables such as building characteristics, school size, physical plant, cost per pupil, student-teacher ratio, salaries, etc. have shown low or inconsistent relationships with effective schools. The Phi Delta Kappa study mentioned earlier noted that "Resource and facility manipulations alone are insufficient to affect school or program outcomes."[31] In the 1979 Rutter et al. study of London secondary schools, no relationship could be found between age of buildings and any of the outcomes studied such as attendance, achievement, behavior or delinquency. Furthermore, neither class nor school size

had any measurable effect. Interestingly, though, like the Phi Delta Kappa study, "decorations and care of school and classrooms was associated with higher student achievement.[32] In the Weber study, where four inner-city schools were studied and in the McDill and Rigsby study, where 20 non-random public high schools with a sample of more than 20,000 students responded to a questionnaire, no correlation between school variables and either climate or achievement was found. In 1964, Flagg found that school size was related to measures of climate in his study using the OCDQ. Larger schools were found to be more "closed."[33]

Anderson surmised that these school-related variables may not show up as being related to school climate because they do not directly operate on student outcomes. It may be that these ecological variables "operate through a mediating effect of school climate."[34] If that is so, variables which are more closely related to students, such as classroom appearance and playground areas, may be more appropriate for ascertaining the relationship between school climate and school variables.

## STUDIES USING THE CFK, LTD., ASSESSMENT SCALE

Because the climate of a school is an "atmosphere" for learning, and because it is a "feeling" or a "spirit" of ill or well being, it is difficult to quantify or weigh. Actually, a school's climate or reputation is being

informally assessed constantly by the media, its community and its alumni. However, it is only the formal, or measurable kinds of assessment that can be studied empirically. Generally, assessment instruments have taken the form of surveys or interviews of the stakeholders, for who better than those who have a direct connection with the school would know it well enough to judge it. Consequently and routinely, school and central office administrators, teachers, support staff, students and parents have been asked to provide an opinion on questions relating to the school, its staff and its program. Responses are tallied, and a total score is compiled and is ranked according to a validated scale which identifies a school's "climate."

The CFK, Ltd., School Climate Profile which is being used as the basis of climate assessment in this study employs the above process of surveying its stakeholders. A team of educational administrators and educational research professors worked on the instrument for several years, using business organizational as well as education administrative principles as its theoretical and practical base. The instrument was designed with two goals in mind:

(1) "to provide a convenient means of assessing the school's climate factors and determinants so that initial decisions can be made about priority targets for improvement projects, and

(2) to serve as a benchmark against which a school may measure climate change."[35]

In their 1987 work, Handbook for Conducting School Climate Improvement Projects, Howard, Howell and Brainard, principal developers of the CFK, Ltd. School Climate Profile cited recent effective schools research as the basis for selecting their eight factors upon which a school can measure its climate.[36] These factors are discussed in detail in Chapter III. Currently, the CFK Ltd., School Climate Profile and short forms of it, developed by Howard and his associates are being used in school districts in every state.[37]

Though the instrument has been used widely in school systems as a diagnostic tool, in 1989, Baily and Young used the CFK Ltd. School Climate Profile in their study which examined the relationship between leadership styles of high school principals (the independent variable) and school climate (the dependent variable) as perceived by teachers in West Virginia. The results were interesting. Teachers who perceived their principals as high task/low relationship, high task/high relationship, or low task/high relationship perceived their school climate as being positive. Teachers who perceived their principals as low task/low relationship perceived their school climate as negative.[38]

In the Kenworthy study, scores from the CFK Ltd. School Climate Assessment Scale were classified into lower, average and high, and were used as the independent variable. Ethnicity, administrative tenure and education of principals were used as moderator variables, and principals' scores on various other instruments (the Visionary Leadership Behavior Questionnaire, the California Psychological Inventory and the Minnesota Satisfaction Questionnaire) were the dependent variables. Statistical analyses for the data included analysis of variance, analysis of co-variance and multiple regression analysis. Findings indicated that

> ...when groups of principals were compared according to their school climates on certain psychological traits, no differences could be found in the principals for the characteristics of Capacity for Status, Flexibility, Social Presence or Intellectual Efficiency ...Principals from varying climate levels did not differ in their perceptions of visionary leadership behavior...Principals from lower and average and lower and high climate schools have significantly different perceptions of satisfaction for "chance to try my own methods of doing a job" and for "the freedom to use my own judgement.[39]

Except for Creativity and Activity, which were identified as predictors of school climate, none of the

principals' job satisfaction variables had any significant effects. As a result of these findings, this study did not examine the variables associated with the Principal's visionary leadership or psychological traits.

## STATISTICAL APPLICATIONS

McPartland and Karweit stated that, "Differences in school environments are not the major causes of differences in students'achievement."[40] This conclusion has been drawn in at least four large sample studies in the last twenty-five years and is at least partially responsible for the concerted effort on the part of educators to prove these conclusions wrong. The authors further commented that,

> Rather than closing up shop or changing their business, educational researchers and school planners have raised issues of research methodology and interpretation to argue that conclusions on the ineffectiveness of schools are premature and misleading.[41]

Writing in 1980, Sirotnik called attention to a problem which develops particularly with school effects studies such as school climate research when a decision needs to be made about what unit of analysis should to be used when studying a particular type of variable. The way in which the individual and group is conceptualized, (that is, whether the researcher wants to study the effects of a variable on

an individual's characteristics or the group average characteristics, or the school's average outcome) is an important factor in determining what kind of statistical analysis should be used. Sirotnik discussed and illustrated examples of appropriate and inappropriate uses of statistics to avoid this area of concern.[42] There is also a need to consider the "frog pond" effect, the individual in relation to the group, when conceptualizing climate sources.

McPartland and Karweit have suggested increasing the scope of school variables in future research studies, paying more careful attention to the differences within schools, and using more powerful statistical multi-level analyses to forestall some of the problems associated with some of the large studies such as the Coleman survey and others.[43]

One powerful way to analyze the difference between groups is through the use of discriminant function analysis. This statistical procedure may be used for interpreting group differences and classifying cases into groups. The basic prerequisites are that two or more groups exist which differ on several variables and that those variables may be measured at the ratio or interval level. In short, "discriminant analysis is a statistical technique which allows the researcher to study the differences between two or more groups of objects with respect to several variables simultaneously."[44] This technique is especially useful because it can be used to discriminate variables, that is,

to tell us which variables may be significantly related to a given factor. Remarkably also, discriminant analysis can identify combinations of variables which may be able to predict certain outcomes, or relate how accurate a derived equation might be.[45]

In 1967, Shaycoft used a number of statistical techniques including canonical correlation analysis, stepwise discriminant function analysis and stepwise multiple correlation to study change in educational achievement after taking characteristics of the home and the school into account. The study examined growth in cognitive skills for a three-year period from grade 9 to 12 in Project Talent students. Socio-economic status was found to have little effect in accounting for variation in performance scores. Though there were differences between schools in their teaching success, the number and kind of courses taken had a direct effect on student performance. In this study, there were many differences between the schools, but the factors which influenced performance were not easily identifiable.[46]

In the earlier mentioned Wiggins' study, 31 randomly selected elementary schools, canonical correlation analysis and trend analysis was used to test the hypothesis that a significant relationship existed between the behavioral characteristics of elementary principals and the organizational climates of the schools within which they

served. Generally, principal behavior and organizational climate were not shown to be significantly related although a significant relationship was found between the interpersonal orientation of the principal and organizational climate. Canonical correlation analysis of teacher-principal perceptions of organizational climate indicated that teachers and principals perceive their climate differently. Another noteworthy finding of this investigation was that climates did not change readily when principals were replaced. A retest of 13 of the schools eight months after the principal had been replaced showed that the turnover of the principal had no significant effect upon the existing organizational climate.[47]

In 1976, Perkins sought to identify the relationships of the perception of the school environment and overall student performance on selected school outcome measures in fourth grade students and elementary teachers. The sample consisted of 3,703 fourth grade students and 958 teachers in 42 elementary schools from five independent school districts. Teachers' scores on the School Survey and students' scores on the My School survey were averaged together within each school to provide a representative school environment score. Canonical correlational analysis was used to test the hypotheses. Results indicated that there was a positive relationship between teachers' perceptions of the school environment and educationally-

related performance of students, that there was a positive relationship between the students' perceptions of the school environment and the educationally-related performance of students, that there was a relationship between teachers' perceptions of the school environment and students' perceptions of the school environment, and there was a relationship between students' perceptions of the school environment and student performance when the effect of the teachers' perception of the school environment has been removed.[48]

## SUMMARY

This chapter reviewed the literature relating to school climate, the instruments used in the study, and the statistical analyses which were used. References to various definitions of school climate and its counterpart, organizational climate, were examined. The history of school climate research was related citing findings from several early studies which served to "spur on" the study of school climate in the early seventies. The theoretical approaches to the study of school climate was then examined.

General findings were separated into studies related to the various categories of variables which were studied. Several empirical studies in each of the classifications of

student-related, parent/community-related, principal-related, teacher-related and school-related variables were reviewed. Studies using the CFK, Ltd. School Climate Assessment Scale were also included in this review. Finally, a discussion of some of the problems associated with statistical analyses (the unit-of-analysis problem and the "frog pond" effect) and studies that have used discriminant function analysis were related in this chapter.

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# CHAPTER III

# METHODOLOGY

**"Although educational researchers and practitioners don't always agree on how to solve specific problems, they do agree that some schools are good and some are bad and that efforts to assess and improve school climate are important."**

**--ERIC, 1978**

This chapter describes the population and the sample to which this study sought to generalize and reviews the data gathering procedure. It also contains a description of the instruments used in collecting data for the study. Following an explanation of the design of the study and the variables which were examined in relation to the hypotheses, a step by step plan of the statistical analyses which were employed in the study is presented.

## POPULATION AND SAMPLE

The population to which this study sought to generalize consisted of the 121 elementary schools in six of the public school administrative districts in the state of Hawaii. The

study utilized a purposive sample of forty-one elementary schools from three Department of Education districts in Hawaii. Each of the schools that was chosen for the sample met two important criteria: the principal was the administrator of the school at the time the parents, faculty and classified personnel responded to the CFK, Ltd. School Climate Assessment Scale in January through June of 1987, and the data from their responses was available in DOE files. Of the 52 elementary public schools which participated in this school climate assessment program, 41 met the stated criteria. There were approximately 1,200 responses of the administrators, teachers, parents, support staff and members of the community who participated in the survey.

The three districts in the sample may be described as follows:

District A-

Suburban with a just a few rural areas
School enrollment - 150 to 900 students with more schools in the 300-500 range
K-6 configuration in all schools in sample
Instructional staff - approximately 20 members
Resembles two of the three other Oahu districts in that all three have heavily populated suburban areas and all three have rural areas

Districts B and C -

Majority of schools are in rural areas
School enrollment - 117 to 900 students with more schools in 400-500 range

One-fourth of schools are in K-8 configuration while the other three-fourth are K-6
Districts B and C resemble each other in population density
District B is half the size (area) of District C
Schools in districts B and C are similar to other rural district schools in the state

To determine whether the 41 schools in the sample were similar in characteristics to the 121 school population, a complete evaluation was conducted using records of the Department of Education. Computer generated chi-square analyses were run to examine whether there was a significant difference between the sample of District A and the population of District A, and the population of each of the other two Oahu districts to see if their characteristics were similar. The sample of districts B and C were similarly compared by chi-square analysis with the populations of districts B and C and another similar rural district.

The findings verified that there were no significant differences in comparing the three sample districts with their respective populations except in the following instances. In District A, there was a significant difference for sex of principals at $p = < .02$ and there was a significant difference for principal's age and administrative tenure at $p = < .05$ when District A was compared to one of the two similar school districts on Oahu.

Thus, with these noted exceptions, the schools in the sample were found to be similar in characteristics to the schools in the population to which the study sought to generalize.

## SELECTION OF VARIABLES

The selection of relevant variables was determined by reading through an abundant amount of literature on school climate and brainstorming on the infinite number of factors which may influence the climate of a school. After generating a list of more than ninety variables, the researcher decided to classify the factors into an input-output "ecological model" (see page 29 for a description of this modified model) in which variables which characterize the school, the parents or community, the teachers, the principal, and student achievement, could be examined from these categories. It was necessary to separate the variables into categories because of the large number which would be impossible to run through the computer as a single group.

The input variables consisted of those characteristics a student brings with him from his home or community. These were classified as the Parent/Community-Related variables consisting of community characteristics such as student ethnicity (in six categories: Chinese, Filipino, Part-Hawaiian, Japanese, Caucasian, and Others), percent of families with federal connections, percent of families on

public assistance, percent of families needing free-reduced lunch, percent of school community who are high school and percent of school community who are college graduates, percent of community unemployment, and percent of single parent children. In all, there were fifteen input variables.

The Institutional variables consisted of sixty-seven characteristics which are directly associated with the formal educational system. These were classified as the school-related variables which included sixteen characteristics such as sick-leave days used by teachers, total number of teachers in the school, number of students enrolled in school, per pupil expenditure, student transient percent, percent of students in special education, number of students in Second Language English Proficiency (SLEP) levels, district exceptions in and out, student average daily absence, number of crisis and regular suspensions, and number of Type A, B and C Incident Reports.

A second group of Institutional variables consisted of the teacher-related variables which included fifteen characteristics such as Ethnicity (in 7 categories: Chinese, Japanese, Filipino, Part-Hawaiian, Caucasian, Mixed, and Others), Teacher Age (in 4 categories: Under 36, Age 36-45, Age 46-55 and Age 56 and above), and Teacher Experience (in 4 categories: 0-5 Years, 6-10 Years, 11-20 years, 21 Years or more).

A third group of Institutional variables consisted of the principal-related variables which included thirty-six personal characteristics such as sex, age, ethnicity, school tenure, administrative tenure and educational attainment and data derived from the Minnesota Satisfaction Questionnaire. The principal satisfaction factors are listed and explained on pages 66-68. A total of sixty-seven Institutional variables were identified.

The Output variables included the products of the Input and Institutional variables, namely the Stanford Achievement Test (SAT) scores. Specifically, these Student achievement-related variables, consisted of the SAT Reading scores which were divided into Above Average, Average, and Below Average groups, and the SAT Mathematics scores which were separated into Above Average, Average, and Below Average groups. These data were collected by hand on a large spreadsheet and were added to the existing computer data bank. In total, there were 88 independent variables against which school climate was analyzed.

## DATA GATHERING PROCEDURES

With the help of the director of the Hawaii L.E.A.D. Project, a meeting was set up with two specialists in the DOE Department of Information System Services to determine whether the data on the list of possible school climate related variables had ever been collected and whether these

data were available. It was determined that most of the information was available in a number of different sources in various offices in the DOE. As this information from the DOE was both available and usable, this researcher decided to plan a dissertation study utilizing this information along with some of the data already collected by Kenworthy, such as:

a. The CFK, Ltd., School Climate Assessment Scale scores of the 41 sample schools,
b. Personal data collected on the sex, age, ethnicity, school tenure, administrative tenure, and educational attainment of the 41 principals in the sample schools, and
c. Idiographic data from the responses of the 41 principals on the Minnesota Satisfaction Questionnaire.

## INSTRUMENTATION

Data generated from two instruments were utilized in this study along with the information generated from DOE files. These were the CFK, Ltd., School Climate Assessment Scale (used as the criterion variable for school climate in this study) and the Minnesota Satisfaction Questionnaire (twenty-one scales of which were used as principal-related predictor variables.)

CFK, LTD., SCHOOL CLIMATE ASSESSMENT SCALE

Developed in 1973 for the Charles F. Kettering II Foundation, this eighty-seven question survey was designed to determine how adequately a school meets some basic human needs--**physiological needs**, ie. the heat, light, uncrowded conditions, etc. of the school's physical plant; **safety needs**, ie. safety from potential hazards such as fire, physical or psychological abuse, assault; **acceptance and friendship needs**, ie. positive relationships within the student body, faculty and administrators; **achievement and recognition needs**, ie. the recognition of success and accomplishments of the students and staff; and **needs to maximize one's potential**, ie. the ability of each individual within the school to achieve personal goals at the highest possible level.[1] Responses by various stakeholders to questions related to the forementioned needs provides the profile of the school's climate.

The four part survey consists of questions in which general climate factors, program determinants, process determinants and material determinants are measured on a "What Is" and "What Should Be" Likert-type scale. Various participants, including students, parents, principal, or vice-principal, school level certificated staff, classroom teachers, and district office and state office administrators are asked to complete the questionnaire. By analyzing the data from this instrument, identification of

positive or negative climate factors, discrepancies in climate factors between what is and what should be, and discrepancies in perceptions of the various groups which fill out the survey can be ascertained and studied.[2]

The instrument was built on the premise that a school is effective and successful when it achieves the goals of productivity and satisfaction and that there are at least eight factors which research studies attribute to effective schools, and consequently are determinants of a school's climate. These General Climate Factors are:

1. Continuous Academic and Social Growth - each student and staff member is developing academically, socially and physically in skills and knowledge,

2. Respect - an atmosphere of mutual respect exists between the faculty and students,

3. Trust - Integrity and confidence is fostered within the entire school,

4. High Morale - self-confidence, self-discipline, and a non-defeatist attitude prevails,

5. Cohesiveness - school spirit and an esprit de corps is highly evident,

6. Opportunities for Input - everyone wants and has the opportunity to provide ideas for improvement,

7. School Renewal - the school continues to grow, change and improve, program improvement is continually sought,

8. Caring - an atmosphere of concern for and interest in others abounds.[3]

The first thirty-one questions of the instrument, Part A, are concerned with assessing these general climate factors.

Part B which includes questions 32 to 53, appraises the Program Determinants which include such factors as Opportunities for Active Learning, Individualized Performance Expectations, Varied Learning Environments, Flexible Curriculum and Extracurricular Activities, Support and Structure Appropriate to the Learner's Maturity, Rules Cooperatively Determined, and Varied Reward Systems.

Part C consists of questions 54 through 79 consisting of the Process Determinants. These are Problem-solving Ability, Improvement of School Goals, Identifying and Working with Conflicts, Effective Communication, Involvement in Decision Making, Autonomy with Accountability, Effective Teaching, and Ability to Plan for the Future.

Finally, Part D consisting of Material Determinants in questions 80-87, assesses the Adequacy of Resources and the Suitability of the School Plant.

In an effort to assess the total school environmental climate, the CFK, Ltd. School Climate Assessment Scale was administered to selected schools in three school districts in 1987 after it had been validated for use in Hawaii's schools. Several school publics including teachers, parents, certificated staff, classified staff and the

principal were surveyed. Mean scores from only three of these groups: the teachers, parents and classified staff were totaled as an operational definition of school climate in this study. The category of certificated staff was eliminated because the numbers in the sample were too small. The principals' responses were not included to control against bias.

## MINNESOTA SATISFACTION QUESTIONNAIRE

The Minnesota Satisfaction Questionnaire (MSQ) was designed to measure the satisfaction experienced by an individual on twenty specific characteristics of the work environment which are identified by this instrument.[4] Job satisfaction is defined as the extent to which the work environment fulfills a worker's vocational needs or preferences for certain reinforcing aspects of the work setting. Each item in the assessment scale refers to a need reinforcer in the work environment. A respondent is asked to indicate how satisfied he or she is with each reinforcer on the job.

The MSQ was developed in 1957 by three psychology professors, Rene V. Davis, Lloyd H. Lofquist, and David J. Weiss in conjunction with the Work Adjustment Project at the University of Minnesota. The instrument was predicated on the rationale that 1) employees have a set of expectations concerning their work settings and jobs that derive from

their work histories, abilities, and interests; 2) employees have work attitudes that emerge from the fulfillment or lack of fulfillment of their expectations, and 3) these attitudes constitute the employee's evaluations of the work environments, or his job satisfaction.[5]

The MSQ has a long and a short form. The long form, which was used in this study, consists of 100 items. Twenty different reinforcer scales, each describing an aspect of the work setting, are measured by five items each (5 reinforcers x 20 scales = 100 items.) Respondents indicate their degree of satisfaction with their present jobs using five Likert-type alternatives: very satisfied (VS)=5, satisfied (S)=4, neither satisfied nor dissatisfied (N)=3, dissatisfied (D)=2 and very dissatisfied (VD)=1.[6]

The following are the 20 MSQ scales measured by this instrument:

1. Ability Utilization. The chance to do something that makes use of my abilities.

2. Achievement. The feeling of accomplishment I get from the job.

3. Activity. Being able to keep busy all the time.

4. Advancement. The chance for advancement on this job.

5. Authority. The chance to tell other people what to do.

6. Company Policies and Practices. The way company policies are put into practice.

7. Compensation. My pay and the amount of work I do.

8. Co-workers. The way my co-workers get along with each other.

9. Creativity. The chance to try my own methods of doing the job.

10. Independence. The chance to work along on the job.

11. Moral Values. Being able to do things that don't go against my conscience.

12. Recognition. The praise I get for doing a good job.

13. Responsibility. The freedom to use my own judgment.

14. Security. The way my job provides for steady employment.

15. Social Service. The chance to do things for other people.

16. Social Status. The chance to be "somebody" in the community.

17. Supervision--Human Relations. The way my boss handles his or her employees.

18. Supervision--Technical. The competence of my supervisor.

19. Variety. The chance to do different things from time to time.

20. Work Conditions. The working conditions.

A General Satisfaction Score can be calculated by summing the responses to the 20 items with the highest scores.[7]

In his 1986 critique of the MSQ, Bolton noted that,

> "The median internal consistency reliabilities for 21 satisfaction scales (20 reinforcer scales plus general satisfaction) calculated separately for 25 occupational groups ranged from .78 to .93, with a median of .86. Retest reliability coefficients with a one-week interval for a heterogeneous sample of employees ranged from .66 to .91 for the 20 reinforcer scales, with a median of .83. For general satisfaction the retest reliability was .89. Retest stability coefficients with a one-year interval for a heterogeneous sample ranged from .35 to .71 for the 20 reinforcer scales, with a median of .61 For general satisfaction the one-year stability coefficient was .70."[8]

Bolton has also noted that the MSQ has been used extensively in "at least 75 investigations reported in journals, 100 Ph.D. dissertation projects, and 20 other research studies", primarily in vocational psychology, organizational behavior, and personnel management studies.[9]

## DESIGN OF STUDY

This study utilized a criterion-group ex post facto design in which the two criterion groups were identified as higher and lower climate schools. In Conducting Educational Research, Tuckman termed this approach a naturalistic study whereby the researcher rather than creating the treatment, examines the effects after the treatment has taken place. In this instance, rather than manipulate or use a treatment on the sample to determine two groups, the natural difference between the two groups' CFK, Ltd. climate scores was used. In this kind of a study, it is possible to take advantage of existing or natural relationships between the two variables.[10] The primary question to be answered was, What input, institutional and output variables can differentiate between the dependent variable (higher and lower climate schools)?

Five groups of variables using the categories of the parent/community, principal, teachers, school and student achievement were run in a series 1) to ascertain the relationship between the 88 independent variables and higher and lower climate schools, 2) to determine if statistical differences existed between the mean scores of variables which may be identified as differentiators of higher and lower climate schools, 3) to discover if there was a combination of variables which would predict school climate.

## ANALYSIS OF VARIABLES

It was noted earlier that it was necessary to group the variables into categories to accommodate their large number. Consequently, both univariate statistical procedures (One-way Analysis of Variance) and multivariate procedures (Discriminant Function Analysis and Step-wise Multiple Regression) analyses were employed in the examination of the variables.

In order to obtain a general picture of the 88 demographic variables, descriptive data was generated via the SPSSX program "FREQUENCIES" on each of the variables. Descriptive information included: The mean, standard error, standard deviation, and the minimum and maximum ranges.

To determine the range of scores for higher and for lower climate schools, a frequency distribution was run of the 41 climate scores. Two groups consisting of 17 schools each were delineated and a t-test was performed to determine if statistically significant differences existed at the $p = <.05$ level between the two groups. The SPSSX subprogram "GROUPS" and the program "T-TEST" were used for these procedures.

A series of stepwise discriminant function analyses by category were performed via the SPSSX program "DISCRIMINANT" to accomplish three tasks: 1) to identify those variables which could differentiate or classify the cases into higher and lower climate schools, 2) to

determine the relative strength or importance of those variables which were able to classify the cases into higher and lower climate schools, and 3) to evaluate the accuracy of the classification.[11] Klecka notes that,

> The characteristics used to distinguish among the groups are called "discriminating variables." These variables must be measured at the interval or ratio level of measurement, so that means and variances can be calculated and so that they can be legitimately employed in mathematical equations.[12]

The variables will "discriminate" between groups of cases and predict the category or group a case falls into, based upon the values of these variables.[13] In the SPSSX program "DISRIMINANT" this is done via the computer which performs the necessary calculations and provides two very important sets of information: statistics for the functions and coefficients for variables used in the functions. The canonical discriminant function, eigenvalues, percent of variance, cumulative percent, canonical correlation, the after function, Wilks' Lambda, chi-squares, degrees of freedom and significance were all calculated and displayed in the printouts.

While the results are described in the next chapter, some of the important terms found in the discriminant function analysis procedure are briefly defined here.

Eigenvalue - the ratio of the between groups to the

within groups sums of squares. It is measured by lambdas (positive or zero), which tell us the relative discriminating power of a function. Thus, the function with the largest eigenvalue is the most powerful discriminator, while the function with the smallest eigenvalue is the weakest.[14]

Canonical Discriminant Function - a linear combination of the discriminating variables which are formed to study the nature of group differences. It's mathematical formula is:

$$f_{km} = u_o + u_1X_{1km} + u_2X_2k_m + \ldots + u_pX_{pkm},$$

where $f_{km}$ = the value (score) on the canonical discriminant function for case $m$ in the group $k$;

$X_{ikm}$ = the value on discriminating variable for $X_i$ for case $m$ in group $k$; and

$u_i$ = coefficients which produce the desired characteristics in the function.[15]

Canonical Discriminant Correlation - on a scale ranging between -1 and +1, this coefficient is a measure of association which summarizes the degree of relatedness between the groups and the discriminant function.

Wilks' Lambda - the ratio of the within group sum of the squares to the total sum of squares. It is the proportion of the total variance in the discriminant scores not explained by differences among groups.[16] Wilk's Lambda

considers both differences between groups and the homogeneity within groups. It is an inverse statistic so the smallest lambda produced would be selected as having the strongest cohesiveness or homogeneity.[17]

Analysis of variance, using SPSSX program, "ONEWAY", was utilized to determine if statistically significant differences existed between the higher climate and lower climate schools for each of the predictor variables. One-way analysis of variance (ANOVA) is an inferential statistic procedure which compares two or more groups in terms of the mean score. The null hypothesis, that there is no difference between two population means, is tested by putting the data into a formula to obtain a calculated value.

Analysis of variance is based on the decomposition of variation or the sums of squares corrected for the mean (SS).[18] As an example, in the following formula, the Y equals the dependent or criterion variables. These are the variables which were previously identified as being able to classify climate scores. The independent variable, or factor, equals the A, or the higher or lower climate scores for each school.

$$SS_Y = SS_A + SS_{error}$$

The computer compares the calculated value against a critical value which is on a table, and the null hypothesis is rejected if the calculated value is larger than the tabled critical value, or not rejected if the calculated value is less than the critical value.[19]

The SPSSX program "ONEWAY" computes and prints out the following information in a summary table: the source (between and within groups), degrees of freedom, sum of squares, mean squares, the F value and the F probability. The key item in the analysis is the F value which is the ratio of the between groups variance to the within groups variance. The F value allows the researcher to decide whether there is a significant difference between the means of the groups being compared.

One-way analysis of variance is predicated on the assumption that the scores in each of the various groups have approximately the same variance. If the various groups do not contain the same number of subjects, a test for the assumption of equal variance should be done. Consequently, Bartlett's Box F test was used to determine if there were any violations in homogeneity of variance.[20]

With regards to the two ancillary questions, discriminant function analysis was used to test the accuracy of the predictor variables. This procedure was explained on pages 71-74. Stepwise multiple regression analysis, utilizing SPSSX program "REGRESSION", was used to generate a

prediction equation. This mode of analysis was selected because it has three useful functions: 1) to identify the best linear prediction equation and evaluate its prediction accuracy, 2) to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables, and 3) to find structural relations and provide explanations for seemingly complex multivariate relationships. The main focus of the procedure is the evaluation and measurement of overall dependence of a variable on a set of other variables.[21]

## MODE OF ANALYSIS FOR TESTING EACH HYPOTHESIS

In Hypothesis #1, the following question is asked: Is there a discrete set of <u>input</u> variables that will produce a non-chance classification of schools into either higher or lower climate? The criterion variables are the climate scores from each school; the predictor variables are the input variables. (See page 17.) Stepwise discriminant function analyses were run on the input variables to ascertain whether a discrete group of them were able to classify the sample schools on the basis of higher or lower climate at or above a non chance function.

In Hypothesis #2, the following question is asked, Is there a discrete set of <u>institutional</u> variables that will produce a non chance classification of schools into either higher or lower climate? The criterion variables are the

climate scores from each school; the predictor variables are the Institutional variables. (See page 18.) Stepwise discriminant function analyses were run on the Institutional variables to ascertain whether a discrete group of them were able to classify the sample schools on the basis of higher or lower climate at or above a non chance function.

In Hypothesis #3, the following question is asked, Is there a discrete set of Output variables that will produce a non chance classification of schools into either higher or lower climate? The criterion variables are the climate scores from each school; the predictor variables are the output variables. (See page 18.) Stepwise discriminant function analyses were run on the Output variables to ascertain whether a discrete group of them were able to classify the sample schools on the basis of higher or lower climate at or above a non chance function.

In Hypothesis #4, the question is broader. Is there a discrete set of variables that will produce a non chance classification of schools into either higher or lower climate? The criterion variables are the climate scores from each school; the predictor variables are all the input, institutional and output variables which were identified in the previous runs to be successful in classifying schools into higher or lower climates. Step-wise discriminant function analyses were run on all of these variables to ascertain whether a group of them were able to classify the

sample schools on the basis of higher or lower climate at or above a non chance function.

In Hypothesis #5, the question is, on a univariate basis, Is there a statistically significant difference in each individual variable which on a multiple classification basis classifies schools into higher or lower climate? In this hypothesis, the dependent variables are each of the variables which were found to discriminate or classify higher or lower climate schools while the independent variables are the higher and lower climate scores from each school. One-way analysis of variance was used to examine this question.

MODE OF ANALYSIS FOR TESTING ANCILLARY QUESTIONS

Two ancillary questions were also addressed:

1. Can the input and institutional predictor variables be used to accurately classify the seven unused schools of the sample into higher or lower climate groups? Discriminant function analysis was used to answer this question and to test the predictor variables.

2. Can certain variables in combination predict school climate? And if these combined variables can be identified, can a prediction equation be generated for school climate? A multivariate analysis procedure, step-wise multiple regression, was used to analyze these questions.

## SUMMARY

In this chapter, the methodology for this study was reviewed. A description of the districts to which the sample schools are a part was provided. The sample of the study consisted of 41 elementary schools in three districts in Hawaii where responses from the CFK, Ltd. School Climate Assessment Scale were available in DOE files. The climate assessment instrument had been administered in the spring of 1987 to selected schools. Only the schools where the same principal had been the administrator of the school during the period of time that the survey was completed were used in the sample. This study sought to generalize to the 121 elementary schools in six of the seven public school districts within the Department of Education of the state of Hawaii.

The five categories of variables which were used in the study (parent/community, principal-related, teacher-related, school-related, and student achievement-related) along with the school climate scores were discussed. The data gathering procedure was described and the two instruments which were employed in the study, the CFK, Ltd., School Climate Assessment Scale and the Minnesota Satisfaction Questionnaire were fully explained. The design of the study, which is a criterion-group *ex post facto*

design in which the two criterion groups are identified as higher and lower climate, was also discussed. Finally, the procedures to be followed and the statistical analyses were related and explained.

## NOTES FOR CHAPTER III

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6.Ibid., 255-256.

7.Ibid., 256.

8.Ibid., 259.

9.Ibid.

10.Bruce W. Tuckman, Conducting Educational Research, 2d ed., (New York: Harcourt Brace Jovanovich, Inc., 1978), 147-159.

11.William R. Klecka, Discriminant Analysis, (Beverly Hills: Sage Publications, 1980).

12.Ibid., 9.

13.SPSSX User's Guide, (New York: McGraw-Hill Book Company, 1983) 623.

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15.Klecka, 15.

16.SPSS Statistical Package for the Social Sciences, (2d ed.) (New York: McGraw-Hill Book Company, 1975) 442.

17.Ibid., 54.

18.Ibid. 400.

19.Huck, 58-66.

20.Ibid., 66-67.

21.SPSS Statistical Package for the Social Sciences, 320-323.

# CHAPTER IV

# FINDINGS

**"The record of research has its barren spots and inconsistencies, and what it suggests as educationally beneficial for one time or place may not be so for another; but, in the long run, it will be the best resource for making educational practice more systematic and productive."**

**--Herbert J. Walberg, 1979**

Descriptive information on the dependent or criterion variable, school climate scores, and each of the eighty-eight independent or predictor variables, along with the results of the statistical analyses for each of the five hypotheses and two ancillary questions are presented in this chapter. Due to the large number of independent variables they were categorized into Input, Institutional and Output factors, and were described statistically according to the five groups (parent/community-, teacher-, principal-, school-, and student achievement-related variables) which were delineated earlier. Results of the statistical analyses which were run on each of these groups to test the hypotheses and ancillary questions are reported.

## DESCRIPTIVE INFORMATION ON SCHOOL CLIMATE SCORES

The criterion variable, school climate scores, was derived by summing the mean scores of the subscales of the

CFK Ltd., School Climate Assessment Scale of each of the three stakeholder groups (the parent/community, teachers, and classified staff) in each of the 41 schools in the sample. Table 1 describes the distribution of scores which ranged from a low of 6.80 to a high of 10.60.

Table 1

Distribution of Climate Scores Showing Value, Frequency, Cumulative Percent, Total Percent, and Division Into Groups

| VALUE | FREQUENCY | CUM PERCENT | TOTAL PERCENT |
|---|---|---|---|
| 6.80 | 1 | 2.4 | |
| 7.70 | 1 | 4.9 | |
| 8.30 | 1 | 7.3 | |
| 8.60 | 1 | 9.8 | |
| 8.70 | 1 | 12.2 | |
| 9.00 | 1 | 14.6 | |
| 9.10 | 1 | 17.1 | |
| 9.20 | 6 | 31.7 | |
| 9.30 | 4 | 41.5 | |
| GROUP 1 | 17 | | 41.5 |
| 9.40 | 2 | 46.3 | |
| 9.50 | 1 | 48.8 | |
| 9.60 | 2 | 53.7 | |
| 9.70 | 2 | 58.5 | |
| UNCLASSIFIED | 7 | | 17.1 |
| 9.80 | 3 | 65.9 | |
| 9.90 | 3 | 73.2 | |
| 10.00 | 2 | 78.0 | |
| 10.10 | 4 | 87.8 | |
| 10.20 | 1 | 90.2 | |
| 10.30 | 1 | 92.7 | |
| 10.40 | 2 | 97.6 | |
| 10.60 | 1 | 100.0 | |
| GROUP 2 | 17 | | 41.4 |
| TOTAL | 41 | | 100.0 |

A frequency distribution was run on the 41 scores to determine the range of scores for higher and for lower climate schools. Table 1 depicts the climate scores, frequency, and total percent of cases involved in the two groups of 17 cases each. The lower climate schools, Group 1, contained 41.5 percent of the cases, with a range of scores from a low of 6.80 to a high score of 9.30. In Group 2, designated as the higher climate schools, which consisted of 41.4 percent of the cases, the mean scores ranged from 9.80 to 10.60. Seven cases, or 17.1 percent of the cases, fell within the unclassified area. These groups of cases were later used to test the classification equation. (See pages 160 and 165.)

Table 2 displays the results of an independent samples t-test which was performed to determine if a statistically significant difference existed between the lower and the higher climate groups.

A significant difference was found to exist between the two means at the .ooo level of significance. In the lower climate group, the mean was 8.8588 and the standard deviation was .687. In the higher climate group, the mean was 10.0824 and the standard deviation was .235.

Table 2

T-test for Lower and Higher Climate Groups with Number of Cases, Mean, Standard Deviation, Standard Error, Degrees of Freedom, and t Value

| GROUPS | NO. of Cases | MEAN | S.D. | S.E. | D.F | t |
|---|---|---|---|---|---|---|
| Lower Climate | 17 | 8.8588 | .687 | .167 | 32 | 6.95* |
| Higher Climate | 17 | 10.0824 | .235 | .057 | | |

* p < .000

DESCRIPTIVE INFORMATION ON INPUT VARIABLES

Fourteen Parent/Community-related variables, defined as those Input variables which a student brings with him upon entering the educational system, were used as the first set of independent variables.

The data on these variables are summarized in Table 3. The mean percentage of Part-Hawaiian students in the sample of 41 elementary schools was measured at 33.7 percent, while the range varied from 8 percent to 91.4 percent. The mean percentage for Caucasian students was 23.8 percent with a range of 2.6 percent to 67.6 percent. The "Other" group, which is a category used by the Department of Education to note the ethnic groups which are not mentioned in the table because of their relatively smaller numbers in Hawaii's

population, had a mean percentage of 17.7 percent. A low percentage range of 3.9 percent to a high of 42.9 percent characterized this group. Although the average percentage of Japanese students was 12 percent, the mean percentages ranged from .6 percent to nearly 43 percent. The mean percentage of students with Filipino ethnicity was about 11 percent with a range of means from .2 percent to 40.6 percent. With a minimum range of zero to a 6.6 percent maximum range, Chinese student ethnicity consisted of a mean of 1.5 percent.

Table 3

Descriptive Statistics of Parent/Community-Related Input Variables Showing Mean, Standard Deviation and Minimum/Maximum Ranges

| FACTOR | MEAN | S.D. | MIN. | MAX. |
|---|---|---|---|---|
| Ethnicity | | | | |
| % Chinese Students | 1.534 | 1.499 | .000 | 6.600 |
| % Filipino Students | 11.178 | 10.952 | .200 | 40.600 |
| % Part-Hawn. Students | 33.722 | 18.234 | .800 | 91.400 |
| % Japanese Students | 12.041 | 9.615 | .600 | 41.200 |
| % Caucasian Students | 23.824 | 15.709 | 2.600 | 67.600 |
| % Other Students | 17.700 | 7.649 | 3.900 | 42.900 |
| % Federal Connection | 19.305 | 17.797 | 3.300 | 99.600 |
| % Public Assistance | 12.849 | 8.313 | .000 | 35.900 |
| % Free-Reduced Lunch | 43.749 | 18.262 | 8.500 | 77.300 |
| % H. S. Graduates | 73.824 | 11.964 | 47.000 | 94.500 |
| % College Graduates | 19.417 | 8.643 | 7.300 | 40.100 |
| % Unemployed | 5.395 | 2.831 | 1.200 | 15.100 |
| % Single Parent Hshd. | 15.261 | 6.675 | 1.300 | 32.600 |
| Family Size | 3.688 | .337 | 3.200 | 4.700 |
| Median Income | 22555.415 | 5584.225 | 13808.000 | 35552.000 |

In addition to ethnicity, other demographic indicators were used. Each year, students bring a Federal Impact Aid Survey card home so that parents can indicate whether they have "federal connections". Families which are living on federal lands, or parents who are employed by a federal agency or working on federal property, are said to have federal connections, thus entitling the state to federal impact aid. The percentage of families in the sample with federal connections ranged from a low of 3.3 percent to a high of 99.6 percent by schools. The overall mean percentage of federally connected families was 19.3 percent.

The data in Table 3 also shows that the percentage of families receiving public assistance varied from a mean of zero to nearly 36 percent among the schools in the sample. The mean percentage of families receiving some form of public assistance such as housing subsidies or various federal or state contributions or welfare was 12.8 percent. Among the sample of schools, there was a mean of about 44 percent of students who were receiving free or reduced school lunches. The average range varied from 8.5 percent to 77.3 percent.

The level of education of a family is another factor which may have an effect on school climate. The data showed that the average percentage of homes where parents were high school graduates was nearly 74 percent. The means of the sample ranged from a low of 47 percent to a high of

94.5 percent. Also relevant may be the average percentage of homes where parents were college graduates. In the sample this was 19.4 percent. The average range in this group varied from 7.3 percent to 40.1 percent.

Family size may also be related to parents perception of the climate of a school. The average size of the family unit in the sample was nearly 3.7 or about four members per family. The means ranged from a minimum of 3.2 to a maximum of 4.7. The Median Income of families by school in the sample was $22,555, with a range of from $13,808 to $35,552. The average percentage of single parent households was calculated at approximately 15.3. The range of the means started at a low of 1.3 percent to a high of 32.6 percent.

## DESCRIPTIVE INFORMATION ON INSTITUTIONAL VARIABLES

Sixty-seven Institutional variables, those factors which are directly associated with the formal educational process of students, were described in terms of Principal-related, Teacher-related and School-related characteristics.

Descriptive data, on the thirty-six Principal-related variables are presented in Tables 4 and 5. The 41 principals of each of the sample schools were included in the study because they were the school administrators at the time the CFK Ltd., School Climate Assessment Scale was administered in the spring of 1987 and in the school year which followed. The data are arrayed in Table 4.

Table 4

Frequency and Cumulative Percentage of Principal-Related Institutional Variables

| FACTOR | FREQUENCY | CUM PERCENT |
|---|---|---|
| FEMALE | 19 | 46.3 |
| MALE | 22 | 53.7 |
| TOTAL | 41 | 100.0 |
| ETHNICITY | | |
| JAPANESE | 25 | 61.0 |
| CAUCASIAN | 7 | 17.1 |
| CHINESE* | 4 | 9.8 |
| KOREAN* | 1 | 2.4 |
| PART-HAWAIIAN* | 1 | 2.4 |
| MIXED* | 3 | 7.3 |
| TOTAL | 41 | 100.0 |
| EDUCATION | | |
| ADMIN. CERTIFICATE | 13 | 31.7 |
| MASTERS DEGREE | 15 | 36.6 |
| 45+ HRS. GRAD. WORK^ | 11 | 26.8 |
| DOCTORATE^ | 2 | 4.9 |
| TOTAL | 41 | 100.0 |

*These 9 cases were collapsed into one case for the discriminant function analysis
^These 2 cases were collapsed into one case for the discriminant function analysis

Table 4 shows that nineteen or 46.3 percent of the principals were female and twenty-two or 53.7 percent were male. The largest ethnic group of principals were 25 Japanese (61 percent), followed by 7 Caucasian principals (17.1 percent). The 4 Chinese principals (9.8 percent), and the other five Mixed, Korean and Part-Hawaiian principals,

were combined into one case with 21.9 percent to compensate for the small numbers in each of these four ethnic groups. Thus, three ethnic groups of principals consisting of Japanese, with 61 percent, Caucasian, with 17.1 percent, and a Combined group of 21.9 percent were examined instead of the original six.

As the level of educational attainment of the school principal may also be an indicator of school climate, data was collected on the amount of formal schooling undertaken by each of the 41 school leaders. Thirteen principals (31.7 percent) had acquired administrative certificates, fifteen (36.6) had received masters degrees, eleven (26.8 percent) had completed more than 45 hours of graduate work, and two principals (4.9 percent) had earned doctorates. The thirteen cases consisting of 45 hours of graduate work and the doctorates were collapsed into one case with 31.7 percent for the discriminant function analysis procedure. Therefore, three categories of educational attainment consisting of principals with administrative certificates, with 31.7 percent, those with masters degrees, with 36.6 percent, and those with more than 45 graduate hours and doctorates, with 31.7 percent were used.

The principal's age, the number of years he has served as an administrator, and the length of time at which a principal has been the educational leader of a particular school may be other factors which effect school climate.

Table 5 provides descriptive information as well as the principals' scores on each of the subscales and the general score of the Minnesota Satisfaction Questionnaire.

Table 5

Descriptive Statistics of Principal-Related Institutional Variables Showing Mean, Standard Deviation, and Minimum/Maximum Ranges

| FACTOR | MEAN | S.D. | MIN. | MAX. |
|---|---|---|---|---|
| Age | 47.976 | 6.263 | 35.000 | 60.000 |
| Administrative Tenure | 11.573 | 7.826 | 3.000 | 27.000 |
| School Tenure | 5.183 | 5.026 | .500 | 23.000 |
| Minnesota Questionnaire Scores | | | | |
| Ability Utilization | 20.463 | 3.210 | 14.000 | 25.000 |
| Achievement | 20.512 | 3.264 | 11.000 | 25.000 |
| Activity | 20.488 | 3.163 | 15.000 | 25.000 |
| Advancement | 17.610 | 3.632 | 10.000 | 25.000 |
| Authority | 18.363 | 3.318 | 14.000 | 25.000 |
| Company Policy/Practice | 15.634 | 3.878 | 8.000 | 24.000 |
| Compensation | 13.732 | 4.995 | 5.000 | 25.000 |
| Co-workers | 19.024 | 3.380 | 10.000 | 25.000 |
| Creativity | 19.951 | 3.294 | 12.000 | 25.000 |
| Independence | 17.073 | 3.327 | 9.000 | 25.000 |
| Moral Values | 19.951 | 2.991 | 15.000 | 25.000 |
| Recognition | 17.634 | 3.986 | 10.000 | 25.000 |
| Responsibility | 20.098 | 2.755 | 14.000 | 25.000 |
| Security | 19.317 | 3.609 | 14.000 | 25.000 |
| Social Service | 21.634 | 3.477 | 11.000 | 25.000 |
| Social Status | 17.927 | 3.488 | 9.000 | 25.000 |
| Supervision-Human Rel. | 16.463 | 4.308 | 5.000 | 25.000 |
| Supervision-Technical | 16.537 | 3.854 | 7.000 | 25.000 |
| Variety | 19.000 | 3.017 | 13.000 | 25.000 |
| Working Conditions | 17.707 | 4.155 | 7.000 | 25.000 |
| General Satisfaction Score | 73.561 | 10.186 | 50.000 | 96.000 |

The mean age of the principals was just under 48 years with a range of from 35 to 60 years of age. The standard deviation was 6.263 years. Years of administrative tenure

ranged from a minimum of three years and a maximum of 27 years, while the mean was about eleven and a half years for the combined group of principals. The standard deviation was 7.826 for administrative tenure. The principals' school tenure averaged 5.1 with a range of from one semester to twenty-three years at their respective schools. The standard deviation was 5.026 years. In addition to the personal descriptors of the principals, Table 5 also contains summary data of the principals' scores on the Minnesota Satisfaction Questionnaire (MSQ), an instrument which was designed to measure the employee's perception of the satisfaction level of twenty different job aspects.

In the MSQ, the respondents indicated their degree of satisfaction with their jobs as principals in a 100 question questionnaire which focused on 20 "reinforcer" or job satisfaction areas. A five-point Likert-type scale which ranged from 5 (very satisfied) to 4, (satisfied), to 3 (neither satisfied nor dissatisfied), to 2 (dissatisfied), to 1, (very dissatisfied) was used for responses. Thus a mean score of 25.0 meant that a principal responded in the "very satisfied" to each of the questions that related to a particular job reinforcer while a score of 5.0 indicated that a principal was "very dissatisfied" with that particular job reinforcer.

In five areas, Social Service (21.6), Achievement (20.5), Activity (20.5), Ability Utilization (20.5), and

Responsibility (20.1), the mean was above 20.0, which indicated that principals were in the "very satisfied" range of the scale for those scales. In fourteen of the twenty indicators, the mean scores ranged from 15.6 to 19.9 indicating that principals were generally "satisfied" with these job reinforcers. Only in the area of Compensation, with a mean score of 13.7, did the sample of principals fall into the "neither satisfied nor dissatisfied" range. It should be noted also, that the mean scores in this category of Compensation ranged from a low of 5.0 (very dissatisfied) to a high of 25.0 (very satisfied) and that this reinforcer had the largest standard deviation, which was 4.995, other than the general satisfaction score. There were no mean responses in the last two categories of "dissatisfied" or "very dissatisfied."

In general, therefore, the sample of 41 principals showed that they were either satisfied or very satisfied with nineteen aspects of their jobs. The one area in which the principals perceived neither satisfaction nor dissatisfaction was Compensation. The standard deviations for these 20 reinforcers generally ranged from 3.017 to 3.986. The exceptions were the three areas with larger standard deviations, Compensation, mentioned above with 4.995, Supervision-Human Relations with 4.308, and Working Conditions with 4.155. The reinforcer of Responsibility had the smallest standard deviation of 2.755. A general

satisfaction score was also computed by summing the responses of the 20 items with the highest scores of the 100 questions of the MSQ. The mean for the general satisfaction score was 73.561 while they ranged from 50.000 to 96.000. The standard deviation was 10.186.

Data on a variety of teacher variables may also have an impact on school climate. The ethnicity of the teachers in the 41 sample schools, their years of experience as teachers, and their ages are described in Table 6. The mean percentage of teachers of Japanese ancestry was nearly 54 percent with a minimum range of from zero to 82 percent. The standard deviation of this group was 17.635. The average percentage of Caucasian teachers was 23 percent, with a range of from zero to 87 percent and a standard deviation of 16.385. Part-Hawaiian teachers accounted for a mean percentage of about 9.5 with a range varying from zero to nearly 35 percent. The standard deviation for the Part-Hawaiian group was 6.908.

Of the other ethnic groups in the study, Chinese teachers had a mean of 4.6 percent with a minimum and maximum range of zero to 20. The standard deviation was 4.607. The "Mixed" category (no predominant ethnic group) averaged 4.3 percent with a standard deviation of 4.007. The range for the Mixed group was zero to 15.4 percent. Filipino teachers averaged about 2.6 percent with a zero to 13.6 percent range. The standard deviation was 3.592. The

category of "Other" had a mean percentage of about two percent with a range of from zero to 12.9 percent and a standard deviation of 3.158.

Table 6

Descriptive Statistics of Teacher-Related Institutional Variables Showing Mean, Standard Deviation, and Minimum/Maximum Ranges by Percentage

| FACTOR | MEAN | S. D. | MINIMUM | MAXIMUM |
|---|---|---|---|---|
| Ethnicity | | | | |
| % Chinese | 4.607 | 5.155 | .000 | 20.000 |
| % Japanese | 53.912 | 17.635 | .000 | 82.100 |
| % Filipino | 2.590 | 3.592 | .000 | 13.600 |
| % Part-Hawaiian | 9.512 | 6.908 | .000 | 34.800 |
| % Caucasian | 23.059 | 16.385 | .000 | 87.000 |
| % Mixed | 4.290 | 4.007 | .000 | 15.400 |
| % Other | 2.046 | 3.158 | .000 | 12.900 |
| Experience | | | | |
| % 1 - 5 Years | 26.054 | 13.899 | 2.800 | 61.900 |
| % 6 - 10 Years | 10.566 | 7.273 | .000 | 25.000 |
| % 11 - 20 Years | 32.793 | 11.636 | 11.100 | 61.500 |
| % 21 plus Years | 30.588 | 15.699 | .000 | 66.700 |
| Age | | | | |
| % 35 or Less | 17.293 | 8.437 | .000 | 37.500 |
| % 36 - 45 | 41.289 | 11.359 | 10.300 | 60.000 |
| % 46 - 55 | 29.966 | 12.389 | 9.000 | 61.100 |
| % 56 plus | 11.437 | 6.812 | .000 | 28.600 |

Teaching experience which was investigated in relation to four categories of years of service is also described in

Table 6. The mean percentage of the teachers with from 1-5 years of teaching experience was 26, with a range of from 2.8 to 61.9 percent. The standard deviation was 13.899. The second category consisted of teachers who had taught from 6-10 years. Their average percentage of experience was about 10.6 percent, with a range of zero to 25 percent and a standard deviation of 7.273. Of the group of teachers who had taught from eleven to twenty years, the mean percentage was 32.8 percent. The range for this group was from 11 percent to 61.5 percent. The standard deviation was 11.636. The last category of teachers in the sample schools had taught a minimum of twenty-one years. This group had an average percentage of 30.6 percent and a mean range of from zero to 66.7 percent. The standard deviation of this group was 15.699. Thus, it can be seen that the mean percentage of about 63 percent of the teachers in the sample fell into the more than eleven years of experience category, while the remaining 37 percent had from one to ten years of teaching experience.

The last of the personal characteristics of teachers which may be related to school climate, the ages of the teachers were looked at by dividing them into four classification levels. The mean percentage of the teachers who were 35 years of age or younger was about 17 percent. The range varied from zero to about 37.5 percent with a standard deviation of this group of 8.437. The thirty-six

to forty-five year old group had a mean percentage of 41.3 percent with a range of from 10.3 to 60.0 percent. The standard deviation was 11.359. Of the forty-six to fifty-five year old teachers, the average percentage was nearly 30 percent. The range of this group was 9 percent to 61.1 percent with a standard deviation of 12.389. Lastly, the 56 years old and older group of teachers in the sample schools had a mean percentage of 11.4 with an average range of from zero to 28.6 percent. The standard deviation of this group was 6.812.

Another group of Institutional variables which are characteristic of the school itself are the School-related factors such as number of days taken by teachers as sick-leave, average daily absence of students, per pupil expenditure, student enrollment, and programs such as special education and the Students of Limited English Proficiency programs.

Table 7 presents the descriptive data of the School-related Institutional variables which may be related to climate of the school. The mean, standard deviation, and the minimum and maximum ranges of the means are also included in the description.

Table 7

Descriptive Results (Mean, Standard Deviation, Minimum/Maximum Ranges) of School-Related Institutional Variables

| FACTOR | MEAN | S.D. | MINIMUM | MAXIMUM |
|---|---|---|---|---|
| Teacher Sick Days | 5.837 | 2.123 | 1.900 | 12.600 |
| Total Teachers | 30.366 | 14.572 | 7.000 | 77.000 |
| Total Enrollment | 574.341 | 287.577 | 139.000 | 1483.000 |
| Per Pupil Expend. | $2215.415 | $387.992 | $1617.000 | $3999.000 |
| % Stud. Transiency | 53.844 | 18.241 | 23.500 | 116.800 |
| District Except-In | 44.415 | 40.454 | .000 | 189.000 |
| District Except-Out | 55.902 | 38.482 | 11.000 | 155.000 |
| Stud. Av. Daily Abs. | 5.293 | 1.195 | 3.100 | 8.100 |
| Crisis Suspensions | .875 | 1.742 | .000 | 8.000 |
| Regular Suspensions | 8.325 | 13.267 | .000 | 67.000 |
| Incident Report A | 3.375 | 3.621 | .000 | 17.000 |
| Incident Report B | 6.250 | 10.310 | .000 | 43.000 |
| Incident Report C | .400 | 1.317 | .000 | 8.000 |
| % Special Education | 8.195 | 3.475 | 1.500 | 15.600 |
| SLEP Level 1 | 29.776 | 25.111 | .000 | 85.000 |
| SLEP Level 2 | 16.015 | 16.124 | .000 | 57.100 |

Table 7 shows that the average number of days of sick leave taken by teachers in the sample schools was 5.8 days. The average range for sick days taken fell within 1.9 and 12.6 days and the standard deviation was 2.123. The total number of teachers employed at the 41 schools ranged from seven to seventy-seven. The mean was 30.3. The standard deviation among the schools was 14.572. School enrollment ranged from 139 pupils to 1,483 students with the mean being 574. The standard deviation for total enrollment was 287.577. Per pupil expenditure ranged from $1617 to $3999

in the 41 schools with a standard deviation of $387.99 The mean for per pupil expenditure was $2215.

In addition to cost factors, the percent of students who transferred from one school to another in a given year, the transient rate, was also investigated as a potential indicator of school climate. In Table 7, it can be seen that the mean percentage of transients was approximately 54 percent, though the range varied from a low of 23.5 to a high of nearly 117 percent. The standard deviation for the transient rate was 18.241.

Table 7 also describes the factor which indicates the number of requests from parents to enroll a child in to (District Exception-In) or out of (District Exception-Out) a school which is designated as the school which should be attended for the particular neighborhood in which the family resides. Reasons for these requests are numerous and include accommodating a parent who wants his child to attend a school which is close to his place of work, or a request for an exception because the parent feels that the neighborhood school may not be academically challenging enough for his child. The mean number of requests for Exceptions-In for all schools in the sample was 44, with a mean range of requests which numbered from zero to 189 and a standard deviation of 40.454. The mean number of requests for Exceptions-Out was about 56. The mean range of the number of requests for these district exceptions out of the

designated school was from 11 to 155. The standard deviation of this variable was 38.482.

Other school-related factors which have been looked at in effective school studies are the number of student suspensions and other kinds of non-conformist behavior which include breaking school rules. The Title 8, Chapter 19 Department of Education Public School code defines "Crisis Suspension" as,

> ...the immediate exclusion of a student from school in an emergency, because the student's conduct presents a clear threat to the physical safety of self or others, or the student is so extremely disruptive as to make the student's immediate removal necessary to preserve the right of other students to pursue their education free from undue disruption.[1]

"Suspensions" are defined by this same code as, "exclusion from school for a specific period during a school year."[2] The mean for crisis suspensions was less than one while the mean range was from zero to eight. The mean for regular suspensions was 8.3 with a mean range of from zero to 67.

The Chapter 19 code also defines three other terms which relate to disciplinary procedures. "Class A" offenses are serious unlawful offenses such as assault, burglary, possession of dangerous weapons or instruments or firearms, murder, property damage, robbery, sexual offenses, terroristic threatening, or the possession, use, or sale of

illicit substances. "Class B" offenses are other unlawful offenses such as disorderly conduct, rendering of false alarm, gambling, harassment, theft, and trespassing. "Class C" offenses are DOE-prohibited conduct such as class cuts, insubordination, leaving campus without consent, smoking tobacco substances and truancy.[3] The mean for Incident Report A was 3.4; for Incident Report B, it was 6.2; and for Incident Report C, it was .4. The Standard deviation for Incident Report A was 3.621, for Incident Report B, it was 10.310 and for Incident Report C, it was 1.317.

Another school-related variable, percent of students enrolled in special education is described in Table 7 also. Special education programs for students who are emotionally, physically and academically handicapped are available at all public schools. The percentage mean of enrollment in special education was 8.2 with a range of from 1.5 percent to 15.6 percent and a standard deviation of 3.475.

Students whose native language is not English may be placed into the Students with Limited English Proficiency programs which are also available at public schools. The numbers enrolled in SLEP programs may also impact on a school's climate. These students may learn the English language and the various subjects in a specialized setting or by using specialized materials with a teacher's help. A student is placed into a SLEP program in elementary school depending on his proficiency in English. Generally,

immigrants or students from the trust territories who know little if any English are placed in SLEP Level 1 programs. Level 2 SLEP students have usually progressed through the SLEP 1 program and are better able to communicate in English. In the sample, the mean numbers of students in the SLEP 1 level was nearly 30, with a range of from zero to 85 students, and a standard deviation of 25.111. In the SLEP 2 level, the mean was 16 with a range of zero to 57 students. The standard deviation was 16.124 for the group.

The descriptive information on the sixty-seven Institutional variables has been provided in this section.

## DESCRIPTIVE INFORMATION ON OUTPUT VARIABLES

Finally, the category of variables which are associated with the outcome or product of the educational process, the Output factors, are described.

In Chapter II, a number of studies were cited in which achievement scores were the dependent variable and factors such as school size, socio-economic status, teacher or principal educational level, as well as school climate and other variables were examined as independent variables. The Stanford Achievement Tests have been widely used as an acceptable standard of the level of educational attainment of students in a school or system.

Table 8 contains the descriptive data of the Output variables in this study.

Table 8

Descriptive Statistics of Student Achievement-Related Output Variables Showing Mean, Standard Deviation, and Minimum and Maximum Ranges for Sixth Graders, 1987-88

| FACTOR | MEAN | S.D. | MINIMUM | MAXIMUM |
|---|---|---|---|---|
| SAT Reading - | | | | |
| % Above Average (Stanines 7-9) | 37.707 | 13.182 | 13.000 | 72.000 |
| % Average (Stanines 4-6) | 42.415 | 10.235 | 24.000 | 78.000 |
| % Below Average (Stanines 1-3) | 18.683 | 8.073 | 3.000 | 36.000 |
| SAT Mathematics - | | | | |
| % Above Average (Stanines 7-9) | 46.878 | 13.851 | 22.000 | 86.000 |
| % Average (Stanines 4-6) | 34.488 | 10.366 | 13.000 | 62.000 |
| % Below Average (Stanines 1-3) | 17.439 | 8.103 | 2.000 | 36.000 |

In the category of Reading, the mean percentage of the sixth graders in the sample schools was nearly 38 percent in the "Above Average" classification with a mean range of from 13 percent to 72 percent and a standard deviation of 13.182. The mean percentage was 42.4 percent in the "Average" level classification. The range for this Average group was from 24 to 78 percent and the standard deviation was 10.235. In the "Below Average" Reading group, the mean percentage was 18.7 percent. The range was from 3 percent to 36 percent and the standard deviation was 8.073.

In Mathematics, the mean percentage in the "Above Average" classification was nearly 47 percent with a range of from 22 to 86 percent. The standard deviation of this group was 13.851. The mean percentage for the "Average" Mathematics category was 34.5 percent. The mean range varied from 13 percent to 62 percent and the standard deviation for this Average Mathematics group was 10.366. In the "Below Average" Mathematics group, the mean percentage was 17.4 percent with an average range of from 2 percent to 36 percent and a standard deviation of 8.103.

With this description of the Output variables, the eighty-eight independent variables which have been classified as either Input, Institutional or Output variables, have been delineated. A discussion of the statistical findings relating to the five hypotheses and two ancillary questions is contained in the next section of this chapter.

## HYPOTHESIS 1

The purpose of this study was to examine the effects of eighty-eight Input, Institutional, and Output variables on climate scores, as measured by the CFK Ltd., School Climate Assessment Scale, on forty-one elementary schools. Because of the impossibility of including this large number of variables into a single discriminant function analysis run, it was necessary to separate them into manageable groups. These were: one group of Input variables consisting of

fifteen Parent/Community-related factors, four groups of Institutional variables consisting of two groups of thirty-six Principal-related characteristics, fifteen Teacher-related variables, and sixteen School-related factors, and one group of Output variables consisting of six Student Achievement-related aspects.

Hypothesis 1 was formulated to determine if a set of Input variables could be found that would produce a non chance classification of schools into either higher or lower climate. In other words, if climate scores from each school were divided into two groups of higher or lower climate, and then a group of predictor variables were entered, how accurately would the set of predictors be able to assign a particular school into the proper group to which its actual climate score data had originally placed it. Using SPSSX program "DISCRIMINANT", a stepwise discriminant function analysis was run on the school climate scores and all of the fifteen variables associated with the Parent/Community, ie., six categories of student ethnicity, percent of federal connection, public assistance, free-reduced lunch participation, high school and college graduates in the community, unemployed adults in the community, family size, median income and the percent of single parent households. (Table 3 on page 88 describes these factors.)

Discriminant function analysis, which allows for the examination of differences between two or more groups using

a number of variables simultaneously, was employed to identify a set of variables which could contribute to the correct classification of each case into either the higher or the lower climate group. The strength or accuracy of the classification into the groups could also be ascertained using this statistical procedure. Another advantage of using discriminant function analysis was that it was possible to utilize the combined contribution of all variables together in classifying cases, instead of the contribution of each variable separately as in univariate analysis procedures.

In Table 9, a summary table of the discriminant function analysis run on the school climate scores and the fifteen Parent/Community variables is presented. The top portion of the table displays the results of functions after the initial runs. These statistics include the step at which each predictor variable came into the equation, the F to remove score, the variable which was identified, the Wilks' lambda and its level of significance, and the standardized canonical discriminant function coefficient.

Table 9

A Summary Table of Results of Action and Steps of Stepwise Discriminant Function Analysis, Canonical Discriminant Functions, and Classification Results of Input Variables

RESULTS OF ACTION OF VARIABLES IN ANALYSIS AFTER STEP 6 -

| Step Entered | F to Remove Score | Variable Identified | Wilks' Lambda | Sig. | Stand. Canon. Coeff. |
|---|---|---|---|---|---|
| 1 | 3.8706 | % Chinese Students | .85243 | .0249 | 0.62972 |
| 2 | 8.4150 | % Caucasian Students | .80492 | .0346 | 1.29127 |
| 3 | 2.6415 | % Federal Connection | .73662 | .0254 | -0.61633 |
| 4 | 3.6616 | % Unemployed | .69129 | .0259 | -0.69724 |
| 5 | 2.9548 | % Public Assistance | .65040 | .0268 | 0.90979 |
| 6 | 1.1838 | % Single Par. Households | .62308 | .0337 | -0.46044 |

CANONICAL DISCRIMINANT FUNCTIONS -

| Eigenvalue | % Variance | Canonical Correlation | Chi-Square | D/F | Sig. |
|---|---|---|---|---|---|
| 0.60493 | 100.00 | 0.6139390 | 13.719 | 6 | 0.0329 |

CLASSIFICATION RESULTS -

| Actual Group | No. of Cases | Predicted Group Membership Group 1 | Group 2 |
|---|---|---|---|
| Group 1 Lower Climate | 17 | 13 76.5% | 4 23.5% |
| Group 2 Higher Climate | 17 | 3 17.6% | 14 82.4% |

Percent of "Grouped" Cases Correctly Classified: 79.41%

The middle portion of Table 9 reports the canonical discriminant functions--the eigenvalue, the variance described by the variables which were identified as classifiers, the canonical correlation, the associated chi-square, and the level of significance. The bottom portion of the table presents the classification results--the number of cases, the actual and predicted group membership, and the percent of "grouped" cases which were correctly classified into the higher or the lower climate groups.

Starting at the top of Table 9, of the fifteen input variables which had been previously run through the discriminant function procedure, or steps, six were identified as predictor variables as their F to Remove score was greater than 1.0. At each step of the function, variables are entered and depending on whether a particular variable contributes significantly to the function, it may remain in the function or be removed. At each step, if the variable contributes more than the cut-off score of 1.0, it is allowed to stay in the function.

The F to remove score tests the significance of the decrease in discrimination should that variable be removed from the list of variables already selected. The test is performed at the beginning of each step to see if there are any variables which no longer make a sufficiently large contribution to the discrimination function. A variable that was a strong contributor in an earlier step may lose its

value as other variables entering later duplicate its contribution. This statistic is important also because it can be used to rank the unique discriminating power carried by each selected variable.[4] Consequently, the variable with the largest F to Remove score in Table 9, percent of Caucasian students (8.4150) was identified as the greatest overall discriminator above and beyond contributions already made by the other variables. The next largest contributor was percent of Chinese students with an F to Remove score of 3.8706.

The six variables were identified as predictors at the level of significance of $p = < .05$. In the first step, percent of Chinese Students was identified as a predictor variable. In the second and successive steps through the sixth step, percent of Caucasian Students, percent of families with Federal Connections, percent of Unemployed, percent of families receiving Public Assistance, and percent of Single Parent Households were classified as predictor variables. It should be noted that in these runs, no other input variables were entered, that is, none of the other fifteen variables had a minimum F value of 1.0 or more. Likewise, none of the six variables identified as predictors were removed during the subsequent steps as each maintained at least an F value of 1.00 throughout the runs. The final F to Remove scores for the variables ranged from 1.1838 to 8.4150.

Another criterion for eliminating discriminant functions is to test for the statistical significance of discriminating information which is not already accounted for by earlier functions. As each function is derived starting from the zero function, the Wilks' lambda is computed.[5] Wilks' lambda, which is sometimes called the U statistic, is the ratio of the within-groups sum of the squares to the total sum of squares. Small values of lambda are associated with functions that have much variability between groups and little variability within groups. Thus, when a lambda of 1.0 occurs, the mean of the discriminant scores is the same in all groups and there is no between-groups variability.[6] Lambdas may also be transformed into chi-square statistics to test for statistical significance. The Wilks' lambdas for the six predictor input variables ranged from a low of .62308 for percent of Single Parent Households to a high of .85243 for percent of Chinese Students. Thus, of the six input variables which were identified as predictors, percent of Single Parent Households had group means which appeared to differ most.

In the last column of the top portion of Table 9, the standard canonical coefficient is presented of each of the six identified predictors. Standard canonical coefficients are the standardized form of the discriminant function scores where all cases in the analysis will have a mean of zero and a standard deviation of one. By standardizing the

scores in this manner, any single score represents the number of standard deviations that a case is away from the mean for all cases on the given discriminant function. The standard canonical coefficient is important because it represents the relative contribution of its associated variable to that function. Thus, variables with large coefficients are thought to contribute more to the overall discriminant function.

The sign designates whether the variable is making a positive or negative contribution to the function.[7] Thus, in Table 9, the percent of Caucasian students with a standard canonical coefficient of 1.29127 was identified as making the largest positive contribution to the overall discriminant function. Likewise, the percent of unemployed with a standard canonical coefficient of -.69724 was identified as making the largest negative contribution to the overall discriminant function. In descriptive terms, percent of Caucasian students was found to discriminate higher climate while the percent of unemployment was identified as a discriminator of lower climate.

In the middle portion of Table 9, the eigenvalue, percent of variance, canonical correlation, chi-square, degrees of freedom and level of significance of the input variables are presented. The eigenvalue, which is a special measure computed in the process of deriving the discriminant function, is a measurement of the relative importance or

strength of the function. The sum of the eigenvalues equals the total variance existing in the discriminating functions.[8] Although the eigenvalue is a relative quantity, an eigenvalue of 1.0 or above is the generally accepted value for determining the worth of a discriminant function. The eigenvalue for this function was .60493, which is below the usual cut-off point. This indicates that the between-group variance was smaller than the within-group variance. In the next column, the percent of variance described by the six variables was 100 percent.

Another means of judging the importance or strength of a discriminant function is by examining its canonical correlation. This is a measure of the association between the single discriminant function and the set of variables which define the group membership. "It tells us how closely the function and the `group variables' are related, which is just another measure of the function's ability to discriminate among the groups."[9] The canonical correlation measured .6139390 in the function.

The other functions presented in the middle section of Table 9 were the chi-square test, degrees of freedom and level of significance. The chi-square test indicated that the results could be generalizable to a larger population at the probability level of 13.719. The degrees of freedom was six and the level of significance was .0329.

In the bottom portion of Table 9, the results of the classification are presented. The actual group categories, lower climate and higher climate, and the predicted group membership into the two groups are noted. Of the seventeen cases in the lower climate group, 13 cases or 76.5 percent were correctly classified while 4 cases or 23.5 percent of the cases were incorrectly classified. Of the seventeen cases in the higher climate group, 3 cases or 17.6 percent were incorrectly assigned while 14 cases, or 82.4 percent were grouped correctly. Of the total number of 34 "grouped" cases, 79.4 percent or 27 cases were correctly classified.

Therefore, on the basis of this percentage, the non chance statement in Hypothesis 1 was rejected as the Input variables of percent of Chinese Students, percent of Caucasian Students, percent of Families with Federal Connections, percent of Unemployed, percent on Public Assistance, and percent of Single Parent Households were identified as variables which were able to classify schools into higher or lower climate groups at the $p = < .05$ level of significance.

## HYPOTHESIS 2

The findings relating to Hypothesis 2, that "there is no discrete set of Institutional variables that will produce a non chance classification of schools into either higher or lower climate are presented in this section. Sixty-seven

predictor variables were examined in four separate groups and runs using the discriminant function analysis procedure. The Institutional variables were divided into three types: those related to the Principal, those related to the School and those related to the Teachers. It was noted that all 67 Institutional variables were directly related to the formal educational setting of a student entering school.

## PRINCIPAL-RELATED INSTITUTIONAL VARIABLES

The largest number of variables that the discriminate function analysis procedure can accommodate in a single run is equal to two less than the number of cases, which in this instance, was 34. Therefore, it was necessary to separate the 36 Principal-related predictor variables into two workable units. The 15 demographic variables of the principals (Sex, Ethnicity, Educational Level, Age, School Tenure, and Administrative Tenure) and the 21 MSQ Job Satisfaction Reinforcers of the principals were stratified into two groups of demographic and reinforcer variables. Variables were then randomly selected from these two groups and two sets of eighteen variables each were then run separately using the stepwise discriminant function analysis procedure. (See pages 91 and 93.)

In Tables 10 and 11, summary tables of the discriminant function analyses of the Principal-Related Institutional variables and school climate scores are presented.

Table 10

A Summary Table of Results of Action and Steps of Stepwise Discriminant Function Analysis, Canonical Discriminant Functions, and Classification Results of Set #1 of the Principal-Related Institutional Variables

RESULTS OF ACTION OF VARIABLES IN ANALYSIS AFTER STEP 7 -

| Step Entered | F to Remove Score | Variable Identified | Wilks' Lambda | Sig. | Stand. Canon. Coeff. |
|---|---|---|---|---|---|
| 1 | 2.2293 | Creativity | .79741 | .0076 | 0.60672 |
| 2 | 3.9603 | Authority | .75086 | .0118 | 0.72450 |
| 3 | 6.8265 | Abil.Utiliz. | .66269 | .0057 | -1.17450 |
| 4 | 6.1425 | Compensation | .61977 | .0063 | -0.98582 |
| 5 | 2.9287 | Responsibil. | .59019 | .0084 | 0.90912 |
| 6 | 3.4113 | Adm. Tenure | .54724 | .0079 | 0.75761 |
| 7 | 1.3412 | Female Prin. | .52039 | .0100 | 0.41168 |

CANONICAL DISCRIMINANT FUNCTIONS -

| Eigenvalue | % Variance | Canonical Correlation | Chi-Square | D/F | Sig. |
|---|---|---|---|---|---|
| 0.92165 | 100.00 | 0.6925418 | 18.616 | 7 | 0.0095 |

CLASSIFICATION RESULTS -

| Actual Group | No. of Cases | Predicted Group Membership Group 1 | Group 2 |
|---|---|---|---|
| Group 1 Lower Climate | 17 | 14 82.4% | 3 17.6% |
| Group 2 Higher Climate | 17 | 3 17.6% | 14 82.4% |

Percent of "Grouped" Cases Correctly Classified: 82.35%

The top portion of Tables 10 and 11 display the results of functions after the initial runs. Each step at which a variable entered the equation, the F to Remove scores, the identified variables, the Wilks' lambdas and their levels of significance, and the standardized canonical discriminant function coefficients are noted.

In the middle portion of the tables, the Canonical Discriminant Functions are reported. The eigenvalues, percent of variance, the canonical correlations, the chi-squares, and the levels of significance are shown.

In the first section of Table 10, the results of the discriminant function analysis of the first set of 18 Principal-related variables are presented. F to Remove scores ranged from a low of 1.3412 to a high of 6.8265. The variable with the strongest F to Remove score was Ability Utilization with Compensation being a close second. In the seven runs, no other variables were entered nor were any removed as each variable had an F value of well over the 1.0 minimum required to remove a variable.

In this initial step, the job reinforcer called Creativity, "the chance to try my own methods of doing the job," was the first variable to enter into the analysis as a predictor. In the second run, Authority, "the chance to tell other people what to do," was identified. Ability Utilization, "the chance to do something that makes use of my abilities," was discriminated next, followed by the job

reinforcer Compensation, "my pay and the work I do." Responsibility, "the freedom to use my own judgment," was the last job satisfaction variable which was identified in this first set of Principal variables. In the sixth and seventh steps, the two demographic variables of Administrative Tenure, the number of years in which a principal had served as a school administrator, and Female principal, were the final variables which were discerned.

The Wilks' lambda, the ratio of the within-groups sum of the squares to the total sum of squares ranged from a low of .52033 for Female principal to a high of .79741. As was noted earlier in a more detailed discussion of Wilks' lambda (see page 112), small values of lambda are associated with functions that have much variability between groups and little variability within groups. Consequently, of the seven variables which were identified as predictors, the demographic variables of Administrative Tenure and the Female gender appeared to have group means which differ most. The level of significance was less than .05 in all seven of the predictor variables.

In the last column, the standard canonical coefficients of the variables are displayed. These scores, which represent the number of standard deviations that a case is away from the mean for all cases on each discriminant function, indicates the relative contribution of each associated variable to that function. As the variables with

large coefficients are thought to contribute more to the overall discriminant function, the variables of Ability Utilization with -1.17450 and Compensation with -.98582 are shown as making the largest negative contribution to the overall discriminant function while Responsibility with .90912 is identified as making the largest positive contribution.

In the middle segment of Table 10, aspects of the canonical discriminant functions such as the eigenvalue, percent of variance, the canonical correlation, chi-square, degrees of freedom and level of significance are displayed. Because the eigenvalue is a relative term which measures the strength or importance of the discriminating function, it should not be discounted in this case even though its value was .92165, which was slightly less than the usual cut-off number of 1.0 which indicates the relative worth of a discriminant function. This eigenvalue indicates that the between-group variance was slightly smaller than the within-group variance. The second column verifies that the percent of variance described by the seven variables was 100 percent.

The canonical correlation also judges the importance or strength of the discriminant function by relating how closely the function and the group variables are related. In this procedure, the canonical correlation was relatively high at .6925418. In the next column, the chi-square test

showed that the results of these findings could be generalizable to a larger population at a level of probability of 18.616. The degrees of freedom was 7 and the level of significance was .0095, well below the p = < .05 level.

In the final segment of Table 10, the classification results are shown. Of the 17 cases in the lower climate group, 14 or 82.4 % were correctly classified into the lower climate group by using these seven predictor variables. Three cases, or 17.6 % were incorrectly classified. The same effect was true with the second group. Of the 17 cases of the higher climate group, three cases or 17.6 % were incorrectly classified and 14 cases, or 82.4 % were placed correctly into their groups. Therefore, of the 34 "grouped" cases, 82.35 % were correctly classified.

Table 11 relates the findings of the second set of Principal-Related Institutional variables which were run, using the discriminant function analysis procedure. The summary table is divided into three segments to show the results of action and steps of the analysis, the canonical discriminant functions, and the classification results.

It should be noted that in Table 10, 7 steps (or runs) were completed prior to the identification of the seven discriminating variables. In Table 11, however, only two steps were needed to identify the discriminating variables from the second set of 18 Principal-related variables which were examined. The F to Remove score of 7.9869 recognized

the reinforcer Co-worker as a very strong contributor to the overall discrimination. The School Tenure score of 1.9366 was also well above the 1.0 cut-off score needed to keep a variable in the function.

Table 11

A Summary Table of Results of Action and Steps of Stepwise Discriminant Function Analysis, Canonical Discriminant Functions, and Classification Results of Set #2 of the Principal-Related Institutional Variables

RESULTS OF ACTION OF VARIABLES IN ANALYSIS AFTER STEP 2 -

| Step Entered | F to Remove Score | Variable Identified | Wilks' Lambda | Sig. | Stand. Canon. Coeff. |
|---|---|---|---|---|---|
| 1 | 7.9869 | Co-workers | .80213 | .0084 | 0.49207 |
| 2 | 1.9366 | Sch. Tenure | .75497 | .0128 | 0.91851 |

CANONICAL DISCRIMINANT FUNCTIONS -

| Eigenvalue | % Variance | Canonical Correlation | Chi-Square | D/F | Sig. |
|---|---|---|---|---|---|
| 0.32456 | 100.00 | 0.4950074 | 8.7135 | 2 | 0.0128 |

CLASSIFICATION RESULTS -

| Actual Group | No. of Cases | Predicted Group Membership Group 1 | Group 2 |
|---|---|---|---|
| Group 1 Lower Climate | 17 | 11 64.7% | 6 35.3% |
| Group 2 Higher Climate | 17 | 4 23.5% | 13 76.5% |

Percent of "Grouped" Cases Correctly Classified: 70.59%

In the top portion of Table 11 at step 1, the MSQ variable Co-workers, "the way my co-workers get along with each other," was identified as a predictor. At step 2, the demographic variable of School Tenure, the number of years the principal had been the administrator at the sample school, was found as a discriminating variable. The F to Remove score for Co-worker was 7.9869 and the F to Remove score for School Tenure was 1.9366.

The Wilks' lambda for Co-workers was .80213 and the lambda for School Tenure was .75497. These lambdas indicate that there was a relatively small amount of variability in the between-group means. The level of significance of both variables were significant at the $p = < .05$ level. The canonical coefficient, which represents the relative contribution of each of the two discriminating variables to the discriminant function was .49207 for Co-workers and .91851 for School Tenure. Consequently, School Tenure was shown to have almost double the contributing effect in this function.

In the middle portion, the eigenvalue was .32456, a relatively small number which is considerably below the usual 1.0 cut-off point for being designated as a strong predictor. The variance described by the two variables was 100 percent. The canonical correlation was .4950074, an indicator that the relationship between the discriminant function and the predictor variables was not close or

strong. The chi-square test score was 8.7135, the degrees of freedom was 2, and the level of significance was 0.0128.

In the bottom portion of Table 11, the results of the classification of the second set of Principal-related Institutional variables are presented. Of the 17 cases in the Lower Climate group, 11 or 64.7 % were identified correctly while 6 or 35.3 % were incorrectly classified. In the Higher Climate group of 17 cases, 4 were predicted incorrectly while 13 cases, or 76.5 % were accurately classified. Overall, the percent of correctly classified "grouped" cases was 70.59 percent.

In summary, nine predictor variables were discerned from the two sets of Principal-related variables which were examined by the discriminant function analysis runs. These were six MSQ job satisfaction reinforcers (Creativity, Authority, Ability Utilization, Compensation, Co-workers and Responsibility) and three demographic characteristics of the principals (Administrative Tenure, Female principal, and School Tenure). As these nine predictors were shown to be significantly different at the $p = < .05$ level, the null hypothesis that there is no discrete set of Institutional variables that would produce a non chance classification of schools into either higher or lower climate was rejected relative to the Principal-related variables.

In the next section, the Teacher-Related Institutional variables were examined to further test Hypothesis 2.

## TEACHER-RELATED INSTITUTIONAL VARIABLES

Can a discrete set of Teacher-related factors be identified that will produce a non-chance classification of schools into either higher or lower climate? This is the question which was examined in this segment. Descriptive data of the fifteen teacher-related variables are displayed in Table 6 on page 97.

To test the Teacher-related factors relating to Hypothesis 2, the stepwise discriminant function analysis procedure was again utilized. In Table 12, the results of the actions and steps relating to this set of variables is shown.

Table 12

Results of Action and of Stepwise Discriminant Function Analysis of Teacher-Related Institutional Variables

RESULTS OF ACTION OF VARIABLES IN ANALYSIS AFTER STEP 6 -

| Step Entered | F to Remove Score | Variable Identified | Wilks' Lambda | Sig. | Stand. Canon. Coeff. |
|---|---|---|---|---|---|
| 1 | 4,7976 | % Filipino | .85310 | .0253 | 0.60822 |
| 2 | 8.1080 | % Age 56+ | .79013 | .0260 | -0.83979 |
| 3 | 2.3116 | % Age 35-45 | .71139 | .0156 | -0.59007 |
| 4 | 9.3723 | % Caucasian | .56406 | .0018 | 0.92698 |
| 5 | 1.8031 | % Age 46-55 | .53025 | .0022 | 0.51242 |
| 6 | 1.0027 | % Other | .51124 | .0036 | 0.28927 |

Six discriminating variables were identified and no variables were removed during the six step procedure which examined the Teacher-related Institutional variables. All of the six were robust enough to be entered and to remain throughout the total number of runs. The F to remove scores recognized percent of Caucasian teachers as the largest contributor to the overall discrimination with a score of 9.8108. The second largest contributor was percent of teachers aged 56 and older with a score of 8.1080. The other scores ranged from a low of 1.0027 for percent of "Other" teachers to 4.7976, percent of Filipino teachers. The six predictors variables were identified as percent of teachers of Filipino ancestry, teachers aged 56 and older, teachers aged 35 and younger, teachers of Caucasian ancestry, teachers aged 46 through 55, and the category of "Other" teachers.

The Wilks' lambda for this group ranged from a low of .51124 for percent of "Other" ethnic groups, to a high of .85310 for teachers with Filipino ancestry. As the Wilks' lambda is the ratio of the within groups sum of squares to the total sum of the squares, it tells us that the .51124 lambda of the "Other" variable appears to be smaller than in the other variables and the between-group variance appears to be larger. Lambda's may also be transformed into chi-square statistics to test for statistical significance. All

six of the identified predictor variables were found to be significant at the p = < .05 level of significance.

The standard canonical coefficients appear in the last column in Table 12. The variable with the strongest contribution to the discriminant function was identified as percent of Teachers with Caucasian ancestry with a .92698 standard canonical coefficient. The second most important variable was percent of Teachers aged 56 or older with a negative .83979 coefficient. The other standard canonical coefficients ranged from a low of .28927 for the variable, "Other" teachers to .60822 for the variable Teachers of Filipino ancestry.

Table 13 presents the canonical discriminant functions and the classification results of the Teacher-related Institutional variables. The eigenvalue, percent of variance, canonical correlation, chi-square, degrees of freedom, and significance level of the discriminant functions are presented. The table also contains the classification results and the percent of correctly "grouped" cases.

Table 13

Results of the Canonical Discriminant Functions and the Case Classifications of Teacher-Related Institutional Variables

CANONICAL DISCRIMINANT FUNCTIONS -

| Eigenvalue | % Variance | Canonical Correlation | Chi-Square | D/F | Sig. |
|---|---|---|---|---|---|
| 0.95603 | 100.00 | 0.6991135 | 19.457 | 6 | 0.0035 |

CLASSIFICATION RESULTS -

| Actual Group | No. of Cases | Predicted Group Membership Group 1 | Group 2 |
|---|---|---|---|
| Group 1 Lower Climate | 17 | 13 76.5% | 4 23.5% |
| Group 2 Higher Climate | 17 | 3 17.6% | 14 82.4% |

Percent of "Grouped" Cases Correctly Classified: 79.41%

The eigenvalue, which was listed as .95603 and the percent of variance, which was 100%, are shown. The eigenvalue is very close to the generally accepted cut-off point of 1.0 which shows robustness. The canonical correlation, which tells us how closely the function and the group variable are related, was .6991135, a fairly strong indicator. The chi-square was 19.457, there were 6 degrees of freedom, and the significance level was .0035.

Also in Table 13, the actual and predicted group membership classification results are shown. Of the 17 lower climate group, 13 cases or 76.5 percent were correctly predicted using these predictor variables. Four of the cases, or 23.5 percent were incorrectly classified. In the higher climate group, three cases or 17.6 percent were incorrectly classified and 14 or 82.4 percent were correctly grouped. Of the total number of cases, 79.41 percent of the "grouped" cases were correctly classified.

These findings have identified three variables relating to teacher age and three variables relating to teacher ethnicity which were capable of discriminating cases into higher and lower climate groups. These six predictors were shown to be significantly different at the $p = < .05$ level of significance. Consequently, the null hypothesis that there is no discrete set of Institutional variables that would produce a non chance classification of schools into either higher or lower climate was rejected.

A final set of Institutional variables, those associated with the school itself, were analyzed in the next section in relation to Hypothesis 2.

## SCHOOL-RELATED INSTITUTIONAL VARIABLES

Are there factors within the school itself, such as its programs, its staff, its demographics, or its areas of concern which contribute to school climate? Can these

variables be used to classify schools into higher or lower climate? Table 14 displays the results of the stepwise discriminant function analysis and the canonical discriminant functions of the School-Related Institutional variables which were examined to answer these questions regarding Hypothesis 2.

Table 14

Results of Action and Steps of Stepwise Discriminant Function Analysis and the Canonical Discriminant Functions of School-Related Institutional Variables

RESULTS OF ACTION OF VARIABLES IN ANALYSIS AFTER STEP 3 -

| Step Entered | F to Remove Score | Variable Identified | Wilks' Lambda | Sig. | Stand. Canon. Coeff. |
|---|---|---|---|---|---|
| 1 | 6.0478 | Av.Daily Abs. | .81930 | .0137 | 0.53051 |
| 2 | 2.9913 | Total # Tchrs. | .70707 | .0055 | 0.71141 |
| 3 | 2.2243 | Crisis Suspen. | .65670 | .0061 | 0.46348 |

CANONICAL DISCRIMINANT FUNCTIONS -

| Eigenvalue | % Variance | Canonical Correlation | Chi-Square | D/F | Sig. |
|---|---|---|---|---|---|
| 0.52276 | 100.00 | 0.5859167 | 12.406 | 3 | 0.0061 |

Sixteen School-related variables which were described in Table 7 on page 100 were examined in relation to the school climate scores using discriminant function analysis.

school climate scores using discriminant function analysis. In the first three runs, Average Daily Absences with an F to Remove score of 6.0478, Total Number of Teachers with an F to Remove score of 2.9913, and Crisis Suspensions with an F to remove score of 2.2243 were identified as predictors.

At the top portion of Table 14, the results of the action of the analysis are presented. The Wilks' lambdas for these three variables were .65670 for Crisis Suspension, .70707 for Total Number of Teachers, and .81930 for Average Daily Absence. All three were significant at the $p = < .05$ level. Of the three variables, the standardized canonical discriminant function coefficients identified Average Daily Absence as the one which appeared to contribute the most to the overall discriminant function as it had the largest coefficient of .71141.

In the next portion of Table 14, the other important elements of the canonical discriminant functions are shown. The eigenvalue of .52276 showed that the measurement was relatively low and therefore not a strong contributor to the function. The percent of variance was 100.00, and the canonical correlation was .5859167, also not a very robust measurement. The chi-square was 12.406, the degrees of freedom were 3 and the level of significance was .0061.

The classification results of the School-related Institutional variables are shown in Table 15.

Table 15

Classification Results of School-Related Variables

| CLASSIFICATION RESULTS - | | | |
|---|---|---|---|
| Actual Group | No. of Cases | Predicted Group Membership Group 1 | Group 2 |
| Group 1 Lower Climate | 17 | 10 58.8% | 7 41.2% |
| Group 2 Higher Climate | 16 | 3 18.8% | 13 81.3% |
| Percent of "Grouped" Cases Correctly Classified: | | 69.70% | |

Of the seventeen cases actually placed into group 1, the Lower Climate schools, ten, or 58.8% were correctly grouped while 7, or 41.2% were incorrectly placed. Of the sixteen cases actually placed into group 2, three, or 18.8% were incorrectly predicted while 13, or 81.3% were correctly predicted as belonging to group 2, the Higher Climate group of schools. The percent of "grouped" cases which were correctly classified was 69.7.

As a result of these findings, three School-Related Institutional variables (Average Daily Absences, Total Number of Teachers and Crisis Suspensions) were identified as variables which do produce a non-chance classification of schools into either higher or lower climate. Hence, the null hypothesis was rejected.

In summary, a total of 67 Institutional variables were examined with regard to the hypothesis, "There is no discrete set of institutional variables that will produce a non-chance classification of schools into either higher or lower climate." Using a series of stepwise discriminant function analyses, a total of 18 Institutional variables were identified as predictor variables. Nine Principal-Related Institutional variables were distinguished. These were Creativity, Authority, Ability Utilization, Compensation, Responsibility, Administrative Tenure, Co-workers, and School Tenure. Six Teacher-Related Institutional variables were found. These were Teachers of Filipino, Caucasian, and "Other" Ancestry, and Teachers Aged 35 or Less, 46 to 55, or 56 or Older. Three School-Related Institutional variables, Average Daily Absence, Total Number of Teachers, and Crisis Suspensions, were also identified. Consequently, the null hypothesis was rejected.

The final set of variables, those associated with the product of the Inputs and the Institution, the Output variables, was examined in the next section.

## HYPOTHESIS 3

The third hypothesis concerns Student Achievement-Related Output variables. Is there a discrete set of Output variables that will produce a non-chance classification of schools into either higher or lower climate? This question

was examined in regard to the six categories of Stanford Achievement Test Reading and Mathematics Percentiles of sixth graders in the sample schools for the 1987-88 school year. Descriptive data of these variables may be found in Table 8 on page 105.

Table 16 displays the results of the discriminant function analysis run and the canonical discriminant function of the Student Achievement-Related variables.

Table 16

Results of Action and Steps of Stepwise Discriminant Function Analysis and Canonical Discriminant Functions of Student Achievement-Related Output Variables

RESULTS OF ACTION OF VARIABLES IN ANALYSIS AFTER STEP 1 -

| Step Entered | F to Remove Score | Variable Identified | Wilks' Lambda | Sig. | Stand. Canon. Coeff. |
|---|---|---|---|---|---|
| 1 | 1.2170 | % SAT Rdg. Below Ave. | .96336 | .2782 | 1.0000 |

CANONICAL DISCRIMINANT FUNCTIONS -

| Eigenvalue | % Variance | Canonical Correlation | Chi-Square | D/F | Sig. |
|---|---|---|---|---|---|
| 0.03803 | 100.00 | 0.1914106 | 1.1758 | 1 | 0.2782 |

Only one step was needed in the discriminant function analysis procedure to test this hypothesis. The "Below Average" percentile which included stanines 1-3, was

was over the minimum 1.0 minimum in the initial calculations. However, upon examination of the Wilks' lambda, which was .96336, it can be seen that there was almost no between-group variability as a lambda of 1.0 means that the discriminant score is the same in all groups. The level of significance was .2782 which verified the fact that no significant differences existed between the means. Thus, these findings indicated that no set of Output variables could be identified to produce a non chance classification of schools into either higher or lower climate from the sample of variables. Consequently, the null hypothesis was not rejected.

## HYPOTHESIS 4

In the preceding series of stepwise discriminant function analyses, six Input variables and eighteen Institutional variables were identified as factors which could classify schools into higher or lower climates on a better than chance basis. Consequently, a related question was asked, "Can a set of multiple predictors be identified that can be used to discriminate between higher or lower climate schools?" An examination of this question was the focus of Hypothesis 4.

The variables which were identified as predictors in the preceding runs of the stepwise discriminant function

analyses are listed in Table 17. The classification type of the variables are also included.

Table 17

Predictor Variables and Their Classification Types As Identified in Hypotheses 1 and 2

| PREDICTOR VARIABLE | CLASSIFICATION TYPE |
|---|---|
| Ability Utilization | Institutional-Principal |
| Administrative Tenure | Institutional-Principal |
| %Age 35 or Less | Institutional-Teacher |
| %Age 45-55 | Institutional-Teacher |
| %Age 56 or Older | Institutional-Teacher |
| Stud. Average Daily Absences | Institutional-School |
| Authority | Institutional-Principal |
| Compensation | Institutional-Principal |
| Co-workers | Institutional-Principal |
| Creativity | Institutional-Principal |
| Crisis Suspension | Institutional-School |
| %Federal Connection | Input-Parent/Community |
| Female Principal | Institutional-Principal |
| % on Public Assistance | Input-Parent/Community |
| Responsibility | Institutional-Principal |
| School Tenure | Institutional-Principal |
| %Single Parent Households | Input-Parent/Community |
| %Students-Caucasian | Input-Parent/Community |
| %Students-Chinese | Input-Parent/Community |
| %Teachers-Caucasian | Institutional-Teacher |
| %Teachers-Filipino | Institutional-Teacher |
| %Teachers-Other | Institutional-Teacher |
| Total Number Teachers | Institutional-School |
| %Unemployed | Input-Parent/Community |

In summary, Table 17 reveals that six Input variables reflective of the Parents and Community, and eighteen

Institutional variables, including nine Principal-related, six Teacher-related and three School-related variables were discriminated.

To test Hypothesis 4, these twenty-four predictor variables were analyzed using stepwise discriminant function analysis procedures. The result of this analysis is presented in Table 18.

Table 18

Results of Action and Steps of Stepwise Discriminant Function Analysis of Predictor Variables

RESULTS OF ACTION OF VARIABLES IN ANALYSIS AFTER STEP 11 -

| Step Entered | F to Remove Score | Variable Identified | Wilks' Lambda | Sig. | Stand. Canon. Coeff. |
|---|---|---|---|---|---|
| 1 | 8.9970 | %Age 56+ | .79822 | .0087 | 0.86022 |
| 2 | 2.2903 | Creativity | .67415 | .0027 | 0.46752 |
| 3 | 15.037 | %Fed.Connect. | .58127 | .0011 | -1.53391 |
| 4 | 15.920 | Ave.Daily Ab. | .47345 | .0002 | -1.15965 |
| 5 | 15.107 | %Age 35- | .32797 | .0000 | 1.09510 |
| 6 | 9.1476 | %Chinese Stu. | .27232 | .0000 | 0.88107 |
| 7 | 3.3303 | %Other Tchrs | .25285 | .0000 | -0.50705 |
| 8 | 3.8167 | Co-workers | .22861 | .0000 | 0.60876 |
| 9 | 1.5025 | Total Tchrs | .20913 | .0000 | -0.42880 |
| 10 | 1.7700 | %Cauc. Tchrs | .19930 | .0000 | 0.49828 |
| 11 | 1.1810 | Crisis Susp. | .18869 | .0000 | 0.31648 |

Table 18 shows that the 24 variables which were identified in previous runs in which groups of Input and Institutional variables were examined, were analyzed as a

group using stepwise discriminant function analysis. After eleven steps, eleven variables were selected as a set of multiple predictor variables which were able to produce a non chance classification of schools into either higher or lower climate.

The F to Remove scores, which can be used to "obtain the rank order of the unique discriminating power carried by each of the selected variables"[10] identified percent of Average Daily Absence (15.920) as the variable with the greatest contribution above and beyond the contributions already made by the other variables in the function. Percent of Teachers Aged 35 or Below (15.107) and percent of families with Federal Connections (15.037) closely followed as large contributors. The next strongest contributors to the function were percent of Chinese Students (9.1476) and percent of Teachers Aged 56 and Older (8.9970). The F to Remove scores for the other eight variables ranged from 1.1810 to 3.8167. The variables, in order of strongest contribution, were Co-workers, percent "Other" Teachers, Creativity, percent Caucasian Teachers, Total Number of Teachers at a school, and Crisis Suspensions. It should be noted that all eleven variables were robust enough to qualify to enter the function with a score of 1.0 and above, and they all remained in the analysis with a score of 1.0 and above throughout the entire procedure of multiple runs.

Table 18 also shows the Wilks' lambdas for the eleven variables. This statistic, which considers both the differences between groups and the cohesiveness or homogeneity within groups, had a range of a high of .79822 to low of .18869. The variable with the smallest lambda, that is, the one with the greatest variability between groups and the smallest homogeneity within groups was Crisis Suspension. All were significant at the $p = < .01$ level of significance.

The standard canonical coefficients, which are helpful in determining which variables contribute most to determining scores on the function, are also listed. Percent of families with Federal Connection was the variable with the highest standardized canonical coefficient of-1.5391. Thus, it was the best contributor to determining lower climate. The next strongest discriminators were percent of Average Daily Absence with -1.15965, another strong predictor of lower climate, and percent of Teachers Aged 35 and Below, with 1.09510, was a strong predictor of higher climate. The other standard canonical coefficients ranged from a low of .31648 to .88107.

In Table 19, the canonical discriminant functions and the classification results are displayed.

Table 19

Results of Canonical Discriminant Functions and Classification Results of Predictor Variables

CANONICAL DISCRIMINANT FUNCTIONS -

| Eigenvalue | % Variance | Canonical Correlation | Chi-Square | D/F | Sig. |
|---|---|---|---|---|---|
| 4.29928 | 100.00 | 0.9007292 | 42.525 | 11 | 0.0000 |

CLASSIFICATION RESULTS -

| Actual Group | No. of Cases | Predicted Group Membership Group 1 | Group 2 |
|---|---|---|---|
| Group 1 Lower Climate | 17 | 17<br>100.0% | 0<br>0.0% |
| Group 2 Higher Climate | 16 | 1<br>6.2% | 15<br>93.8% |

Percent of "Grouped" Cases Correctly Classified: 96.97%

The eigenvalue of this analysis was 4.29928. As it is well above the 1.0 general cut-off score, this statistic shows that this function was very important and strong. The utility of this function is also borne out by the canonical correlation statistic, which was .90072792. As this coefficient measures the association which summarizes the degree of relatedness between the groups and the

discriminant function, a value of zero indicates no relationship at all and a 1.0 denotes maximum correlation.[11] The canonical correlation of 90 percent is, therefore, very robust. The chi-square test results indicated that the results could be generalizable to a large population at a relatively high level of probability with 11 degrees of freedom. The level of significance for the discriminant function was .000.

Table 19 also exhibits the results of the actual and predicted group memberships using the eleven predictor variables. Of the 17 cases in the Lower Climate group, all 17, or 100% were accurately predicted into the proper group. Of the 16 cases actually in the Higher Climate group, 15 or 93.8% were correctly grouped. One case of the actual Higher climate group, or 6.3%, was incorrectly placed. Of all the grouped cases, 96.97% were correctly grouped according to this set of multiple predictors.

Based on these findings, the null hypothesis, that no discrete set of multiple predictors can be used to discriminate between higher and lower climate schools was rejected.

## HYPOTHESIS 5

Having identified a set of multiple predictors which could produce a non chance classification of schools into

either higher or lower climate groups, the fifth hypothesis was examined. The question being addressed was, on a univariate basis, is there a significant difference in the values obtained for higher and lower climate schools for each of the variables identified as multiple classification predictors? One-way Analysis of Variance (ANOVA) was used to test each of the eleven identified predictor variables which were used as dependent variables, with the climate scores from each school, which was the independent variable.

One-way Analysis of Variance is an inferential statistical procedure which has the general purpose of comparing two or more groups in terms of their mean scores. The procedure for assessing the validity of the null hypothesis using one-way ANOVA consists of three main steps: 1) the original raw data are put into a formula in order to obtain a calculated F value, 2) the resulting calculated F value is compared against a critical value, and 3) the null hypothesis is rejected if the calculated value is larger than the tabled critical value, or not rejected if the calculated value is less than the critical value.[12] Table 20 presents the results of the analysis using school climate and the two Parent/Community predictor variables.

Table 20

Summary Results Using One-way ANOVA with School Climate as the Independent Variable and the Parent/Community Input Variables as the Dependent Variables

| SOURCE OF VARIATION | SUM OF SQUARES | DF | MEAN SQUARES | F RATIO | F PROB. |
|---|---|---|---|---|---|
| Percent Chinese Students | | | | | |
| Between Grps. | 5.1259 | 1 | 5.1259 | 4.6255 | .039* |
| Within Grps. | 34.3541 | 31 | 1.1082 | | |
| Total | 39.4800 | 32 | | | |
| Percent with Federal Connections | | | | | |
| Between Grps. | 93.5390 | 1 | 93.5390 | .2508 | .620 |
| Within Grps. | 11570.6544 | 31 | 373.2469 | | |
| Total | 11664.1933 | 32 | | | |

* $p < .05$

In Table 20, the Source of Variation (between and within groups), Sum of Squares, Degrees of Freedom, Mean Squares, F Ratio and F Probability are shown. The dependent variables, the two Parent/Community Input variables which were identified as predictors of higher or lower school climates (Percent Chinese Students and Percent of Families with Federal Connections) were each analyzed with the independent variable, the higher or lower School Climate Scores, using the SPSSX program "ONEWAY". The

computations revealed that in only one variable, Percent of Chinese Students, was the calculated F ratio larger than the tabled critical value, implying that the sample means were far enough apart to conclude that the chances are less than 5 out of 100 (p = .039) that the population means are the same. Thus, a significant difference is said to exist between the means of the two groups for Percent of Chinese Students.

In Table 21, one-way ANOVA was used to examine the two Principal-Related Institutional variables which were identified as predictors and the School Climate Scores.

Table 21

Summary Results Using One-way ANOVA with School Climate as the Independent Variable and the Principal-Related Institutional Variables as the Dependent Variables

| SOURCE OF VARIATION | SUM OF SQUARES | DF | MEAN SQUARES | F RATIO | F PROB. |
|---|---|---|---|---|---|
| Creativity | | | | | |
| Between Grps. | 60.5135 | 1 | 60.5135 | 6.860 | .013* |
| Within Grps. | 274.8199 | 31 | 8.8652 | | |
| Total | 335.3333 | 32 | | | |
| Co-workers | | | | | |
| Between Grps. | 63.0018 | 1 | 63.0018 | 6.6192 | .015* |
| Within Grps. | 295.0588 | 31 | 9.5180 | | |
| Total | 358.0606 | 32 | | | |

* p < .05

In each of these one-way ANOVA procedures, Co-workers, and Creativity were examined as the dependent variables while the School Climate scores were the independent variables. In Table 21, the between and within group variations, the sum of squares, the degrees of freedom, the mean squares, the F ratio, and the F probability were identified. The data indicated that both predictor variables were found to be significant at the $p < .05$ level. The F probability for Co-workers (the way my co-workers get along with each other) was $p = .015$ while the F probability for Creativity (the chance to try my own methods of doing the job) was $p = .013$.

Table 22 shows the summary results of the data from the one-way ANOVA analyses of the Teacher-Related Institutional variables. The four factors identified as predictor variables (Percent Caucasian Teachers, Percent of Teachers Age 36 or Less, Percent of Teachers Age 56 or Older and Percent of Other Teachers) were used as dependent variables in each analysis while the two groups of School Climate Scores were used as the independent variable. Of these four variables, only one was found to be statistically significant.

Table 22

Summary Results Using One-way ANOVA with School Climate as the Independent Variable and the Teacher-Related Institutional Variables as the Dependent Variables

| SOURCE OF VARIATION | SUM OF SQUARES | DF | MEAN SQUARES | F RATIO | F PROB. |
|---|---|---|---|---|---|
| Percent Caucasian Teachers | | | | | |
| Between Grps. | 3[illegible].1054 | 1 | 365.1054 | 1.2419 | .273 |
| Within Grps. | 911[illegible].4370 | 31 | 293.9818 | | |
| Total | 9476.5424 | 32 | | | |
| Percent Age 36 or Less | | | | | |
| Between Grps. | 45.0783 | 1 | 45.0783 | .6057 | .442 |
| Within Grps. | 2307.2041 | 31 | 74.4259 | | |
| Total | 2352.2824 | 32 | | | |
| Percent Age 56 and Older | | | | | |
| Between Grps. | 273.0730 | 1 | 273.0730 | 7.8364 | .008* |
| Within Grps. | 1080.2494 | 31 | 34.8468 | | |
| Total | 1502.1956 | 32 | | | |
| Percent Other Teachers | | | | | |
| Between Grps. | .0071 | 1 | .0071 | .0009 | .976 |
| Within Grps. | 250.0153 | 31 | 8.0650 | | |
| Total | 250.0224 | 32 | | | |

* $p < .05$

In Table 22, the between and within group variations, the sum of squares, the degrees of freedom, mean squares, F ratio and F probability are presented for all three of the predictor variables. Percent of Teachers Age 56 and Older

was the only factor found to be significant at p = .008. None of the other Teacher-Related variables had F ratios which met the significance level.

The School-Related Institutional Variables were examined using one-way ANOVA as well. Table 23 shows the summary results of these analyses.

Table 23

Summary Results Using One-way ANOVA with School Climate as the Independent Variable and the School-Related Institutional Variables as the Dependent Variables

| SOURCE OF VARIATION | SUM OF SQUARES | DF | MEAN SQUARES | F RATIO | F PROB. |
|---|---|---|---|---|---|
| Total Number of Teachers in School | | | | | |
| Between Grps. | 1063.0482 | 1 | 1063.0482 | 5.2995 | .028* |
| Within Grps. | 6218.4669 | 31 | 200.5957 | | |
| Total | 7281.5151 | 32 | | | |
| Average Daily Absence of Students | | | | | |
| Between Grps. | 8.2788 | 1 | 8.2788 | 6.8372 | .013* |
| Within Grps. | 37.5363 | 31 | 1.2108 | | |
| Total | 45.8151 | 32 | | | |
| Number of Crisis Suspensions | | | | | |
| Between Grps. | 13.3373 | 1 | 13.3373 | 4.1498 | .050* |
| Within Grps. | 99.6324 | 31 | 3.2139 | | |
| Total | 112.9697 | 32 | | | |

* $p < .05$

The three school related factors which were identified as predictors of higher or lower school climate (Total Number of Teachers in School, Average Daily Absence of Students, and Number of Crisis Suspensions) were used as the dependent variables in each one-way ANOVA procedure while the School Climate Scores were used as the independent variables. Table 23 shows the summary results of these procedures, including the sum of squares, degrees of freedom, mean squares, R ratios and F probabilities for each analysis. The F Ratio of all three of the factors met the standard of the critical values table and were shown to be significant at the $p < .05$ level. The F probability scores for the three variables were: Total Number of Teachers in the School, $p = .028$, Average Daily Absence of Students, $p = .013$, and Number of Crisis Suspensions reported for the year, $p = .050$.

Recapping the findings from the previous procedures, the data demonstrated that seven of the eleven predictor variables of higher or lower climate schools were found to be significant at the $p < .05$ level on a univariate basis of analysis. These are identified in Table 24.

Table 24

Summary of Significant Input and Institutional Predictor Variables by Classification Type as Identified in Hypothesis 5

| PREDICTOR VARIABLE | F PROB. | CLASSIFICATION TYPE |
|---|---|---|
| Percent Chinese Students | .0394 | Input-Parent/Community |
| Creativity | .0137 | Institutional-Principal |
| Co-workers | .0151 | Institutional-Principal |
| Percent Age 56 and Older | .0338 | Institutional-Teacher |
| Total Teachers | .0282 | Institutional-School |
| Average Daily Absence | .0137 | Institutional-School |
| No. Crisis Suspensions | .0503 | Institutional-School |

In summary, of the two Input Parent/Community-Related variables identified as predictors using the multivariate analysis procedure of discriminant function analysis, only one, Percent of Chinese Students, was found to be statistically significant using the univariate analysis of one-way ANOVA. In terms of climate, the data indicated that higher climate schools had a higher percentage of Chinese students while lower climate schools had a lower percentage of Chinese students.

Six of the nine Institutional variables were identified as significant predictors. Two Principal-Related variables, Creativity (the chance to try my own methods of doing the job) and Co-workers (the way my co-workers get along with each other) were found to be significant. In terms of school climate, higher climate schools were found to have

principals with higher Creativity scores while the lower climate schools had principals with lower scores. In regards to the variable Co-workers, schools with principals with higher Co-worker scores had higher school climate while schools with principals with lower scores had lower school climates. The standardized canonical coefficient was .46752 for Creativity and .60876 for Co-workers.

Only one Teacher-Related variable, Percent of Teachers Age 56 and Older was identified as a significant indicator using the univariate statistic. Schools with a larger percent of teachers who were age 56 or older had higher climate scores while schools with a smaller percent of teachers who were age 56 or older had lower climate scores. The standard canonical coefficient was .86022.

Three School-Related factors, Total Number of Teachers in the School, Average Daily Absence of Students, and Number of Crisis Suspensions, were identified as significant determiners of higher or lower climate schools using the one-way ANOVA statistic. In terms of size and climate, schools with a larger number of teachers, were found to have lower climates while schools with a smaller number of teachers were found to have higher climates. In terms of student attendance, schools with higher student absence had lower school climate, while the schools with fewer student absences, had higher climates. The number of crisis suspensions reported during the year was also found to be an

indicator of school climate. The higher numbers reported for crisis suspensions, the higher climate of the schools predicted. The standard canonical coefficient for Total Number of Teachers was -.42880, for Average Daily Absence it was -1.15965 and for Crisis Suspensions it was .31648.

As a result of this data, Hypothesis 5 that "on a univariate basis, there is no significant difference in the values obtained for higher and lower climate schools for each of the variables identified as multiple classification predictors," was rejected.

Because one-way analysis of variance is based on the assumption that the scores in the groups being examined have approximately the same variance, a test for the assumption of equal variance was done using an option of the SPSSX "ONEWAY" program. Bartlett's Box F test was calculated to determine if there were any violations in homogeneity of variance in the eleven significant predictor variables. Of the seven variables which were determined to be significantly different, only one of the variables, the School-Related factor of Crisis Suspensions ($p = .000$) appeared to have a violation of homogeneity of variance. Consequently, the null hypothesis which notes that there is no homogeneity of variance between the two groups was rejected in this instance only. Because homogeneity of variance was found in the variable Crisis Suspension, caution is needed when examining this predictor.

## ANCILLARY QUESTION 1

In order to test the accuracy of the eleven identified predictor variables, the first ancillary question was posed. "Can the Input and Institutional predictor variables be used to accurately classify the seven unused schools of the sample into higher or lower climate groups?" Several options of the SPSSX program "DISCRIMINANT" were used to answer this question.

Table 1 on page 85 depicted the distribution of the climate scores of the 41 sample schools showing the value, frequency, cumulative percent and total percent of schools which were classified into one of three groups - lower, unclassified, or higher climate. The seven cases with scores ranging from 9.40 to 9.70 were not classified into either the lower or the higher group because they fell into the gray area between the two statistically significantly different groups. It was the purpose of this ancillary question to test the classification model on this group of schools which had not been previously classified.

Table 25 presents an excerpt from a SPSSX generated printout that lists classification information for each of the 41 schools in the sample.

## Table 25

## Classification Output of 41 Schools Using 11 Predictor Variables and Discriminant Function Analysis

| CASE SEQNUM | MIS VAL | SEL | ACTUAL GROUP | HIGHEST PROBABILITY GROUP | P(D/G) | P(G/D) | 2ND HIGHEST GROUP | P(G/D) | DISCRIMINANT SCORES... |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 2 | 2 | 0.8957 | 0.9995 | 1 | 0.0005 | 1.9405 |
| 2 | | | 2 | 2 | 0.9328 | 0.9998 | 1 | 0.0002 | 2.1560 |
| 3 | | | 1 | 1 | 0.3452 | 1.0000 | 2 | 0.0000 | -2.8936 |
| 4 | | | 1 | 1 | 0.1585 | 0.9180 | 2 | 0.0820 | -0.5397 |
| 5 | | | 2 | 2 | 0.0421 | 1.0000 | 1 | 0.0000 | 4.1045 |
| 7 | | | 2 ** | 1 | 0.1637 | 0.9231 | 2 | 0.0769 | -0.5570 |
| 8 | | | 2 | 2 | 0.5364 | 0.9963 | 1 | 0.0037 | 1.4533 |
| 9 | | | UNGRPD | 2 | 0.0231 | 1.0000 | 1 | 0.0000 | 4.3433 |
| 10 | | | 2 | 2 | 0.6306 | 0.9979 | 1 | 0.0021 | 1.5907 |
| 11 | | | 1 | 1 | 0.1279 | 0.8770 | 2 | 0.1230 | -0.4275 |
| 12 | | | 2 | 2 | 0.0524 | 1.0000 | 1 | 0.0000 | 4.0116 |
| 13 | | | 1 | 1 | 0.5529 | 0.9967 | 2 | 0.0033 | -1.3563 |
| 14 | | | 1 | 1 | 0.4875 | 1.0000 | 2 | 0.0000 | -2.6440 |
| 15 | | | 2 | 2 | 0.7000 | 0.9986 | 1 | 0.0014 | 1.6862 |
| 16 | | | 2 | 2 | 0.3619 | 0.9881 | 1 | 0.0119 | 1.1598 |
| 17 | | | 2 | 2 | 0.6054 | 1.0000 | 1 | 0.0000 | 2.5882 |
| 18 | | | 1 | 1 | 0.6932 | 0.9999 | 2 | 0.0001 | -2.3443 |
| 19 | | | 2 | 2 | 0.5482 | 0.9966 | 1 | 0.0034 | 1.4711 |
| 20 | | | 1 | 1 | 0.8192 | 0.9999 | 2 | 0.0001 | -2.1784 |
| 21 | | | UNGRPD | 2 | 0.4286 | 0.9926 | 1 | 0.0074 | 1.2801 |
| 22 | | | UNGRPD | 1 | 0.1178 | 0.8576 | 2 | 0.1424 | -0.3855 |
| 23 | | | 1 | 1 | 0.3212 | 1.0000 | 2 | 0.0000 | -2.9418 |
| 24 | | | 1 | 1 | 0.6006 | 0.9975 | 2 | 0.0025 | -1.4263 |
| 25 | | | 1 | 1 | 0.5052 | 0.9955 | 2 | 0.0045 | -1.2835 |
| 26 | | | 1 | 1 | 0.3506 | 1.0000 | 2 | 0.0000 | -2.8831 |
| 27 | | | UNGRPD | 2 | 0.2648 | 0.9734 | 1 | 0.0266 | 0.9566 |
| 28 | | | 2 | 2 | 0.8327 | 0.9999 | 1 | 0.0001 | 2.2829 |
| 29 | | | UNGRPD | 2 | 0.6050 | 0.9975 | 1 | 0.0025 | 1.5543 |
| 30 | | | 2 | 2 | 0.7055 | 0.9999 | 1 | 0.0001 | 2.4495 |
| 31 | | | 1 | 1 | 0.7245 | 0.9999 | 2 | 0.0001 | -2.3022 |
| 32 | | | 1 | 1 | 0.5751 | 1.0000 | 2 | 0.0000 | -2.5104 |
| 33 | | | 2 | 2 | 0.7065 | 0.9999 | 1 | 0.0001 | 2.4482 |
| 34 | | | 2 | 2 | 0.8401 | 0.9999 | 1 | 0.0001 | 2.2734 |
| 35 | | | UNGRPD | 1 | 0.2147 | 0.9567 | 2 | 0.0433 | -0.7091 |
| 36 | | | UNGRPD | 1 | 0.0652 | 0.6618 | 2 | 0.3382 | -0.1061 |
| 37 | | | 1 | 1 | 0.2586 | 1.0000 | 2 | 0.0000 | -3.0795 |
| 38 | | | 1 | 1 | 0.4733 | 1.0000 | 2 | 0.0000 | -2.6669 |
| 39 | | | 2 | 2 | 0.9877 | 0.9997 | 1 | 0.0003 | 2.0870 |
| 40 | | | 1 | 1 | 0.2031 | 0.9511 | 2 | 0.0489 | -0.6769 |
| 41 | | | 1 | 1 | 0.3380 | 0.9857 | 2 | 0.0143 | -0.9917 |

Using the predictor variables, which were tested in the fourth hypothesis, each case in Table 25 has been classified, into the group in which the posterior probability was the largest. That is, each case was assigned to the most likely group based on its discriminant score.[13]

It has been noted earlier that the discriminant function analysis statistic has two research objectives, analysis and classification. The analysis aspects of the technique have been utilized and discussed in the first four hypotheses. The classification capability of the statistic was used to answer the first ancillary question regarding the use of the predictor variables to accurately classify the seven previously unclassified schools.

In Table 25, the first column (labeled CASE SEQNUM) is the sequence number of the 41 cases in the file. The group into which a case really belongs, based on its climate score, is listed in the column labeled ACTUAL GROUP. The group with the largest posterior probability, which is an estimate of the likelihood of membership in a particular group, is denoted by P(G/D). The most likely group for a case, based on the discriminant analysis (the group with the largest posterior probability) is listed in the column labeled HIGHEST PROBABILITY.

A case is classified by the discriminant function statistic into its most likely group based on its discriminant score, which is presented in column five in the table. The 21 scores beginning with a minus were predicted to be the lower climate schools, while those with the positive sign were designated as the higher climate schools. There is one exception in case number 7 which was predicted to be a lower climate school but in actuality was a higher climate school. Such cases which are misclassified using the discriminant function analysis, are generally noted with asterisks next to the actual group number. Case 7 was the only case of the 41 which was classified incorrectly. Because only two groups are involved, both probabilities are given since one is the highest and other the second highest. Case number 1, with the probabilities .9995 and .0005 sum to 1.0 as in the subsequent cases, because in a two-group analysis, the portion of the probability which is not in one group, must be a member of the other group.

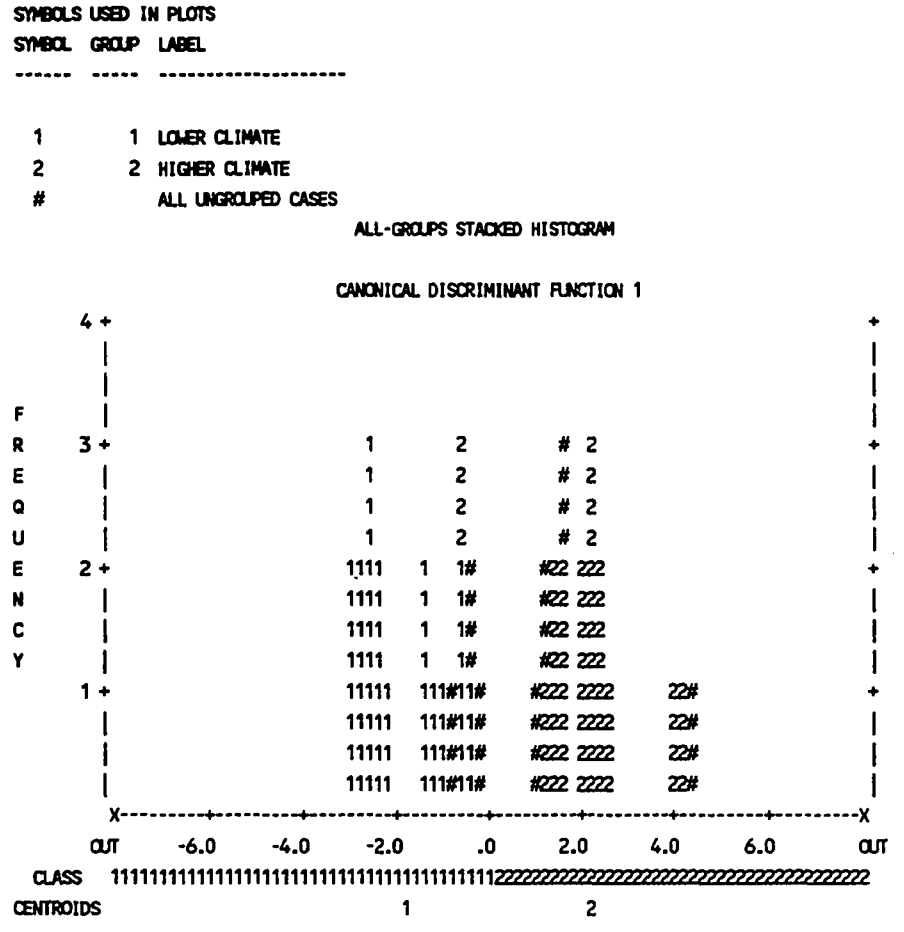
The question which is being addressed in this segment focuses on cases # 9, 21, 22, 27, 29, 35 and 36, which are identified as UNGRPD (ungrouped or unclassified) in the Actual Group, or column two. The discriminant scores have clearly placed all seven cases into designated Highest Probability and 2ND Highest Probability groups. Using the discriminant function statistic, cases 9, 21, 27 and 29 were

assigned to the higher climate group while cases # 22, 35 and 36 were placed into the group of lower climate schools. The actual means of the seven cases were 9.40 to 9.70. (See page 85.) Thus, all of the cases with the higher actual means were predicted to be in group 2 (higher climate). Likewise, all of the cases with the lower actual means were correctly classified.

To better conceptualize this classification function, a histogram of all of the 41 cases, the "All-Groups Stacked Histogram", canonical discriminant function is shown in Figure 3. Using four symbols per case, the lower climate schools are symbolized by the number 1, the higher climate schools are symbolized by the number 2, and the # marks the seven ungrouped cases. All seven of the previously ungrouped cases have been classified into a higher or lower climate group using the discriminant function. Based on their discriminant scores, three schools have been placed into the lower climate group while the other four schools have been placed into the higher climate group. The case which was misplaced into the higher climate group when it actually should have been in the lower climate group, is noticeable as the only number 2 in the group 1 section of the continuum range. The range of the discriminant scores for the lower climate schools was -3.0795 to .0 while the range of the scores for the higher climate group was .0 to 4.1045.

Figure 3

**All-Groups Stacked Histogram Showing Lower and Higher Climate Cases Using Canonical Discriminant Function**




In Table 26, a summary of the classification results of all of the 40 schools which were correctly classified is presented. The table shows, that of the 34 cases which were

initially grouped into lower or higher climate schools based on climate score means ranging from 6.80 to 9.30 (lower climate group) and 9.80 to 10.60 (higher group), all but one case was correctly grouped.

Table 26

Summary of Classification Results of Predictor Variables Using Discriminant Function Analysis

| Actual Group | No. of Cases | Predicted Group Membership Group 1 | Group 2 |
|---|---|---|---|
| Group 1 Lower Climate | 17 | 17<br>100.0% | 0<br>0.0% |
| Group 2 Higher Climate | 16 | 1<br>6.3% | 15<br>93.8% |
| Ungrouped | 7 | 3<br>42.9% | 4<br>57.1% |
| Total | 40 | | |

Percent of "grouped" cases correctly classified : 96.97

Percent of "ungrouped" cases correctly classified : 100.0%

Table 26 further shows that when the prediction model was tested on the seven cases which had been initially left unclassified because they fell between the two groups, all seven were correctly placed into either the lower or higher climate school groups. That is, four schools, or 57.1% were classified into the higher group based on their actual

climate scores and three schools, or 42.9%, were correctly predicted to be in the lower group.

Hence, the classification option of the SPSSX program "DISCRIMINANT" was used to affirmatively answer the question, "Can the Input and Institutional predictor variables be used to accurately classify the seven unused schools of the sample into higher and lower climate groups? Table 26 has presented the summary of the classification results of the 40 cases which were classified using the predictors which were identified. The findings from the analysis of the final ancillary question were discussed in the next section.

## ANCILLARY QUESTION 2

The final ancillary of this study concerned a two-part question, Can certain variables in combination be effective in the prediction of school climate, and if these combined variables can be identified, can an equation be generated, using these variables which may enable school authorities to predict climate based on the weights of the variables? Two separate sets of stepwise multiple regression analyses were run, first on school climate and all the eighty-eight variables, and secondly, on school climate and all of the variables minus the twenty-one Principal characteristics of the Minnesota Satisfaction Questionnaire. The latter statistic was employed because the MSQ data might not be

available for principals in all schools. It was, therefore, surmised that both approaches might provide prediction formulas which would be useful. Thus, schools with the MSQ data and schools with out it would both have a prediction formula which could be used to predict school climate, depending on what set of information was available in a particular school.

The basic prediction equation of the unstandardized regression model was used to develop an equation that summarizes the relationship between school climate and the independent variables in both of the runs. The formula,

$$Y' = A + B_1X_1 + B_2X_2 + . . . + B_kX_k$$

where Y' is the estimated value of the dependent variable, school climate, A is the Constant or the Y intercept, $B_1$ to $B_k$ are the unstandardized regression coefficients and where $X_1$ to $X_k$ are the independent variables, was utilized.[14]

In terms of the actual variables used to answer the second ancillary question, the formula consisted of the following:

**School Climate = 9.8684 + .1565 (Creativity)**
**- .3907 (Average Daily Absence)**
**- .1015 (Activity)**
**+ .0422 (Chinese Teachers)**
**+ .0272 (Teachers Age 35 or Less).**

In the first series, five stepwise Multiple Regression analyses were performed on the criterion or dependent variable, school climate scores, and all of the eighty-eight Input, Institutional and Output predictor variables, to ascertain the final set of predictors. SPSSX subprogram "REGRESSION" was used to calculate the data. Table 27 displays the summary of the findings of these procedures.

Table 27

Summary Table of Results from Stepwise Multiple Regression Analyses Indicating Prediction Equation for School Climate Using All Eighty-Eight Predictor Variables

| STEP | VARIABLE | MULT.R | R SQUARE | ST.ERR. | B | BETA |
|---|---|---|---|---|---|---|
| 1 | Creativ. | .4884 | .2385 | .6472 | .1565 | .6912 |
| 2 | Av.D.Abs. | .6410 | .4109 | .1723 | -.3907 | -.6173 |
| 3 | Activity | .7355 | .5409 | .1301 | -.1015 | -.4324 |
| 4 | % Chin.Tch. | .7727 | .5971 | .0561 | .0422 | .2978 |
| 5 | % Age <36 | .8150 | .6643 | .0672 | .0272 | .2957 |
| | (Constant) | | | | 9.8684 | |

In Table 27, the five steps which were required to produce the prediction equation, the variables which were identified as predictors, the multiple R, the R square changes, the standard error, the B and the Beta weights are presented.

As stepwise multiple regression was used, the first variable considered for entry into the equation, Creativity,

was the one with the largest positive or negative correlation with the dependent variable, school climate. From that point onward, the Creativity variable was examined to see whether it should be removed according to the removal criterion, or kept, as succeeding variables were entered or removed. After step 5, when no other variables met the entry and removal criteria, variable selection terminated. Following Creativity, Average Daily Absence, Activity, Percent of Chinese Teachers, and Percent of Teachers Age 35 or Younger were entered as predictor variables.

In the third column the Coefficient of Multiple Correlation (MULT.R), which provides an index of the accuracy of the prediction equation, is presented. The findings were as follows: Creativity (.4884), Average Daily Absence (.6410), Activity (.7355), Percent Chinese Teachers (.7727) and Percent of Teachers Age 35 or Younger (.8150).

The fourth column indicates the Square of the Coefficient of Multiple Correlation (R SQUARE) or the actual strength of the equation, in terms of the variance in the climate scores which was accounted for by knowledge of the predictor scores, as a whole and of each predictor singularly. The data indicated that together, the five variables accounted for 66.4 % of the total variance of the predictors of school climate. It further demonstrated that of that 66.4 %, Creativity accounted for about 24 % of the variance, Average Daily Absences accounted for about 17 %,

Activity accounted for about 13 %, Percent of Chinese Teachers accounted for about 5.6 %, and Percent of Teachers Age 35 or Younger accounted for about 6.7 % of the variance.

The Standard Error of Estimate and Prediction Accuracy (ST.ERR.) is shown in the next column. This statistic, which is the standard deviation of actual Y values from the predicted Y' values, indicates the amount of prediction error associated with the prediction. Thus, the data showed that all of the five predictor variables fell between .06 to .65 plus or minus 1 standard error of estimate units from the predicted values, which is well within the usual limits.[15]

In the sixth column, the Nonstandardized Regression Coefficient or the Y intercept (B), are displayed. These cannot be compared against one another to determine which variable is the best predictor as they do not have the same scale of measurement. However, they are very useful for creating a regression equation.

The Nonstandardized Regression Coefficients are weighted, or standardized using a conversion formula, into Beta Weights. These Beta Weights, or Standardized Regression Coefficients, are shown in the last column in Table 27. The Beta Weights identified the best predictors according to weight, ie. the largest weights, regardless of positive or negative sign, signify the strongest predictors. Thus, Creativity was identified as the best variable of the

five, with .6912, and Average Daily Absences, with a beta weight of -.6173, was a close second. Though Activity, which had a beta weight of -.4324, Percent of Chinese Teachers, with a beta weight of .2978, and Percent of Teachers Age 35 or Younger, which had a beta weight of .2957, qualified as significant contributors, they were considerably less strong as predictors than Creativity and Average Daily Absences.

With regards to the second calculation which was performed, that is, stepwise multiple regression on school climate and all of the variables minus the twenty-one MSQ principal characteristics, the findings were rather consistent. Three steps were used to identify a prediction equation consisting of three variables, Average Daily Absence, Crisis Suspension, and percent of Japanese students. Table 28 presents a summary table of these results.

Table 28

Summary Table of Results from Stepwise Multiple Regression Analyses Indicating Prediction Equation for School Climate Using All Predictors Except MSQ Variables

| STEP | VARIABLE | MULT. R | R SQUARE | ST.ERR. | B | BETA |
|---|---|---|---|---|---|---|
| 1 | Av.D.Abs. | .4422 | .1955 | .0934 | -.3540 | -.5593 |
| 2 | Cris.Susp. | .5603 | .3139 | .0568 | -.1788 | -.4256 |
| 3 | Jap.Studts. | .6285 | .3950 | .0119 | -.0261 | -.3362 |
| | (Constant) | | | | 11.8247 | |

The findings in Table 28 indicates that when the twenty-one MSQ principal characteristics were removed from the analysis, the prediction equation formula identified three negative contributors of school climate. These were Average Daily Absence, with a Multiple R or Coefficient of Multiple Correlation of .4422, Number of Crisis Suspensions, with a Multiple R of .5603 and Percent of Japanese Students, with a Multiple R of .6285. In this equation, the three variables were identified as accounting for nearly 39.5 percent of the prediction equation. Average Daily Absence and Crisis Suspensions proved to be important predictors in both equations.

Using the basic prediction equation of the unstandardized regression model cited earlier, the formula for the prediction of this statistic was,

**School Climate = 11.8257 - .3540 (Average Daily Absence)**
**- .1788 (Crisis Suspensions)**
**- .0261 (Percent of Japanese Students)**

The data from these findings have indicated, therefore, that the final ancillary question can indeed, be answered in the affirmative. Through a series of stepwise multiple regression analyses using all eighty-eight variables and school climate, the variables Creativity, Average Daily Absence, Activity, Percent of Chinese Teachers, and Percent

significant multiple predictors and a prediction equation was generated which could be used to determine school climate. When the same formula was utilized with the MSQ Principal characteristics omitted, Average Daily Absence, Number of Crisis Suspensions and Percent of Japanese Students were identified as predictors.

## SUMMARY OF FINDINGS

The purpose of Chapter IV was to present and explain the findings of this study. Five hypotheses and two ancillary questions were analyzed using a number of univariate and multivariate statistical procedures.

Hypotheses 1, 2 and 3 were formed to determine if a set of Input, Institutional and Output variables could be found that would produce a non chance classification of schools into either higher or lower climate. Stepwise discriminant function analyses were employed to test each of the hypotheses. In all, twenty-four Input and Institutional variables were found to be significant discriminators of higher or lower school climate.

Six Input variables, Percent of Chinese Students, Percent of Caucasian Students, Percent of Families with Federal Connections, Percent of Unemployed, Percent of Families on Public Assistance, and Percent of Single Parent Households were found to be able to classify schools into

Households were found to be able to classify schools into higher or higher or lower climate groups at the p = <.05 level of significance.

Eighteen Institutional variables of the sixty-seven being examined, were found to produce a non chance classification of schools into either higher or lower climate. Nine of these were the Principal-Related variables, Creativity, Authority, Ability Utilization, Compensation, Responsibility, Administrative Tenure, Female Principals, Co-workers and School Tenure. Of the fifteen Teacher-Related Institutional variables, six were found to be significant at the p = < .05 level of significance. These were Percent of Filipino Teachers, Percent of Caucasian Teachers, Percent of Other Teachers, Percent of Teachers Age 56 or Older, Percent of Teachers Age 35 or Younger and Percent of Teachers Age 46 to 55. Three School-Related Institutional variables were significant. These were Percent Average Daily Absence, Total Number of Teachers in the School, and Number of Crisis Suspensions. Only with Hypothesis 3, which was designed to examine whether a set of Output variables could be found which could discriminate higher and lower school climates, did the data fail to identify significant predictors. Hence, the null hypothesis was not rejected.

Hypothesis 4 examined the question, Can a set of multiple predictors be identified that can be used to

discriminate between higher or lower climate schools? The results identified eleven predictors which qualified as significant discriminators. These were Percent of Teachers Age 56 and Older, Creativity, Percent of Families with Federal Connections, Percent of Average Daily Absence, Percent of Teachers Age 35 or Younger, Percent of Chinese Students, Percent of Other Teachers, Co-workers, Total Number of Teachers, Percent of Caucasian Teachers, and Number of Crisis Suspensions. Of these, Percent of Teachers Age 56 or Older, Percent of Teachers Age 35 or Younger, Percent Caucasian Teachers, Percent Chinese Students, Creativity, Co-workers, and Number of Crisis Suspensions were indicators of higher school climate. Percent of families with Federal Connections, Average Daily Absence, Percent Other Teachers and Total Number of Teachers were identified as indicators of lower school climate.

With this set of eleven significant discriminators, Hypothesis 5 was formulated to test whether, on a univariate basis, there was a significant difference in the values obtained for higher and lower climate schools for each of the variables identified as multiple classification predictors. Through the use of One-way Analysis of Variance seven significant Input and Institutional predictor variables were identified. These were Percent of Chinese Students, Creativity, Co-workers, Percent of Teachers Age 56 and Older and Number of Crisis Suspensions which were

identified as contributors of higher school climates and Total Number of Teachers, and Average Daily Absence, which were identified as contributors of lower climate in schools. In a test for homogeneity of variance, Number of Crisis Suspensions, was identified as having a violation. Thus, caution was advised in making conclusions about this variable.

Two ancillary questions were examined in Chapter IV. Discriminant function analysis was employed to test the classification model on the seven unused cases which fell between the higher and lower climate groups. All seven were correctly classified using the classification model.

Finally, the question concerning the generation of a prediction equation for potentially higher climate situations was affirmatively answered with the identification of five Institutional variables, Creativity, Activity, Average Daily Absence, Percent of Chinese Teachers and Percent of Teachers Age 35 or Younger, which account for 66.4 percent of the variance between higher and lower climate schools. When the MSQ Principal characteristics were deleted as predictor variables, Average Daily Absences, Number of Crisis Suspensions and Percent of Japanese Students were identified as negative contributors of higher climates and were found to account for 39.5 percent of the prediction formula.

## NOTES FOR CHAPTER IV

1.Department of Education, Title 8, Chapter 19 Public Schools, "Student Misconduct, Discipline, School Searches and Seizures, Reporting Offenses, Police Interviews and Arrests, and Restitution for Vandalism and Negligence," 8-19-7, RS 86-0208, (August 1986) 3 and 10.

2.Ibid., 8-19-8, 6 and 11.

3.Ibid., 8-19-6, 8-9.

4.William R. Klecka, Discriminant Analysis. (Beverly Hills, CA: Sage Publications, 1980)) 57-58.

5.Norman H. Nie, C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner and Dale H. Bent, SPSS, Statistical Package for the Social Sciences, 2d ed, (New York: McGraw-Hill Book Company, 1975) 442.

6.SPSS Advanced Statistics, 79.

7.Nie, et al., 443-444.

8.Ibid., 442.

9.Ibid.

10.Klecka, 57.

11.Ibid., 36-38.

12.Schuyler W. Huck, William H. Cormier and William G Bounds, Jr., Reading Statistics and Research, (New York: Harper & Row, Publishers, 1974) 58.

13.SPSSX Advanced Statistics, 83.

14.Nie, et al., 325-326.

# CHAPTER V

## SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

**"The way to improve education is through a healthy environment at each school."**

**--John Goodlad, 1986**

In this final chapter, a summary of the preceding chapters is provided. Conclusions drawn from an analysis of the findings are related, and recommendations for further study are advanced.

### SUMMARY OF CHAPTER I

"Climate" is an important construct which has been identified as being highly correlated to schools which are effective. It has been described as an elusive term which is imprecise because it is based on impression and perception; yet, it has been the focus of hundreds of research studies and has been recognized as a "tremendous mediating factor" on the end products of the place called school. Climate may be viewed as an enduring feature or characteristic of a particular school which influences the behavior of its students, faculty and administrators and

distinguishes it from other schools, on the one hand, and as the "feel" or "personality" which is generated within its campus and among its stakeholders, on the other. It is, in fact, the entire milieu of opinions, norms, expectations, beliefs, practices, conditions, and events which operate within the school that affect the way groups feel about and toward the institution. Consequently, school climate is an important concept.

Though school climate and its many models, theories, methodologies, and related factors have been studied widely throughout the world, and within the United States, very few empirical studies have been done in Hawaii. A study of the effects of a large number of variables, extracted from data from Department of Education files, on school climate would add to the pool of educational research available to school based, district level and state office educators of Hawaii. This would be especially beneficial because of the uniqueness of Hawaii's single public school district with its relatively homogeneous population of teachers and administrators, standardized selection and training procedure for prospective administrators, low turnover of personnel, and fairly standard facilities and resources.

Are there factors that influence the climate of elementary schools in Hawaii? Is it possible to identify variables that are able to differentiate higher and lower climate in schools? Are there combinations of factors which

can predict school climate? Can a prediction equation be found to include those variables which may determine with some degree of accuracy, schools in Hawaii that will be likely to have higher or lower climate? These questions were posed in this study.

The theoretical basis of this study was the Getzels and Guba Social Systems model which conceptualizes an organization as having two independent but interrelated dimensions, the idiographic or personal aspect and the nomothetic, or institutional dimension. Downey adapted and applied the Getzels and Guba model to the school, as a formal social system with climate as a central factor within its structure. He noted that group norms and the social climate of the school influence the process of education. School climate is seen as an aspect within the system along with the values, ethos, culture, limitations, resources, and social environment, (including the organizational structure, the students, and the staff) all of which impose on and interact with the process.

Five hypotheses and two ancillaries were tested.

1. There is no discrete set of Input variables that will produce a non-chance classification of schools into either higher or lower climate.

2. There is no discrete set of Institutional variables that will produce a non-chance classification of schools into either higher or lower climate.

3. There is no discrete set of Output variables that will produce a non-chance classification of schools into either higher or lower climate.

4. There is no discrete set of multiple predictors from Input, Institutional and Output variables that can be used to discriminate between higher and lower climate schools.

5. On a univariate basis, there is no significant difference in the values obtained for higher and lower climate schools for each of the variables identified as multiple classification predictors.

Two ancillary questions were also examined.

1. Could the seven schools in the sample which were not used in the first run be tested using the predictor variables to ascertain the accuracy of the model in discriminating potentially higher and lower climate schools?

2. Could an equation be generated to include the variables which may predict potentially higher climate situations?

A number of key operational terms relating to the study, such as school climate scores, input variables, institutional variables, and output variables were clarified. Finally, limitations of the non-randomly selected sample and the assumption that school climates do not change markedly or quickly were noted.

## SUMMARY OF CHAPTER II

The literature on school climate abounds with definitions for the construct stemming back thirty-five years from the time when industrial behaviorists such as Halpin and Croft first identified climate as the "personality" of the work place. As the theories and practices of the business world began to impact on the academic scene and the field of educational administration gained its own recognition and credibility, "organizational climate" became "school climate" and instruments were created to examine and identify climate in the school setting just as they had been designed for the factory or the office and the work place.

Though many other definitions may be found, this study uses Kelley's denotation of school climate as,

> **"prevailing or normative conditions which are relatively enduring over time and which can be used to distinguish one environment from another. Climate conditions, as perceived by persons who work within or know a particular environment, serve as the basis for establishing expectations and interpreting events or activities which occur within that environment."**[1]

In this context, school climate is a function of an individual's personality, physical abilities, need-dispositions, attitudes, and beliefs (idiographic dimension variables) and the norms, roles, and expected behaviors

(nomothetic dimension variables) of society and the school, as depicted in the Getzels and Guba Social System model.

A number of methodologies have been employed in the study of school climate including experimental studies, both longitudinal and short term, surveying and interviewing techniques, and documentary research utilizing demographics. Hundreds of studies have scrutinized nearly every aspect of the school, including its facilities, resources, personnel, students, administration, neighborhoods, etc. in relation to school climate.

Regarding student-related variables, some studies, but not all, have been able to ascertain a relationship of school climate to student achievement or reading scores, and personal background such as race, sex, age, or socio-economic status. The literature also contains a number of studies which have measured the affects of teacher-related variables such as staff attitudes or demographic characteristics (sex, age, race, experience, or level of education) on climate. Climate has been found to be significantly related to positive attitudes among teachers and age, sex and experience.

Regarding studies using parent/community related variables, the results from the Phi Delta Kappa studies indicated that high levels of parent contact with the school and parental involvement with school activities were positively related to achievement. Other findings indicated

that high- and low-achievement schools differed on climate when climate composition and community were controlled. Teacher perception of parent support and parent conferences accounted for significant portions of the variance in all parent involvement outcomes in the Hoover-Dempsey, et al. study of over a thousand teachers.

In studies which involve principal-related variables, strong leadership was generally found to be positively related to climate. School size, cost per pupil, student-teacher ratio, salaries and other school-related variables have also been studied extensively in relation to climate. While climate has been found to be related to school size, such as the finding that large schools tended to be more "closed", in general, the results of school-related variables show little or no correlation between school facilities or resources and climate.

A review of the literature on research studies which have utilized the CFK Ltd., School Climate Assessment Scale indicated that the instrument has been used by school districts in every state since its development in 1973. The findings of two recent empirical studies which used the CFK Ltd. survey were reviewed.

## SUMMARY OF CHAPTER III

The population to which this study sought to generalize consisted of the 121 elementary schools in six of the public school districts in the state of Hawaii. In the spring of 1987, the CFK Ltd., School Climate Assessment Scale was administered in three of the public school districts. The study utilized a purposive sample of 41 elementary schools, out of a total of 52 who had participated in the climate survey. These particular 41 schools were included in the sample because the same principal was the administrator at the school at the time the survey was conducted and in the following school year, 1987-88. For consistency, the data which were collected for this study, consisting of eighty-eight parent/community-related, teacher-related, principal-related, school-related, and student-related variables, also consisted of information contained in DOE files on the sample schools for the 1987-88 school year.

The three districts in the sample were described in terms of type of area, suburban or rural, school enrollment, grade configuration, and number of instructional staff. Chi square analysis was performed to compare the 41 sample schools with the 121 schools in the six district population to which this study sought to generalize. The findings verified that there were no significant differences in comparing the three sample districts with their respective populations except in two areas which were noted.

The criterion variable in the study, School Climate Scores, were derived by totaling the mean scores on the CFK Ltd. School Climate Assessment Scale of three stakeholder groups (the parent/community, teachers, and classified staff) within each school. These produced mean School Climate Scores ranging from a low of 6.80 to a high of 10.60.

The eighty-eight predictor variables were selected after a large list of possible variables were generated. Because of the large number, it was decided to classify the factors into an input-output Ecological model in which the variables would be categorized into five groups. One group consisted of 15 Input variables, the parent/community-related variables, which consist of those characteristics which students bring with them upon entering the school system. The characteristics which are directly associated with the schooling process and system, the Institutional variables, were divided into three groups which included 15 teacher-related variables, 36 principal-related variables, and 16 school-related variables. The fifth group consisted of the Output variables which may be considered as the products of the Input and Institutional variables in the school system. These consisted of 6 student achievement-related variables.

The data on the criterion variable were derived from the CFK, Ltd., School Climate Assessment Scale scores. With

the exception of the information on the scores of the principals on the Minnesota Satisfaction Questionnaire, all of the data regarding the predictor variables were gathered from existing files found in various locations of the DOE Department of Information System Services.

This study utilized a criterion-group ex post facto design in which the two criterion groups were identified as higher and lower climate schools. The purpose of the study was 1) to ascertain the relationship between the 88 predictor variables and higher and lower climate schools, 2) to determine if statistical differences existed between the mean scores of variables which may have been identified as differentiators of higher and lower climate schools, 3) to discover if there was a combination of variables which would predict school climate. If this combination were found, then a prediction equation would have been derived.

In order to obtain a general picture of the independent variables, descriptive data was generated on each of the 88 variables. This included information such as the mean, standard error, standard deviation, and the minimum and maximum range. To determine the range of scores for higher and for lower climate schools, a frequency distribution was run of the 41 climate scores. From the frequency distribution, three clusters of scores were delineated: a higher climate group, a lower climate group, and a group of seven schools which were titled Unclassified. This latter

group was later used to test the classification equation. The higher and lower climate groups each contained seventeen schools. To determine if the two groups represented different populations, a t-test of means was performed. The results indicated that the groups differentiated beyond the $p = < .05$ level.

Next, a series of stepwise discriminant function analyses were performed to test the first four hypotheses and to accomplish three tasks: 1) to identify those variables which could differentiate or classify the cases into higher and lower climate schools, 2) to determine the relative strength or importance of those variables which were able to classify the cases into higher and lower climate schools, and 3) to evaluate the accuracy of the classification.

The univariate statistic, one-way analysis of variance was employed to determine if statistically significant differences existed between the higher climate and lower climate groups and each of the eleven predictor variables which had been identified in the previous analyses as discriminating variables. Of the original eleven, seven variables were found to have statistical significance. To test for violations in homogeneity of variance, Bartlett's Box F test was utilized.

Two ancillary questions were posed. Stepwise discriminant function analysis was used to examine the

first ancillary regarding the accuracy of the predictor variables in classifying schools into higher or lower climate. Consequently, the predictors were used in classifying the schools which had originally been left unclassified because they had climate scores which fell between the cut-off points of the delineated higher and lower climate groups.

The second ancillary question was, Can certain variables in combination predict school climate and can a prediction equation be generated for school climate? A series of stepwise multiple regression analyses were used to identify the best linear prediction equation and evaluate its prediction accuracy, to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables, and to find structural relations and provide explanations for the multivariate relationships.

## SUMMARY OF CHAPTER IV

The criterion variable, the school climate scores of the 41 schools, were arranged from lowest to highest by use of a frequency distribution and were used to divide the sample into three groups. The lower climate group had mean scores ranging from 6.80 to 9.30, and the higher climate group had mean scores ranging from 9.80 to 10.60. When tested, the two groups differed significantly. (See pages

85 and 86.) The remaining seven cases, with scores between 9.30 and 9.80, formed a third group that subsequently was used to test the discriminant function model.

Descriptive statistics were run on each of the eighty-eight independent variables and they were described statistically in categories in regards to mean, standard deviation and minimum/maximum ranges. The results were related in tables and reviewed as Input, Institutional and Output variables.

Some of the more interesting descriptive statistics among the fourteen Parent/Community-related variables were those associated with student ethnicity. The minimum and maximum ranges for Percent of Japanese Students was .6% to 41.2%, with a mean of 12.%. With the variable, Percent Caucasian Students, the range was 2.6% to 67.6%, with a mean of 23.8%. Percent of Families with Federal Connections, which had a mean of 19.3%, had scores which ranged from 3.3% to 99.6%. Percent Unemployed was another variable in which differences in the range were quite noticeable, with a mean of 5.3%, and scores ranging from 1.2% to 15.1%.

The descriptive information on the sixty-seven Institutional variables was broken into three categories: 36 Principal-related, 15 Teacher-related, and 16 School-related variables. Of the Principal-related variables, Creativity (The chance to try my own methods of doing the job.) had a mean score of 20.0, while the scores ranged from

12.0 to 25.00. The variables, Activity (Being able to keep busy all the time.) and Co-workers (The way my co-workers get along with each other.), had similar statistics. The mean for Activity was 20.5 and the scores ranged from 15.0 to 25.0. While the mean score for Co-workers was 19.0, the range for the variable was 10.0 to 25.0.

Descriptions of the Teacher-related Institutional variables included statistics on Teacher Ethnicity, Years of Service, and Age. Of note were the statistics in regard to the Percent of Chinese and Percent of Caucasian Teachers. Chinese teachers had a mean of 4.6%, and ranges of zero to 20.0%. On the other hand, Caucasian Teachers had a mean of 23.0%, and had a range of from zero to 87.0%. With regard to the variables related to age, Percent of Teachers Age 35 or Less, had a mean of 17.3%, and a range of from zero to 37.5%. At the other end of the age spectrum, the variable, Percent of Teachers Age 56 or Older had a mean of 11.4%, and a range of from zero to 28.6%.

The third category of Institutional predictors, School-related variables, also included some noteworthy statistics. The variable, Student Average Daily Absence, had a mean of 5.3 days, and a range of from 3.1 to 8.1 days. Another important variable, Number of Crisis Suspensions had a mean of .8. While some of the schools had no suspensions, others had as many as 8 during the year. The variable, Total Number of Teachers, which indirectly concerns school size,

had a mean of 30.4. Of the sample, the smallest school had 7 teachers, and the largest had 77 teachers.

The Output variables consisted of Stanford Achievement Test scores in Mathematics and Reading for the sixth grade in three levels, Percent Above Average, Percent Average, and Percent Below Average. As none of the six predictors proved to be statistically significant, there was no need to discuss them further.

Three preliminary hypotheses were examined, the results of which were used to test Hypothesis 4. Hypothesis 1 was derived to determine if a set of Input (Parent/Community-Related) variables could be found that would produce a non chance classification of schools into either higher or lower climate. Six predictors variables were identified by using stepwise discriminant function analysis. Three had positive canonical coefficients. These were: Percent Caucasian Students, Percent of Families on Public Assistance, and Percent Chinese Students. Three produced negative correlations to school climate. These were: Percent of Families Unemployed, Percent of Families with Federal Connections, and Percent of Single Family Households.

The eigenvalue for this run of the Input discriminators was .60493. Of the thirty-four cases, 79.4 percent or twenty-seven cases were correctly classified into higher or lower groups of school climate based on this set of predictor variables.

The second hypothesis examined the question, Is there a set of Institutional variables that will produce a non chance classification of schools into either higher or lower climates? Nine predictor Institutional variables were identified. These were six MSQ job satisfaction reinforcers--Ability Utilization (The chance to do something that makes use of my abilities), Authority (The chance to tell other people what to do.), Compensation (My pay and the amount of work I do.), Co-workers (The way my co-workers get along with each other.), Creativity (The chance to try my own methods of doing the job.) and Responsibility (The freedom to use my own judgment.) and three demographic principal variables--Administrative Tenure, Female Principals, and School Tenure.

A substantial eigenvalue of .92165 was derived from the seven discriminant function analysis runs of the first group of Principal variables (see page 117) and a relatively weak eigenvalue of.32456, was found for the run of the second group of Principal variables (see page 122). Using these discriminators, 82.4 percent of the cases were correctly classified into higher or lower climate groups while 17.6 percent were incorrectly classified.

Upon examining the Teacher-related factors, six discriminators were found. These were, Percent of Caucasian Teachers, Percent of Teachers Age 56 and Older, Percent of Filipino Teachers, Percent of Teachers Age 35-45, Percent of

Teachers Age 46-55, and Percent of Other Teachers. The eigenvalue for this set of discriminant function analysis runs was a relatively robust .95603.

A final set of Institutional variables, those which are associated with the school itself, were identified using stepwise discriminant function analyses. These were Total Number of Teachers, Student Average Daily Absence, and Number of Crisis Suspensions. The eigenvalue was .52276. (See page 130.) Of the cases, 70.6 percent were correctly classified using these discriminator variables.

Hence, as a result of the findings in which eighteen Institutional variables were identified as predictors, the null hypothesis, that there is no discrete set of Institutional variables that will produce a non chance classification of schools into either higher or lower climate was rejected.

In the examination of Hypothesis 3, the null hypothesis that there is no discrete set of Output variables which would produce a non chance classification of schools into either higher or lower climate was not rejected. No set of Output variables could be found which met the significance criteria.

Hypothesis 4 examined the question, Can a set of multiple predictors be identified that can be used to discriminate between higher and lower climate schools. All of the twenty-four Input and Institutional variables which

were examined in a series of stepwise discriminant function analyses to ascertain this answer.

Results identified a set of eleven predictors which qualified as significant canonical correlations. Seven of these variables predicted classification into the higher climate group. These were, by order of the strength of the variable to the discriminant function, Teachers Age 35 or Younger (1.09510), Percent of Chinese Students (.88107), Percent of Teachers Age 56 or Older (.86022), Co-workers (.60876), Percent of Caucasian Teachers (.49828), Creativity (.46752), and Number of Crisis Suspensions (.31648). The variables which produced results with negative relationships were Families with Federal Connections (-1.53391), Average Daily Absence (-1.15965), Percent Other Teachers (-.50705), and Total Number of Teachers (-.42880). Hence, these four predictors were related to the schools with lower climate scores.

The eigenvalue for this culminating run was a robust 4.29928. Classification results were also very strong as 96.97 of the cases were correctly classified into higher or lower school climate based on these discriminators. Therefore, these findings resulted in the rejection of Hypothesis 4, that there is no discrete set of multiple predictors that can be used to discriminate between higher and lower climate schools.

Having identified this set of eleven significant discriminators of higher and lower climate, the final hypothesis was tested. Hypothesis 5 stated, On a univariate basis, there is no significant difference in the values obtained for higher and lower climate schools for each of the variables identified as multiple classification predictors. One-way analysis of variance was employed to test this hypothesis. Seven significant Input and Institutional predictor variables were identified.

With regard to parent/community factors, results indicated that there was a significant difference in climate between schools with a higher percentage of Chinese Students, than those with a lower percentage. Higher climate schools were found to have principals with significantly higher Creativity scores. Significant differences were also found on the subscale, Co-worker. A factor related to teachers was also identified by means of this one-way analysis of variance. Schools with a larger percent of teachers who were Age 56 or Older had significantly different higher climate scores. Three school-related factors were identified as significant determiners of higher or lower climate as well. In terms of size of staff and climate, schools with a larger number of teachers, were found to have significantly different and lower school climates. With regard to attendance, Average

Daily Absence was identified as a negative contributor of school climate. There was a significant difference in climate in schools with higher student absence.

An unusual finding resulted in regards to the Number of Crisis Suspensions. There was a significant difference in climate between schools with higher numbers of reported crisis suspensions. That is, the higher climate was related to Number of Crisis Suspensions with a standard canonical coefficient of .31648. However, in testing for homogeneity of variance in these seven variables using Bartlett's Box F statistic, results indicated only one variable, Number of Crisis Suspensions, which was identified as having a violation of homogeneity of variance. Consequently, caution should be taken when making conclusions about this variable.

Two related questions were also examined in relation to these hypotheses. Ancillary Question 1 was asked to determine whether the eleven identified discriminators could be used to accurately classify the seven schools which were included in the Unclassified group of climate scores into higher or lower climate groups. (See pages 85 and 153.) Stepwise discriminant function analysis was used to test the accuracy of the classification model. The results showed that 100 percent of the schools with school climate scores ranging between the higher and lower climate groups, could be correctly classified by using the classification model.

The final ancillary question concerned the problem of

whether an equation could be generated from the predictor variables which would predict the climate scores of other elementary schools in Hawaii. The data indicated that this was indeed possible. Using stepwise multiple regression analyses, a prediction equation was generated which included five Institutional variables. These were two Principal-Related Institutional variables, Creativity and Activity, (which predicted 24 percent and 13 percent of the variance respectively), one School-Related Institutional variable, Average Daily Absence, (which accounted for 17 percent of the variance), and two Teacher-Related Institutional variables, Percent of Chinese Teachers and Percent of Teachers Age 35 or Younger, (which accounted for about 5.6 percent and 6.7 percent of the variance respectively). These five variables were determined to account for a very respectable total of 66.4 percent of the total variance in scores between the higher and lower climate groups.

In a second stepwise multiple regression analysis, the principal's 21 Minnesota Satisfaction Questionnaire variables were eliminated, while the other 67 predictor variables were run with school climate scores. This second statistical analysis was employed because the principal's MSQ scores may not readily be available in all schools. In this run, a prediction equation identified Average Daily Absence (.19.6 percent), Number of Crisis Suspensions (.11.8 percent), and Percent Japanese Students (8.1 percent), as

negative contributors to school climate. In this equation, these three variables accounted for 39.5 percent of the weight of the prediction equation.

## CONCLUSIONS AND IMPLICATIONS

Several questions were posed in the form of five hypotheses and two ancillary questions in this study. From the statistical analyses used in examining these questions, several conclusions may be formulated.

First, there are factors which can discriminate school climate in elementary schools in Hawaii and these factors may be identified by use of a the discriminant function analysis statistical technique. A set of eleven Input and Institutional factors were identified as statistically significant discriminators of higher or lower school climate by using the stepwise discriminant function analysis procedure. The resulting eigenvalue of 4.29928 demonstrated that the strength of the discriminators was very substantial and the correct classification of 96.97 percent of the total number of cases into climate groups illustrated the accuracy of the model.

Consequently, this discriminant function model is a powerful tool for describing the multiple relationship between variables that are related to climate. This tool has revealed some specific aspects of the place called school which has brought us closer to being able to identify

the roots of the construct of climate. It is a first step toward focusing on structured aspects in schools which influence climate other than the more general statements often found in the research.

Secondly, the model utilized a large number of easily attainable demographic variables which are readily available in schools all over the United States. Therefore, replication of the process and statistical analyses performed on these variables, would not be difficult.

Next, the results of the study indicated that the Output variables, the Student Achievement-related factors, were not significant predictors of school climate, nor were they correlated with any of the predictor variables. In the six districts to which this study sought to generalize, academic success, or the lack thereof, does not appear to have a major impact on the perception of groups on the climate of the school. This challenges a number of findings in the literature which have attributed positive school climate to high student achievement scores. It is particularly interesting since the teachers were a prominent part of the response set of the CFK, Ltd. School Climate Assessment scale.

Another conclusion borne out by this study relates to the failure of the usual predictors of school climate to be identified as significant discriminators. Per Pupil Expenditure, Compensation, Principal's Administrative

Tenure, Median Family Income, Number of Sick-Leave Days Taken by Teachers and Percent of Student Transiency have been identified in a number of studies as indicators of lower school climate. These factors were not found to be significant variables which relate to either lower or higher climate in this study.

Of the five variables identified in the prediction equation, the MSQ principal-related variables of Creativity (The chance to try my own methods.) and Activity (Being able to keep busy all the time.), were found to contribute 37 percent of the weight of the equation. It is noteworthy that this finding reinforces the Kenworthy study in which Creativity and Activity were the only factors found to be significant predictors of school climate. (See page 46.) The importance of these factors in particular, were dramatically shown in the first stepwise multiple regression run when the twenty-one Minnesota Satisfaction Questionnaire scores were included with all of the predictor variables for the purpose of finding a prediction equation for school climate. With the MSQ factors included, the equation was able to account for 66.4 percent of the prediction contribution. When these twenty-one job satisfaction scores of the principals were eliminated, the strength of the equation dropped to 39.5 percent. Thus, it can be concluded that the MSQ factors appear to be important

indicators of school climate as they add greatly to the strength of the prediction equation.

Other results of the multiple regression analyses proved to be notable. Two teacher-related factors were identified in the prediction equation which included the MSQ factors. These were Percent of Chinese Teachers, which was determined to contribute 5.6 percent, and Percent of Teachers Age 35 or Less, which responsible for 6.7 percent of the contribution. Together these variables were found to contribute about 12 percent of the total contribution of 66.4 percent which the prediction equation was able to correctly identify.

The descriptive statistics of the two variables was as follows. The mean for Percent of Chinese Teachers was 4.6 percent, with a minimum range of zero and a maximum of 20.0 percent. The standard deviation was 5.155. The mean for Percent of Teachers Age 35 and Less was 17.3 percent while the range was zero to 37.5 percent. The standard deviation was 8.437. It is interesting to note that in both variables the ranges differed greatly, yet, the two factors were found to be related to higher climate. Thus, it may be concluded from the data that in schools where there are a larger percent of Chinese teachers and a larger percent of relatively young teachers, climate is higher. Attempts to ascertain the causal aspects of these findings would be an interesting question to address in another study.

Finally, Average Daily Absence was found to be an important negative predictor variable in both prediction equations which were generated. While it would be expected that there might be lower school climate in schools where student attendance is very poor, the descriptive data on Average Daily Absence showed that the mean for the sample was 5.3 days and the range was from 3.1 to 8 days of absence. The standard deviation was 1.195. Yet, these numbers are not excessive. It may be concluded then, that even though Number of Average Daily Absences may be relatively small in a school, it is an important factor which is closely related to lower climate. An administrator would do well to keep accurate records and a watchful eye on trends of growing absence in a school.

## IMPLICATIONS AND RECOMMENDATIONS FOR FURTHER STUDY

The following recommendations are presented as insights and ideas which were developed as the researcher collected the data for and conducted this study. It is hoped that ideas from these suggestions might be adopted by others who are attempting scholarly studies in related areas.

The Department of Education has a wealth of data stored in a number of places under the auspices of the Department of Information Systems Services and other areas. It is recommended that these files and data banks be consolidated

into one unit, with a central file index of the contents of the data. This would permit better access to researchers who seek to study various phenomena and effects which these data provide.

The Minnesota Satisfaction Questionnaire was shown to be a good indicator of school climate where principals perceptions are concerned. Therefore, schools which are planning to use the prediction equation found in this study should also seriously consider the use of this instrument in conjunction with the equation. The data from the instrument boosted the strength of the prediction equation from accounting for 39.5 percent to 66.4 percent of the weight of the variables which may be attributable to school climate.

Number of Crisis Suspensions appears to be a significant predictor and discriminator of school climate which was categorized as a school related variable in this study. Initially, it was identified as a positive contributor of school climate, though a test of homogeneity of variance found the variable to have violations. In the final regression analysis, however, Number of Crisis Suspensions was identified as a negative contributor to higher climate. The mean for this variable was .8, while the range was zero to 8 Crisis Suspensions in a year. The standard deviation was 1.742. Thus, it can be seen that the numbers in the sample were small. Yet, the variable has demonstrated that it is a significant predictor of school

climate. It would appear that this variable can be a useful tool in ascertaining school climate and that schools need to accurately collect and report data on the variable.

It was not until 1986, with the adoption of the Department of Education code, Title 8, Chapter 19 , that reporting of this information was mandated. Yet, data on this variable may be under reported because an administrator may believe it indicates failure to correct school-related problems. Consequently, schools should be made aware of the strength of this variable as a predictor and care should be taken to keep accurate records of these data.

Related to this recommendation is a concern regarding who really is responsible for crisis suspensions. Is a crisis suspension, a parent/community or a school variable? An interesting study might look at the crime statistics, average income level, unemployment rate, and other indicators of poor social adjustment within a neighborhood to ascertain if there is a relationship between school climate, crisis suspension and these parent/community variables. If the principal has no real control over crisis suspensions because the students who are suspended are a product of their homes and communities rather than the school itself, and if this were realized by the supervisors of the principals, the problem of the under reporting of crisis suspensions might be corrected.

What are the implications of the findings relative to various ethnic groups? A follow up study might examine the relationship between higher school climates and greater or lesser percentages of Chinese, Caucasian, or other ethnic groups of teachers and students.

Finally, it is recommended that a walk-through or campus visit of each of the sample schools be conducted to corroborate whether the forty schools were correctly classified as lower or higher climate institutions. As climate is a "feeling" or visible phenomena which purveys the environment or setting in which individuals spend their time, an experienced researcher who is familiar with lower and higher climate types, may be able to discern or identify examples of each as he or she canvasses a schools' physical plant, in the same manner as a member of an accreditation team does when making an on-site school visit.

## NOTES FOR CHAPTER V

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