AN ETHNOGRAPHIC STUDY OF THE INTERRELATIONSHIP OF COMMUNITY COLLEGE TEACHERS AND STUDENTS IN A LABORATORY SETTING

By

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ABSTRACT

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The college science laboratory offers a unique opportunity for instructors to interact with students in a variety of ways; however, few studies have analyzed the complex social encounter that occurs in this important instructional setting. The purpose of the study was twofold--to describe and analyze the factors that shape the dynamics of the face-to-face interaction between teacher-student(s) in the community college laboratory and then to develop a descriptive model of teacher-student interaction in that setting. To accomplish this, the study examined the key factors of teacher role and leadership-management patterns as they naturally occur in the laboratory classrooms of three experienced community college instructors.

In this study, to examine what was happening in lab, ethnographic methods were used to look at teacher-student interaction in terms of a grounded analytical model. Qualitative research methods included participant observation, field notes, surveys, interviews, videotape of laboratory sessions, and review of college and course documents. The data provided a rich description of what was happening in lab but also an understanding of the broader context in which

the social event is rooted. Throughout the year-long study, field work focused on meaningful patterns of interaction jointly produced and interpreted by the instructors and their students.

Interaction in the laboratory is not an accident, but a complex social encounter. In the study, the inquiry process moved from an examination of teacher role, to management patterns, and finally to teacher-student interaction. The study suggests that teacher role is a function of the transaction between a myriad of extrinsic and intrinsic factors, and that the individual instructors' perception of role not only influences the leadership-management patterns employed in the laboratory, but ultimately the amount and type of teacher-student interaction.

The theoretical model of teacher-student interaction developed in the study portrays the dynamic encounter of teacher and student(s) within the classroom setting. The study has implications for both improving instruction and for teacher training. The interactive model has implications for educational researchers interested in classroom interaction.

ACKNOWLEDGMENTS

To properly thank those people who contributed to the study is an impossible task, yet I must recognize several individuals never meaning to diminish the contributions of others.

Two individuals who dramatically influenced me in my formative years were my father, Arthur Haminger, and a very special teacher, Marinus Swets. They both encouraged me to be a sensitive observer and participant in my environment.

My father, although not formally educated beyond the eleventh grade, is wise in the ways of nature and a creative, gentle teacher and parent. I thank him for taking me fishing and sharing his world.

Marinus Swets, a master teacher and now a college dean, had a decided effect on the direction of my early education. I am forever in his debt for exposing me to Steinbeck and snakes, constantly feeding my sense of wonder.

My professional colleagues and instructors at Michigan State made the move into field work an exciting one. Encouraging me throughout my doctoral program and research, Howard Hickey as committee chair always provided wise counsel and support--¡gracias me amigo!

Susan Florio as dissertation chair provided strategic criticism in preparing the manuscript as well as being a personal model as a field researcher. Her time and valuable suggestions were instrumental in helping to weave together the multi-faceted strands

of the study. For her personal time and thoughtful advice, I am most grateful.

To Ben Bohnhorst, a perpetual hug in my heart, and to Lou Hekhuis, Bob George, and all the other instructors and colleagues, sincere thanks for providing me with solid foundations and personal support.

One is diminished without loved ones, family and friends, and I am so rich on this account. The understanding and support of these important people in my life must also be recognized for they share the sweat, tears, and broken bones that have been part of this project.

Finally, I must thank my three teacher informants and many students who participated so willingly in the study. Although they will remain nameless, they are the study. I only hope the world they were so willing to share can help others grow in knowledge and awareness of this very special learning environment.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Page

FOREWORD

"The Making of a Field Worker"

Five A.M. on what promised to be a marvelous Michigan August day, a fisherman loaded his gear and sleepy eight-year-old daughter into the car. Driving for perhaps twenty minutes before leaving the paved roads, he turned off onto a tree-covered gravel country road on his way to Angel Lake. As he drove he pointed out the natural sights hidden to many--a fat woodchuck nibbling grass at the woods' edge, a red-tailed hawk perched watchfully in a dead tree, or a snake coiled in the morning sun alongside the road. Later as they sat in a small wooden rowboat, they talked of fishing lore, the dragon flies dancing on the ends of the poles, and the carefully packed lunch in the picnic basket. The hours were spent talking and sharing, and very often just listening to the natural world. The fisherman and his daughter returned home in the late afternoon with fish stories and a small catch of fish displayed proudly on a silver stringer.

Learning to look and really see the multifaceted world around is not a universal characteristic of modern man. In fact, in our complex society, so much of the world around us is filtered out because of distraction and noise, that often only a small portion of any scene is really comprehended. Much of the richness of reality is lost, and with it the knowledge of the whole. Being raised in an environment where observation was important, and even reinforced,

learning to look, listen, and really see were part of growing up. Today, as a researcher, the skills cultivated in my early years of exploring and studying the natural environment have had a profound influence on my perceptions. Fishing with my father was only a beginning of a series of events that were to shape my attitudes, values, and perceptions.

From the time I was a young girl, I wanted to be a teacher. Although what I desired to teach changed over the years, the goal of being a teacher remained, for I loved the process of learning and discovery, and school opened up areas of knowledge home could not provide.

Graduating from college with a double degree in biology and art, I began my teaching career in the tumultuous times of the late sixties. Revolution, evolution, and a period of change were reflected in both the social and academic structure of the public schools.

Throughout my career as a biology and ecology teacher, the artist in me vied for expression. An artist-scientist for some is a troublesome dichotomy, but for me it offered a more holistic way of seeing the world. The late sixties and early seventies were exciting times in innovative and alternative education, and I became a curriculum innovator within my school district and community college. While developing many new classes in the humanities and environmental sciences, my respect for the value of "field work" grew. Traveling extensively with students, both in this country and in Central America, the value of "face-to-face" encounters with people, places, and things continued to grow. My science expanded into the

multidisciplinary field of ecology with its intricate interrelationships. Looking and listening were not enough, for the problems of the environment had to be framed within a social and cultural context. My art also evolved both through the lenses of my Nikkormat and a newfound interest in detailed wildlife painting and drawing.

For me, the success of my teaching was measured by the involvement and ability of my students to see. Unleashing the "sense of wonder" in the man or child was my personal goal. Influenced by naturalists like Rachel Carson and John Muir, biologists like Jane Goodall, and educational psychologists like Abraham Maslow, my teaching became highly experiential. Charges like "you get out of an experience only what you are willing to put into it," or "never lose your precious sense of wonder" were paramount. Western culture often forces the curious, hungry child to put the sense of wonder and emerging intellectual curiosity in his/her "back pocket." Some never retrieve this sense of wonder and as a result see little of the world around them. In teaching, I sought to bring out the child in the man. The roles of teacher and student were often indistinguishable for me--I learned as I taught, and I taught as I learned. Today, as an educational researcher, those years of probing, observing, teaching, and learning travel with me into the field. I, too, am a sum total of my experiences. Teacher, ecologist, biologist, artist, mother, wife, and friend--each contributes to the cultural lenses through which I see. What I see are interrelationships, spatial configurations, and teaching and learning modes that cause me to ask questions

concerning the dynamics of teachers and students within various settings.

How to study the complex educational setting was a problem ethnography helped me resolve. Since choosing ethnographic methodology, changes in my thinking and ultimately my perspective have occurred. I cannot, nor do I wish to, divorce myself from who I am, but as a researcher I must expose myself to the reader. Past experiences should be supporting, rather than controlling, factors in any research. As I gained a better understanding of and respect for the process of ethnography as it applies to educational settings, a priori notions were in fact replaced by questions that emerged from participant observation. Spending countless hours in the college science laboratory, not only as a teacher but also as a student, I began to see a setting with potential for teacher-student interaction rare in lecture-dominated college classrooms. But only after observation as a researcher could I really see the multidimensional setting from the perspectives of not only teachers but also students in that setting. Allowing the setting and unique actors in the setting to provide the definition of the scene, I could ask better questions. Ultimately, more meaningful questions evolved out of the reality of the situation. The patterns emerging from observation are like the multicolored hues of the artists as they blend into a painting, for there is both art and craft involved in the teaching and learning process.

What is happening in educational settings goes far beyond test scores or the number of times a teacher reinforces student behavior, for teaching and learning are but part of a complex

educational, cultural, and social environment. Understanding of the whole can help educators plan strategies for a more effective and affective use of the educational setting. For the college laboratory, discovering the roles, management, and context of the setting in terms of the teachers and students have become important considerations during observation. Observed behavior within a social setting is influenced by complex factors discovered only through indepth observation, interview, and survey.

Although I have always been interested in the qualitative nature of the educational process and setting, ethnographic methodology has caused me to ask more succinct qualitative questions concerning the dynamics of the setting. In ethnographic research method I have found a systematic approach for addressing educational-research questions in a holistic, humanistic manner.

Although not as exotic as a native village on the Amazon, the social setting of education can provide an exciting arena for the researcher. The words I wrote many years ago can be appropriate to the cultural environment as well as the natural setting:

At our doorstep,
Nature's gifts
Offer the same wonder
Found in the alpine wood.
But unfortunately,
Do not seem so grand
So are passed by.

1974

CHAPTER ONE

INTRODUCTION

Higher education in America has experienced dramatic change in its short history due in part to major social and economic shifts in the counrry as a whole. The secular, elitist institutions that were the early foundation of higher education could not meet the technical and vocational needs of a growing industrial and agricultural nation. The Land Grant Act of 1862 opened the door for a shift not only in curriculum, but also in population served. The more egalitarian nature of the institutions was to have a profound effect on higher education in America.

Although not as highly acclaimed, other factors have also changed the face of higher education. They include the post-war influx of students under the G.I. Bill, the increased enrollment of young women, and more recently the emergence of the two-year institutions. The decade of the 80s has produced two additional challenges that must be addressed--crushing funding cuts and the changing profile of the American college student. All facets of higher education will be affected by these profound changes, and to remain viable, higher-education institutions must adapt to the evolving milieu. In an article on the transformation of American education, Trow (in Karabel & Halsey, 1977) suggested:

> The commitment of America to equality of opportunity, the immense importance attached to education throughout American history, the very great role of education as an avenue of mobility in a society where status ascribed at birth is felt to be an illegitimate barrier to advancement. All of these historical and social psychological forces are involved in the extraordinary American commitment to mass secondary and higher education. (p. 107)

The Community College

Since their humble beginnings early in the 1900s, community and junior colleges have become an important component of the higher-education system in the United States. Traditionally, many of the older junior colleges operated as transfer institutions with curricula designed to complement the programs of the universities they served. Currently, two-year colleges enroll approximately two-thirds of all college-freshmen in the United States (Rowe, 1980). The more dynamic missions of community and junior colleges provide multidimensional educational programs and services. With goals and missions closely linked to the communities they serve, these two-year institutions are responsive to a wide range of educational needs, including two-year academic transfer programs, terminal two-year degree programs, pre-professional programs, technical training, and community-service experience.

Arthur Cohen (1975) considered the responsiveness to the local community the "ideological cornerstone" of the community college. The growth of community colleges is a reflection of the need for community-based higher-education programs. Because of the emphasis on instruction rather than research, the two-year colleges are able to provide quality academic instruction for a fraction of the cost per

student. Unlike the larger four-year institutions, the use of graduate or teaching assistants is absent; instructors teach not only specialized courses, but introductory and laboratory courses as well. With an emphasis on teaching and a more egalitarian approach to higher education, community and junior colleges provide educational opportunities to many groups previously excluded from higher education. With a more heterogeneous population, community-college programs have had to be adaptable and flexible (Garrison, 1968; Zoglin, 1981).

In light of the current economic constraints, all higher-education institutions are having to adapt to reduced resources. While many colleges are experiencing enrollment declines, some community and junior colleges are experiencing enrollment increases. More students are staying in their own community for the first two years of training, then either transferring to a senior institution or graduating with a two-year associates degree (Magarrell, 1981). Because of the ever-changing milieu of the community college, the institution has had to possess dynamic flexibility to survive. Community colleges are a reflection of the needs of the communities they serve. It will be a challenge to community college institutions to provide quality educational opportunities in these times of financial stress.

Historically, the community and junior college movement has been under a great deal of criticism concerning both their mission and overall quality of instruction (Astin, 1979; Cohen, 1975). George B. Vaughn (1979) concluded that much of the criticism comes from scholars not versed in the real contributions of the community

college movement. He contended that the post-World War II growth of community colleges has expanded access to post-secondary education, thus mainstreaming many groups previously excluded from higher-education opportunities. The criticism of "quality of instruction" is often voiced, but claims that students are not receiving as good an education at two-year colleges has been dramatically refuted by the actual success of transfer students when compared to students spending four years at the university. Community and junior college transfer students in many institutions are doing as well as, and sometimes better than, their four-year counterparts (Kellogg, 1981, pp. 115-16; Sanford, 1962, p. 176).

Effective teachers have long been recognized as important factors in student success in college. Although the characteristics that create effective teachers have been the subject of much debate, Cooper (1979), in her study of university instruction, suggested that effective teachers:

> . . . create an interest in the subject;
>
> . . . help students learn and create a desire to learn;
>
> . . . establish rapport and are at ease with students;
>
> . . . create a sense of harmony in class and orchestrate interactions;
>
> . . . are selected by students; and
>
> . . . are modeled by colleagues.

Although much is known about the characteristics of an effective teacher, less is known about how various instructors operate within the actual classroom setting in higher education.

Ultimately, whether at a large university or a two-year college, the actual learning comes down to the individual student in the individual classroom. The educational hierarchy and complex institution may be dramatically reduced to the relationship between teacher and student within an educational setting. What happens between a teacher and learner in that setting has been the subject of many quantitative studies, but few qualitative ones. If assertions are made concerning the quality of community college instruction and that instructors do make a difference in the quality of the program, there is a need to examine fully such contentions within the actual educational setting.

To research the question, it is necessary to find an environment that will clearly demonstrate the interaction between teacher and student in a community college setting. The science laboratory is such a setting. The science laboratory, taught by a professor or instructor rather than a graduate student or lab assistant, is an excellent site for the investigation of the interaction between science student and community college instructor in a social context.

Purpose

The purpose of this study is to develop a descriptive model of the interaction between teachers and students in a college laboratory setting and to understand that special learning environment within the community college. The lab is a good place to undertake such a study because it involves considerable face-to-face interaction between teacher and student. We need to know more about the factors

that shape the dynamics of the laboratory setting--the types and amount of interaction, the value of the actual interaction, the various management patterns teachers use to orchestrate the setting, and how roles within the setting are determined.

What is learned can be used not only as an inquiry process to study other laboratory settings, but also to develop a strategy for improving teaching within the college laboratory setting through self-analysis.

The purpose of any research should be a contribution to the knowledge base of a particular field. To analyze, to explain, to understand--each of these research goals is best pursued under the fullest possible awareness of the research question, and to reach the goal of full awareness the researcher can benefit most from an interface with the holistic qualities of the educational setting. Care must be taken to ground the research questions in actual classroom life and to refine it continually in the fieldwork.

By experiencing the laboratory environment firsthand, the researcher might better analyze the complex social setting from the point of view of both teachers and students. To focus on an educational setting such as a college laboratory class, ethnographic, e.g., participant observation or field research, methods would appear to provide the researcher with wide and rich ranges of descriptive information. The social context in which teaching and learning take place is considered an important source of explanations for classroom phenomena (Clark, 1979; Cooper, 1979; Erickson et al., 1980; Florio, 1978; Yinger, 1978). Theory and methods of fieldwork research allow

the researcher to get closer to the subjects, not only to explore proposed research questions, but also to conceptualize new questions and emerging hypotheses as they occur in the setting. Schatzman and Strauss (1973) stressed that the researcher's task requires distinctive and flexible strategies to maximize discovery in a situation. They also concluded that the field method of research is like an umbrella of activity beneath which any technique may be used for gaining the desired information and for thinking about this information. Erickson (1972) claimed the "ethnos" (in this case, the laboratory classroom) is "any social network forming a corporate entity in which social relations are regulated by custom" (p. 10). This dynamic social unit can be described ethnographically with more accurate and systematic descriptions of both the whole and integral parts. Erickson contended that ethnography, because of its holism and because of its cross-cultural perspective, provides an inquiry process by which we can ask open-ended questions that will result in new insights about schooling in American society. He concluded that the unique "cultural lenses" of the researcher using participant-observation techniques allow for new vantage points for reflection.

The purpose of this study is to examine the interactions of teacher and students within the social context of the science laboratory. Because college today is a complex social institution operating within an even more complex society, to research any facet of the school, a whole myriad of external and internal forces must be considered. Ethnography, Erickson contended, provides a rich, more

systematic definition of the school society's "whole and parts." What results is a more accurate definition of what is happening.

For the study, the unit of analysis is the college laboratory setting and actors in the setting, but only as they operate within the larger contextual setting of the college and community. It is not enough to count microscopes or to compare students' grades. The task demands analysis of the question in terms of the values, needs, and attitudes of the natives in this setting.

The development of descriptive models of interaction is based on grounded theory, which is uncovered from the data emerging from the actual event (Glaser & Strauss, 1973). Evolving throughout the study, these models of interaction can provide an effective tool for comparison with other similar settings.

Research Questions

Because of the highly inductive nature of fieldwork, broad conceptual questions the researcher brings into the field are focused and redefined while in the field. From many successful fieldwork projects, Erickson, Florio, and Bushman (1980) concluded that fieldwork can best address the following classes of closely linked research questions. These qualitative questions have been adapted to the community college laboratory setting.

1. What is happening in the laboratory setting?
2. What do the happenings mean to the teachers and students in the laboratory setting?
3. What do teachers and students have to know to function in the setting?

4. How does the organization of what is happening in the laboratory relate to what is happening in the wider social context of the setting?

5. How does the organization of what is happening in the laboratory differ from that found in different places and times?

In the following two chapters, the research methodology and literature related to the study are explored. The appropriateness of fieldwork, including strengths and weaknesses related to the research questions, is the primary focus of Chapter II. The literature related to the research questions is examined in Chapter III, including research on college laboratory teaching, important research on role and interactive management from social science literature, and related ethnographic studies.

CHAPTER TWO

THEORY AND METHODS

Background of the Study

To understand a wolf, I must become a wolf--not in a cage or a zoo, but in the context of a wolf's reality. Ecologists have only recently learned that the true nature of the beast, or even of nature itself, can be accurately analyzed, described, and assessed only within the social, cultural, and environmental setting of the observed. No, I cannot simply become a wolf, but as a researcher, I can go to the field and observe the environment of the wolf and experience his world through his eyes.

What can be learned by this kind of inquiry is exemplified by recent discoveries by ecologists concerning status and communication within the social structure of the wolf pack. The notion of the "lone wolf" has been replaced by that of the wolf as a highly social animal that lives in a hierarchical group. For example, only through extended observation could the subtle communication, yet rich vocabulary, of the "tail" be revealed. In a wolf's world, the tail is an expressive signal of status and mood. Role, status, body language, and interaction are as important in a wolf's social structure as in man's.

Training as an ecologist and experience as an educator have led me to recognize that, just as an ecologist must adapt to holistic

research methods to reach understanding, so too must the educational researcher.

Methods of Fieldwork

The community colleges of the 80s are experiencing dramatic change. The American Association of Community and Junior Colleges (AACJC), in their guide published for prospective community college instructors, advised that "no safe generalizations could be made about community and junior colleges" (Garrison, 1968, p. 1). These unique institutions are as varied as the communities in which they are rooted. For this reason, to answer any specific question about a community colleges or problems that may exist within a particular setting, the answers are best derived from the actual cultural context within which the questions are framed.

The use of fieldwork research (also ethnography, participant observation, and descriptive research) as a holistic approach to understanding schooling involves not only face-to-face encounters but an understanding of the broader context in which the social event is rooted. Because the process of teaching and learning operates within the social context of a larger educational setting, ethnographic methodology with the associated participant-observation fieldwork techniques can provide a rich descriptive picture of "what is happening" in terms of those involved. The fieldwork or ethnographic approach would focus on meaningful behavior patterns produced and interpreted by actors within the setting. Qualitative research techniques can address the question of what is happening in lab in

a holistic manner, allowing a systematic documentation of reality within a local setting--"being there." But the functional relevance of such a study would come from understanding of the problem in the terms of the actors and implications that may emerge related to the natives' attitudes, values, and, specifically, needs. Future planning for student-teacher interaction could best be based on clear understanding of local meanings for the people involved in the college classroom.

Lutz (1981) argued that ethnography, although not statistical, is empirical. The classroom may be observed as a cultural system using anthropological theory to guide data collection and ultimately to provide meaning and understanding. Lutz suggested that a representational model--the natives' interpretation of events and meaning of events--is interfaced with the operational model--the researcher's view of the events--to produce a final explanatory model.

Ethnographic Approach

Ethnography, with its roots in anthropology, was developed and used to study cultures, particularly cultures foreign to the ethnographer (Malinowski, 1961; Moore, 1973; Powdermaker, 1966; Smith-Bowen, 1964). The methods of participant observation, fieldwork, use of informants, and derivation of hypotheses from analysis of field notes have been refined and modified to fit the more familiar context of American schools. The ethnographer is committed to studying a whole social system by portraying it in terms credible to and understandable by its participants. Indeed, major questions in most ethnographic

studies have to do with locating the boundaries of the "whole" and identifying the web of meaning shared by teachers and students (Clark, 1979; Cooper, 1979; Florio, 1978).

Value of Observation

For ethnographic research in education, observational methods involve a multidimensional process carefully managing the roles of participant and observer. Making the "familiar strange," then redefin- the familiar in terms of the occupants within a social setting is made possible through extended participant observation. To create a holistic view of any social event, observation must take place and must include the "emic" meaning as well as the "etic." The etic refers to the perspective assumed by an outsider, in this case the researcher, while the emic would involve the meaning in terms of those personally involved in the event (Pike, 1967).

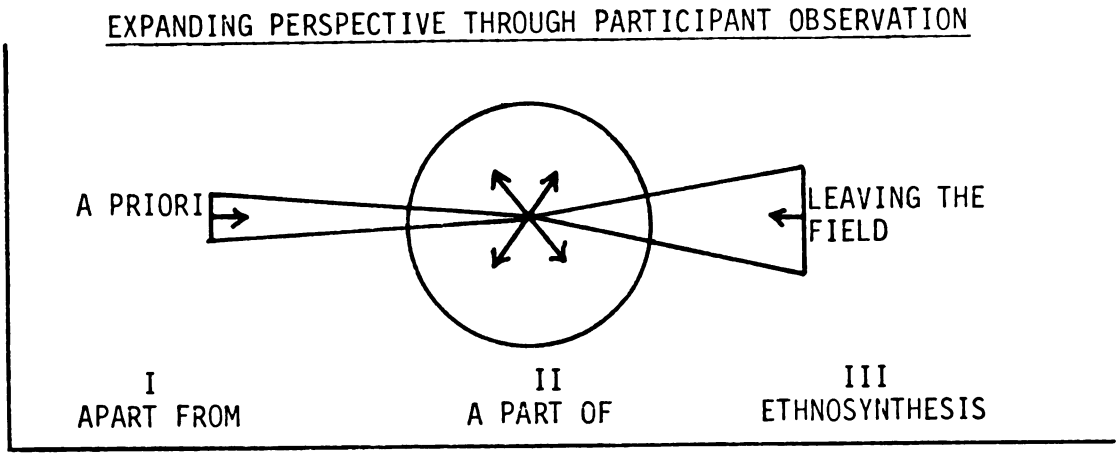
Erickson (1972) contended that ethnography should be considered an "inquiry process guided by a point of view" (p. 10). "Making the familiar strange" is essential in fieldwork, for the ethnographer must adopt a critical stance, continually questioning the obvious and situations taken for granted. The strategy for ethnographic research centers on discovery in the field, in this case the laboratory setting. The human element operating within the social unit is of utmost importance to the researcher. Ethnography allows--no, demands--that the researcher get close to the people studied in a "face-to-face" encounter. This more naturalistic approach to inquiry allows linkage of data and theory grounded in reality (Schatzman & Strauss, 1974).

"Face-to-face" encounters with natives in the setting allow the researcher to construct an "emic" definition of situation, or situational frame. The frame, as described by Erickson (1971), is ontologically not a "given" but "made" (p. 11). Observation provides the researcher with a deluge of sensory information that must be processed, recorded, and analyzed. But care must be taken, for the translation of the event must be presented in terms of the native's reality, rather than that of just the researcher.

First-hand observation is important, for it allows the researcher to ground theory in reality (Glazer & Strauss, 1975; Yinger, 1978). If observable patterns emerge, theory may be applied and tested. Borrowed from the social sciences, participant-observation research methods have proved to be the best form of research for understanding the "ethnos"--the complex cultural frames that we as humans construct. Through participant observation, a rich, more accurate description of social events can be constructed, analyzed, and, it is hoped, better understood.

As a researcher, being "apart from" the setting only gives a limited perspective of the event, often influenced by a priori assumptions. Becoming "a part of" the event as a participant observer presents a multiple-lens collage of the event from the natives' perspectives. The natives' perspectives are the key, for there may be many such native perspectives. In addition, the broad-based questions brought into the field could be redefined and specific questions derived from the field experience. After leaving the field, the

researcher could then create an "ethnosynthesis"--a more accurate description and analysis of the complex human event being studied.



I "APART FROM"	II "A PART OF"	III "ETHNOSYNTHESIS"
. researcher's point of view . assumptions based on researcher's reality . historical perspective	. native points of view . native language . native experience . empathy	. multiple points of view . internal and external validity . synergistic effect . holistic view

Figure 1.--Expanding perspective through participant observation.

Research Strategies

To move from an outsider's perspective to that of an insider, the researcher must employ a variety of research strategies. Addressing the questions of teaching and learning is a complex task, for the process may have multiple meanings for the many actors involved in the

process. The study of the interactions of community college teachers and students in the laboratory setting involved the following methods modified from McCall and Simmons (1969). By using a variety of strategies, the meanings of the social event could be defined and redefined.

Participant Observation

To gain a better understanding of the event, the naturalistic researcher must become involved in face-to-face interaction with the actors. As a field researcher, I observed and participated in three laboratory classes taught by different science instructors. The amount of actual participation varied, depending on the instructor and the nature of the class. Gathering information by participating in the laboratory process from beginning to end (i.e., planning, preparation, the actual class, and evaluation) provided a comprehensive picture of the event. Participation in and observation of events outside the classroom were also included in the study. It was necessary continuously to develop relationships with both teachers and students and to negotiate entry into all aspects of the educational process.

Field Notes/Recording and Analysis of Verbal and Nonverbal Behavior

Because the systematic recording of events is essential in ethnographic research, detailed field notes of the laboratory sessions were recorded both from on-site observation and videotaped sessions. The notes provided a rich, detailed description of what was happening. Schatzman and Strauss (1974) and others have outlined strategies for

watching, recording data, and coding events. Observational notes were helpful in the ongoing analyses and hypothesis development. Recording and analysis of both verbal and nonverbal behavior was essential for the recognition of patterns and key linkages, as well as triangulation of data (Gordon, 1969; Green, 1981; Shatzman & Strauss, 1974). The multiple perspectives of teacher, students, and researcher (Figure 2) allows multiple comparison of the phenomenon observed.

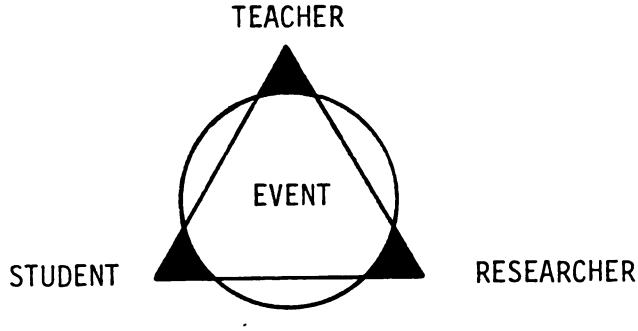


Figure 2.--Triangulation of a single event.

Rather than a multiple comparison of a single event, Sevigny (Green, 1981) suggested triangulated inquiry as "the comparison of several groups using varied perspectives and multiple procedures at two or more points in time" (p. 73). Gorden (1969) suggested that

> Often the nature of the problem under investigation demands a multimethod approach because the various methods give totally different kinds of information that can supplement each other, because we do not know how to interpret some of the information unless we can couple it with other information, or because we need a cross-check to verify the validity of our observations. (p. 12)

For this reason, the study included multiple observations of three instructors teaching two courses elected by two diverse student groups.

Erickson (1971) and Glazer (1975) suggested thorough field notes can reveal situational frames as perceived by various actors so that better sense can be made of the flow of events. Thirty-five millimeter slides and photographs were used to frame various interactive patterns, and videotaped sessions provided a detailed record of laboratory events for later analysis.

Interview

To understand fully and to analyze what was happening in lab, interview was an important means to clarify or to reinforce the data gathered by observation.

Formal and informal interviewing of teacher informants occurred during and after the observations. Student informants were identified and interviewed after the observations began. Former students who are now at a senior institution or graduated were also interviewed. both formal and informal interviews provided useful information to support and/or refute working hypotheses and allowed exploration of attitudes, values, and perceptions of the actors. Gordon (1980) provided specific strategies for ethnographic interviews (Appendix C).

Florio (1978) demonstrated the value of developing a working relationship with an informant. Development of trust and adherence to ethical practices were paramount. While information gathered via interview was most valuable for understanding the event from the

points of view of varied participants, the information could also be biased or, worse yet, unreliable. Care was taken to guard against this problem by interviewing many informants and interviewing throughout the entire observational period.

Enumeration and Sample

The use of a survey instrument was a logical vehicle to reach a large number of students not interviewed and other faculty not specifically included in the study. The qualitative questions emerged from the strategies previously listed.

Participant surveys were given to teachers and students at the end of the project. Direct, repeated, quantifiable observations of behavior and focus were recorded during several laboratory sessions. These were used to chart interaction and movement within the lab period. Grades of students were obtained at the end of the semester. Comparative grade data within and between lab sections were used to support contentions that teacher interaction may have had an effect on student performance.

Ethnographic descriptions, although highly qualitative, may be reinforced by relevant quantitative data obtained as questions arise from observation. While obtaining entry and selecting appropriate informants, it was necessary to become familiar with the basic ecology of the study--the community, the college, the department, and actors within the setting. Schatzman and Strauss suggested starting at the top of the organization, obtaining a historical perspective, and establishing subsites for observation.

The process of data collection, according to Glaser and Strauss (1975), is controlled by the emerging theory. The use of "local" concepts may be relevant to describing the whole. Theoretical metaphors then can be developed to account for relevant behavior, and grounded theory can be developed through comparative analysis.

Overview of the Study

Fieldwork as a process of inquiry is ongoing and ever evolving. The study was preceded by a three-week observational study of three laboratory instructors in the general biology labs of a community college (Dodge, 1980). That short study suggested the need to conduct a more indepth study of "what was really happening" in the college laboratory classroom.

The study was conducted at a large metropolitan two-year college, which I have renamed Lakeside Community College. Three master teachers were selected for the study. Teaching style was not a factor in the selection process; only their experience and willingness to participate were considered. Although the major focus of the study was on one instructor's classroom, all three were observed extensively to allow comparison and triangulation. The term "master teacher" refers to instructors highly experienced who are considered to be effective teachers by both students and colleagues. The three instructors, who were also renamed to provide anonymity, each taught preprofessional biology classes.

The field study was conducted for the entire winter semester, January-June 1981. Follow-up observations, interviews, and videotaping

of laboratory sessions occurred in the fall semester 1981. Although observations were conducted in several laboratory sections, the primary focal group was followed through both semesters. Ten of the twelve regular two-hour lab classes were attended. In addition, thirty-six additional hours were spent in the labs of the other two instructors.

A collegial relationship developed between the researcher and participating instructors, facilitating entry into many facets of the instructors' daily routine. Morning coffee break, student conferences, office hours, staff meetings, and planning sessions provided additional insight into the complex social scene.

The students were very willing to share attitudes and feelings about the class and their relationship to the instructor and fellow classmates. Formal interviews were conducted with students, but many more personal comments were shared informally. Because of the researcher's familiarity with the content area of science and a dual role of researcher and instructor in the department, participation in day-to-day events was accomplished with ease.

A general student and teacher survey was developed from observational data. Information from a large number of students was triangulated with that from the research groups.

Initial analysis of the data occurred during the summer of 1981. Follow-up observations and videotaping sessions in the fall added to a clarified descriptive data.

Sharing of the observations was ongoing. As a result of sharing the videotaped sessions with staff, suggestions for in-service

programs on effective use of laboratory interaction were presented for the faculty in-service.

Strengths and Weaknesses of Fieldwork

Many of the positive aspects of fieldwork were aforementioned. A study's ultimate quality is determined from careful consideration of issues including the following:

. . . defining the problem

. . . the relevance of the methodology to the problem under study

. . . dealing with weaknesses inherent in the research design and methods

. . . the accuracy of the data

. . . linking data to theory

. . . the meaning of the findings to the participants and practitioners

The method a fieldworkers selects to study any problem will be reflected in the quality and quantity of data gathered. The methodology must be relevant to the question and will be a key in evaluating the research. Fieldwork methods--participant observation, interview, and related qualitative and quantitative data gathering--can provide a comprehensive perspective of the problem from "inside and out." But this is true only if the problems of fieldwork are adequately addressed. Strength will be derived from dealing with weakness. Experienced fieldworkers warn of the many pitfalls of fieldwork, some of which are common to all empirical research! They include observer bias, the effect of observer on observed, reliability of informant information (dependent on trust, defense mechanisms),

ethical considerations, stress, and many others. Problems begin before the researcher enters and field and continue through the sometimes painful exit from the field site. Problems must be identified, literature searched, data-collection methods planned and implemented; then problems of data analysis and sharing findings come later. Disconfirming as well as confirming evidence must be sought.

Why bother to undertake a field study if there are so many problems to address? The answer is simple. The richness of the description can explain "what is happening," and that is the value of field research--grounding theory in reality. Meaning can be derived from "imponderabelia" of the event in terms of the natives, and, it is hoped, in terms of the question (Malinowski, 1961). Fieldwork allows penetration of "the flow of life."

One of the major strengths in fieldwork is the rich description of what is happening in a local situation, as described by Yinger (1978):

> Since grounded theory is concerned with theoretical conceptualization that "fits" real situations and "works" when put to use, the primary source of data for this type of investigation should be real social encounters. Thus, fieldwork becomes a fundamental basis for theory development. For conceptual categories and hypotheses which have meaning for real situations, they must be based on qualitative descriptions of behavior in natural situations. This does not rule out qualitative data from other sources such as questionnaires, interviews, written documents, and other research reports and writings. In applying this method of theory building to research on teaching, the central concern should be that the theorizing is grounded in situations that are representative of real teaching and learning settings. Better yet, theorizing should be grounded in actual teaching/learning situations. The fact that grounded theory is closely tied to field data means that the kinds of theories emerging from these efforts will be somewhat specific and limited in scope. (p. 13)

The potential validity of any ethnographic study lies in its meaning not only to the researcher, but also to the natives in the setting. A perceived weakness for some lies in the generalizability of the findings. Because environments and actors vary, generalizing findings to other settings may not always be appropriate. However, grounding theory in the rich descriptive data and meanings of the setting by the participants may reveal potentially significant theoretical frames for future planning, teacher training, and existing faculty development related to laboratory instruction.

Revealing the meaning of what is happening in the laboratory can be a valuable tool to the teacher in the environment and to practitioners who wish to improve laboratory instruction. Clearly, there are major concerns in the scientific community about the quality of laboratory instruction (Dean, 1970). How to use the laboratory most effectively is an important question, which can be addressed in two ways (Figure 3). First, one can develop a clear picture of how effective instructors manage the laboratory setting to be shared with other instructors. Second, one can develop a way in which individual lab instructors might analyze what is happening in their own labs and how they might improve or maximize their management and teacher-student interaction. Figure 3 illustrates this strategy.

Ultimately, this dissertation attempts the former with an eye toward the applicability of improving the instruction of the latter. Development of descriptive models and application of theoretical constructs may also result in a degree of generalizability when analyzing other labs.

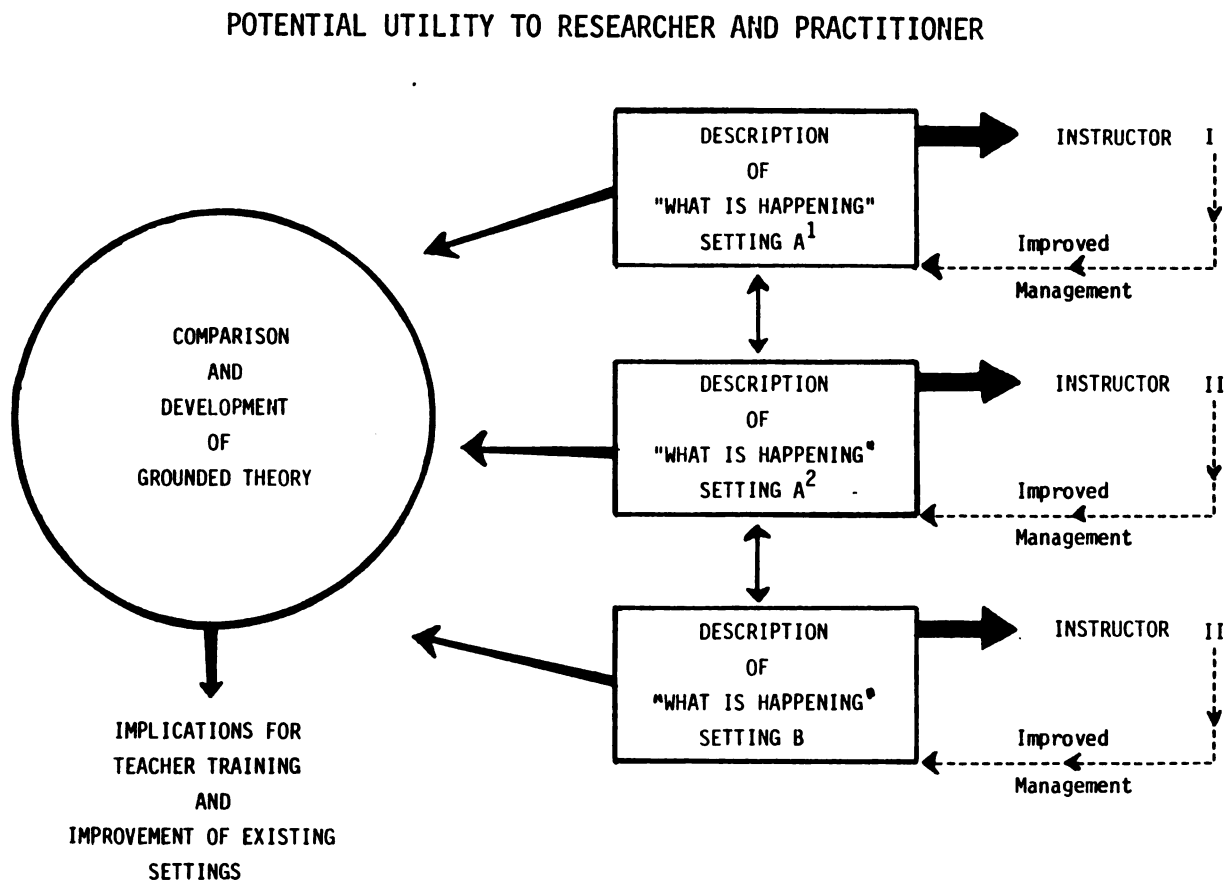


Figure 3.--Research outcomes.

The Evolution of an Ethnographer

Man, like all creatures, is ever changing and evolving. So, too, are the thought processes within each of us as we move through the stimuli of life and learning. My thinking changed from the initial notions I had as I approached the field experience. Without a doubt, as a practitioner, I brought with me to the field a rich teacher-based experience. But, because I have also been a student concurrently, the student perspective is also strong.

The tendency to formulate questions from past experience, rather than letting the questions evolve from the patterns observed while in the field, was tempting but was dealt with and resolved early in my research. This very important change in my thinking was in part due to literature review and reinforced by practitioners, but was driven home only after my first days in the field. Because I had been properly warned about the fragile nature of a priori notions in ethnographic research, my original questions concerning lesson focus were painlessly replaced by questions emerging from observation.

The original research questions of my field study very generally focused on the nature of the teacher-student interaction in the community college laboratory setting. The social events within this dynamic setting provide a wealth of information to be described, analyzed, and interpreted. Questions of behavior, role, management, and context guided my initial observations. After many hours of participant observation and interview, the potential questions of lesson focus and sex became less important variables, while questions

of context and perception became key elements to describe various behavior patterns. The emerging hypothesis proposed that both the nature and management of the teacher-student interaction in the laboratory setting were a function of the teacher's perception of his/her role in that setting. The parameters of the "situational frame" suggested by Hall (1966) provided a way of systematically describing the setting (see page 46). Because most human behavior is purposeful, it also became necessary to explore further the observed behavior through both the use of interview and the application of analytical tools.

As expected, methods for my research ranged from the collection of detailed observational notes to formal and informal interview. But through time in the field, the focus of the observation became more multifaceted by using analytical tools to chart actual contact or proxemic moves within the setting. This allowed the formulation of typologies of interaction, development of organization patterns, and descriptions of situational frames. The cycles of the situational frames provided me with samples of social behavior for later analysis. The actual questions for the formal or informal interviews evolved through focusing on the behavior observed within the social setting. Interviews clarified, reinforced, and even refuted what I had been observing in the laboratory. As entry expanded in the field, a myriad of new questions demanded answers.

Even as I observed the phenomenon, the phenomenon changed. Like any life form functioning within a community environment, change is an ever-occurring process. Indiscernible at first, through extended

observations the subtle change becomes a reality. Change builds upon change--an open system of intricate feedback mechanisms, resulting in adjustments. To understand the "ethnos," the complex cultural frames that instructors construct and reconstruct within their own laboratories, I focused more and more on perceived roles. The "key linkage" describes the roles in terms of the instructor's individual needs and personality. The control of the interaction between student and teacher, and the resulting behavior within the social setting, can be molded dramatically by these very important characteristics.

The rich descriptive data and emerging theoretical framework bring definition to the scene; the task of the researcher in conjunction with native informants is to make sense of the scene with disciplined subjectivity.

> Notebook in hand, I walk into the physical setting of the laboratory. Yes, I've been here before, but somehow it is very different. As an ethnographer, I have donned new lenses. No rose-colored hues, but multifaceted angles and attitudes. Life enters the setting. The physical setting becomes alive with the biological. They merge into new realities. Can I learn from these complex natives? And ultimately can I answer the questions that need answering? (Personal notes, 2-16-81)

CHAPTER THREE

REVIEW OF RELATED LITERATURE

Both educational and social science literature include many studies that shed light on the dynamics of the college classroom. In this chapter three areas of literature are reviewed. First are studies related to college teaching, including research on the role of the instructor and more specific research on science laboratory instruction. Second, literature is examined that focuses on behavior within a social context, including metaphors and models from the social sciences. Third, the epistemological foundations for the study, including related ethnographic studies of classroom interaction, are discussed.

College Teaching

The decades of the 60s and 70s produced volumes of research and rhetoric related to college teachers and college teaching (Astin, 1978; Bogue & Saunder, 1976; Brophy, 1980; Chickering, 1981; Dean, 1970; Garrison, 1968; Herge, 1965; Lee, 1967; McKeechie, 1962; Sanford, 1962; Umstattd, 1964). Many of the comprehensive studies were sponsored by such groups as the American Council on Education, the Center for Applied Research in Education, and the American Association for Community and Junior Colleges. Clearly the change American higher education was undergoing was reflected in research. In response

to a changing milieu, educational researchers proposed a redefinition of both the role of higher-education institutions and the role of the instructor in the teaching and learning process.

Brophy (1980), in a review of recent research on teaching, concluded that the decade of the 70s, rather than focusing on curriculum as was common in the 60s, more appropriately focused on the teacher as the unit of analysis. He suggested that research conducted under more natural conditions produced the following generalizable conclusions:

1. Teachers do make a difference
2. Teacher expectations and role definition are important
3. Effective teachers engage students in meaningful tasks
4. Students need direct instruction from the teacher
5. Different contexts call for different teacher behavior

Although the research included all grade levels, Brophy specifically applied his comments to adult learners and college settings.

Feldman and Newcomb (1969), in their analysis of research on the American college student, contended that the amount of faculty-student contact is an important element in the effect of faculty on students' educational and career plans and that many students desire increased contact with their college instructors.

Most often the teacher assumes the leadership role in the classroom. The leadership style employed often is a reflection of the underlying needs of the leader (Fiedler, 1969). Because the basic needs of individuals in the teaching profession are generally met, they often look for other satisfiers (Griffith, 1979; Maslow,

1954). Douglas M. McGregor suggested that individuals will commit themselves only to the extent that they can see ways of satisfying their ego and developmental needs. Each of these factors contributes to the interactive behavior of teachers in the classroom setting.

In a study of effective teaching in different contexts (Brophy & Evertson, 1978), two of the findings are specifically salient to college laboratory instruction. First is the relationship between student maturity, achievement level and intelligence, and the degree to which the student depends on the teacher for learning. They concluded that the levels of cognitive development are important, along with the mastery of skills relative to the need for teacher-student interaction. But their research also indicated that even older students learn more efficiently when given more direct guidance from the teacher. Second, the context-dependent relationship concerns student field dependence or independence relative to teaching style (management).

> Students who are bright and confident, especially if they also tend toward a field-independent cognitive style, tend to prefer to be, and achieve more when taught by teachers who are oriented more toward subject matter than individuals, and who are intellectually stimulating but also demanding in their interactions with students. (p. 11)

Insecure or field-dependent learners, according to Brophy, may be alienated or discouraged by this style but respond well to encouragement and support from teachers who establish themselves as concerned helpers rather than authority figures. Brophy contended that matching students with teachers according to needs and style, although somewhat ideal, may be appropriate at the college level.

The importance of role, leadership, and management was addressed in the following studies.

Chickering (1981), examining the modern American college, suggested that as with any leadership role, the teacher has the power to influence decisively the interpersonal tone of the group. He also concluded that the interaction between faculty and students can have crucial effects on interpersonal development. Related to teacher-student interaction, he also suggested that the roles of model, mentor, friend, and even "charismatic shaman" can benefit both student and teacher (pp. 206-208).

Examining role theory in relation to management of the educational setting, Griffith (1979) contended that roles are complementary and interlocking, deriving meaning from other related roles. For example, a student's role is defined in terms of the teacher's role, and a teacher's role is defined in terms of his students' roles. A student perceives his role to be that of a learner, and his teacher perceives his role to be that of director of learning. Thus the rights of one role become the obligation of related roles.

The research of Umstattd (1964) addressed both the problem of role and effective college teaching. He stated that research findings refute the assumption that knowledge of content alone will result in effective teaching. He concluded that sound purpose determines rational action; thus knowledge of purpose lends direction and vitality to classroom activity. The increased heterogeneity of student populations "demands greater skill in motivation, deeper insight into sensing divergent abilities and interests and keener sensitivity" (p. i).

Bogue and Saunders (1976) suggested that a major barrier to the effectiveness of educational managers is directly tied to inadequate role concept. They contended "that the effective professional has his actions anchored in knowledge--knowledge of himself, knowledge of his role, and knowledge of the environment in which he performs" (p. 11). They also suggested that an individual's behavior in any organization has multivariate causes derived from management philosophy, organizational structure, group membership, and personality of the individual. Too often, they suggested, educational managers become involved in the operational detail and materials but have little or no conception of where they are going. Thus both purpose and direction would seem to be valuable for both teachers and students.

Science Teaching

The growth of science and technology in the past twenty years has created a need for research not only of curricular methods and materials, but also a need for research on science teaching. Blazer and Evans (1973), in A Review of Research on Teacher Behavior--Related to Science Education, revealed that only 8 percent of the studies reviewed concerned college classroom behavior. Included in the report were many suggestions for further investigation, including these two:

> . . . Studies primarily inductive in methodology are needed. Use of this methodology has sharply increased in the past two or three years but primarily inductive studies still number only about a dozen. A major contribution of inductive studies is the provision of empirical data which may not be implied by the theoretical frameworks of deductive studies. (p. 95)

> . . . More emphasis should be placed on behavioral studies in science classrooms at the primary grades level and the college level. Behavioral data at these levels are presently very limited. (p. 96)

Both an ERIC search (Dodge, 1981) and the Summary of Research in Science Education (Peterson & Gaylen, 1979) supported that fact that there has been only minimal research on teacher-student interaction in the laboratory setting. Although the ERIC search covering 1968-1981 produced no studies directly related to teacher-student interaction, teacher role, or management of the college laboratory setting, there were several studies that did examine teaching assistants' (TAs) behavior in the laboratory.

Four closely related studies by Shymansky, Kyle, and Penick at the University of Iowa focused on teachers and students in the science laboratory (Kyle et al., 1979, 1980; Shymansky & Penick, 1979, 1981). The behavior was analyzed using Science Laboratory Interaction Categories (SLIC) developed to provide objective, detailed, quantitative descriptions of laboratory interaction. Because of the concerns related to the quality of laboratory instruction by TAs, the observational system was developed as a potential assessment tool and feedback device. Shymansky and Penick (1979) succinctly described the rationale for this systematic approach:

> Teaching need not be a random activity. With even the crudest of instruments, teaching can be approached systematically. One such approach involves the use of observational data collected in the laboratory classes. Accurate and detailed feedback concerning the events taking place in the laboratory sessions is an essential first step in analyzing and improving instruction. Only after instructors are aware of what they and their students are doing in the laboratory can they begin to think of ways of improving that instruction. (p. 196)

Stressing the need to observe teaching activities systematically, Kyle et al. used the SLIC to assess and analyze college laboratory instructors' behavior strategies. They concluded that although the primary purpose of science laboratories was to provide students with procedural and investigative skills through hands-on experimentation, a large percentage of the laboratory periods was used by the instructor to transmit information. In the laboratories they observed they also found that the opportunity on the part of students to interact freely with lab instructors was almost nonexistent (Kyle, 1980, p. 135). The largely taxonomic descriptions can, according to the researchers, be used to improve teaching effectiveness through analysis, but not to explain the phenomenon. They concluded that more longitudinal studies would be necessary to explain what was happening in lab.

Behavior Within a Social Context

The second area of literature examined focused on the dynamic behavior within a social context. Man is a sophisticated animal operating within a social, cultural framework. To understand the dynamics of the phenomenon observed, better metaphors and models may be adapted from social science and educational literature. The purpose of this study was to examine the interactions of actors within the cultural frame of the community college laboratory. As with a good camera lens, observation allows definition and redefinition of the frame.

The field of administrative theory is rich in models and metaphors that may be applied to the college classroom. Francis Griffith, in his book Administrative Theory in Education (1979), concluded that contemporary theorists attempt to reflect actuality rather than utopian states. Their concern is with the way things are, rather than how they should be. He contended that analysis of the professional literature in the fields of business, education, medicine, and public health reveals common patterns and principles of administration that apply to educational settings as well.

As part of a larger organization, the college classroom and its occupants form the base of the hierarchical structure--students, teachers, department chairs, deans, and boards of education. The authority and responsibility of each position or role are defined within the framework of the institutional mission and goals.

Organizations and Leadership

When analyzing organizations, Roethlisberger (1939) contended that patterns of human interrelationships are defined by the system, rules, and regulations of the company (in this case the college) and that these patterns constitute a formal organization. But along with the formal structure, he also suggested, there exists a less obvious, yet highly important, informal organization including values, sentiments, face-to-face relationships, and prestige.

Max Weber (1952; Wrong, 1970) cited the importance of authority and leadership in any organization. Leadership styles vary in relation to both the culture and personality of the leader. The

teacher, as leader, uses the power and authority of the position to manage the learning environment.

Situational leadership, as defined by Hersey and Blanchard (1976), provides a model based on the interplay of task behavior--the amount of direction a leader gives--and relationship behavior--the amount of social or emotional support a leader gives. They contended that successful leaders adapt their behavior to meet the needs of each unique environment or situation. The theory suggests that as the level of maturity (experience, knowledge) increases, leaders should begin to reduce task behavior and increase the relationship behavior until the desired maturity level is reached. Only when the maturity level is reached can both the task and relationship behavior be reduced.

Role

The roles of teacher and student are not always as clear-cut and easy to define. The development of roles and the functioning of individuals within roles have been the subject of much organizational literature.

Roles are complementary and interlocking, deriving meaning from other related roles (Goffman, 1961; Griffith, 1979). In education the definitions of teacher role and student role are often the function of the curriculum and setting.

Although roles are externally defined and serve as norms to guide the behavior of role incumbents (Guba, 1958), the role is often modified by the personality of individuals within the role. The

dynamics of the interaction between institutional role and individual personality may produce role conflict (Getzels, 1968). The model developed by Getzels and Guba is explored further at the end of this section.

How an individual feels about a job or role within an organization has been the subject of recent research (Argyris, 1957; Hertzberg, 1968; Rosenthal & Jacobson, 1974).

The importance of recognition, accomplishment, positive reinforcement, and other satisfiers is particularly salient when examining teacher and student roles in lab. The importance of the "job satisfiers"--e.g., recognition, accomplishment, etc.--in contrast to "nonsatisfiers"--physical environment, money, etc.--applies to both the "job" of teacher and student in the laboratory setting. How a person feels about his role is reflected in the functioning within and attitude about that role.

In his study of individuals operating within organizations, Argyris contended that every person is capable of self-actualization, and that although both the individual and the organization benefit, unfortunately, organizational structure often inhibits self-development. External forces operate both on the functioning of a teacher within a role, and similarly the teacher can influence how the student operates within a role.

When exploring teacher role within educational settings, Rosenthal and Jacobson (1974) found teacher expectations can become self-fulfilling prophecies. They contended that effects of these expectations can have long-term ramifications. The implications of

of the study have the potential for both positive and negative effects on student learning.

The study of leadership is not new, but the application of leadership principles to educational settings is a very recent phenomenon. Much can be learned from the application of established organizational leadership and role theory. From Lao-Tzo (Townsend, 1970), came two enlightened concepts:

> . . . When the best leader's work is done, the people say, "We did it ourselves."
>
> . . . To lead the people, walk behind.

Getzels and Guba: Social-Psychological Model

To understand the complex dynamics of human behavior, social scientists employ models that are simply analytical tools used to examine behavior within a social setting. Appropriate to the study is Getzels and Guba's Social-Psychological Model (Getzels, Lipham, & Campbell, 1968). The model suggests that all behavior occurs within a social setting and that behavior is a function of role and its expectations, interfaced with personality and accompanying needs disposition.

$$B = F (R \times P)$$

"Behavior is a function of role times personality"

In any model that employs abstractions to make reality understandable, it is necessary to define the parts of the model. The social-psychological model of Getzels and Guba analyzes behavior within a social system by examining two interacting dimensions--the nomothetic and the idiographic.

Nomothetic and Idiographic Dimensions

The NOMOTHETIC or sociological dimension of the model consists of institutions, roles, and expectations, while the IDIOGRAPHIC or psychological dimension includes the individual, personality, and needs disposition. The dimensions are independent, yet have a "transactional interface" (Figure 4).

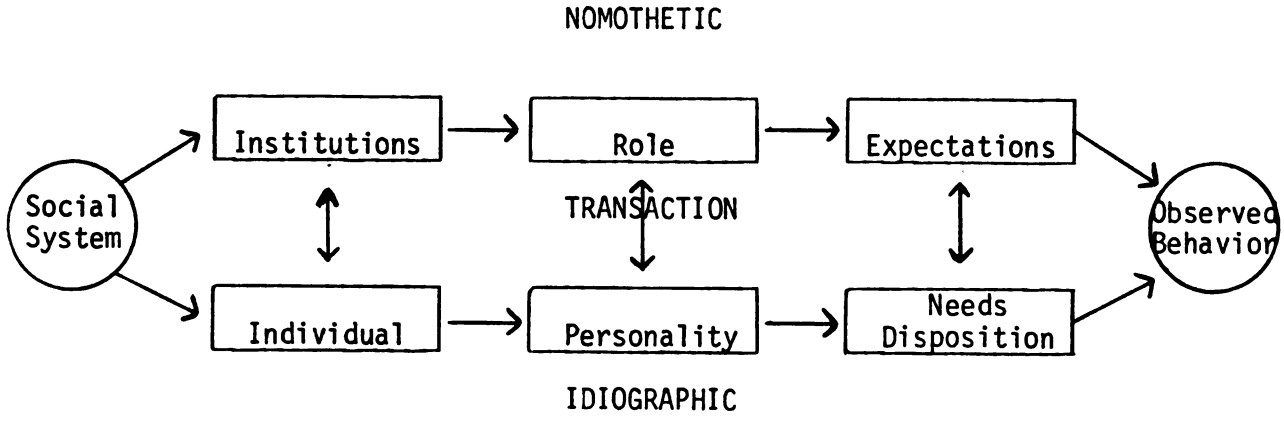


Figure 4.--Getzels and Guba's model.

Nomothetic: institutions.--Institutions are social units purposefully created to pursue specific goals. These entities, although having varied functions (e.g., education, protection), are normative, ingrained structures within a society. Institutions are types of organizations having a structure independent of individuals operating within them. They are sanctioned to exercise normative control of roles established to accomplish institutional goals.

Nomothetic: roles.--The role component of the nomothetic dimension can be defined as the structural elements that define expected behavior. The set of expectations of any particular role is independent of the person occupying that role. Within an institution there are many complementary roles (usually hierarchically arranged), each with a set of expectations, responsibilities, or obligations. Roles are a process of socialization, for roles tend to be socially determined and individuals are socialized into them.

Nomothetic: expectations.--The expectations component of the nomothetic dimension include explicit rules, regulations, and responsilibities--the things one is accountable for. Although there is an infinite range of expectations from role to role, how well an individual or actor is functioning within a role is determined by the degree to which the responsibilities are met.

Idiographic: individual.--The idiographic dimension represents the psychological element within the social structure, centering on the individual. To analyze the observed behavior within a social structure or institution, it is essential to know the actor.

Idiographic: personality.--The personality, according to Getzels, Lipham, and Campbell (1963), involves "the dynamic organizations within the individual of those need-dispositions and capacities that determine his unique interaction with the environment." It is the totality of behavior--personality of "style" is a determining factor in behavior.

Idiographic: needs-dispositions.--Needs dispositions are internal forces that cause individuals to act in a particular way or to move in particular directions. Individuals tend to orient themselves and behave with respect to objects in their environment according to personal needs (Maslow, 1976).

Transactions

The resulting observed behavior, according to the model, is a function of each of the elemental components interacting. To understand behavior it is necessary to analyze the nature of the interaction between the nomothetic and idiographic dimensions. The model, which can be applied to many situations within institutions, allows analysis of the various roles and personalities along with resulting interactions, including potential conflicts. In any administrative position (including that of college teaching), there is a transaction between role (institutionally determined) and personality (individually determined). The degree to which role or personality is dominant in a given setting is usually determined by the organization and nature of the role. In situation "A" in Figure 5, role has a greater effect on behavior; in "B" the personality of the individual is more dominant. There are usually institutionally determined ranges of transactions allowed with organizational roles (e.g., "C"). The needs-disposition and personality of the individual may not always be congruent with institutional roles and expectations, resulting in conflict.

$$B = F (R \times P)$$

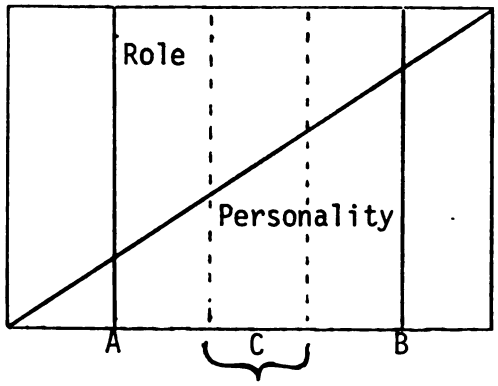


Figure 5.--Role and personality.

Conflict

Conflict within social systems is almost certain when institutions and individuals collide. Conflicts, the model suggests, may arise from several sources:

1. A conflict between multiple roles
2. A conflict between role and personality
3. Internal personality conflicts or personality disorders

Knowing how adaptation or resolution of conflict occurs is important in meeting both institutional and individual needs and also in analyzing behavior.

> Models are mere tools to analyze behavior in the setting. Guided by research questions, with one foot in related literature and the other firmly planted in the field the ethnographic researcher becomes immersed. (Field notes, 4-27-81)

Epistemological Perspective

In the following section, the third area of literature explores epistemological foundations of the research and related ethnographic studies of classroom interaction. To locate the Getzels and Guba model in everyday life, it becomes necessary to analyze social and psychological interaction.

Situational Frame

To develop a working hypothesis that would shed more light on the nature of the teacher-student interactions, questions of teacher perception and control and management of the interaction are important considerations. The parameters of the "situational frame" first described by Edward T. Hall (1966) and the "situational frame cycle" developed by Erickson (1971) provide a way of examining the effects of spatial settings on behavior.

The "situational frame cycle" model developed by Erickson "permits the researcher to produce a process-based rather than boundary-based definition for a social unit of analyses" (p. 3). The behavioral records (videotape, film, etc.) monitor behavior in a variety of situations. From the data situational frames, cycles can be derived by analysis of patterns of behavior. The patterns are interesting for they are the enactment of the curriculum.

Erickson defined the situational frame using five parameters:

1. Space (both location and proxemics)
2. Time, occupants (status relationships between frame occupants and their accompanying roles)
3. Activity (work, play, courting, etc.)

4. Perception (of the frame by frame occupants)

5. Control (who controls and frame and which frame occupants control the other occupants)

All the parameters interact simultaneously to define the situational frame. The parameters are complex, as are the interactions among them. It is necessary to define the nature of the parameters in greater detail and to illustrate their syntactic relationships (p. 6).

As the following analysis illustrates, salient to the study are the "control" factor (culturally defined by the occupants of the frame) and the "perception" of the frame by the occupants. These interact to produce different behavior patterns in otherwise similar settings. The evolved hypothesis proposed that both the nature and the management of the teacher-student interaction in the laboratory setting would be in part determined by the instructor's perception of his/her role as a science teacher.

Because the study involved three different instructors, differences in the quantity and quality of interaction became clear during ongoing observations. The instructors' perception of the "frame" seemed the key linkage in determining management and control within very similar spatial and activity settings.

As a result of cultural and personality differences, each of the instructors views his/her role differently. Although they have very similar overt goals, the perceived role and method each instructor uses to orchestrate the lab and resulting student-teacher interaction creates very different "situational frames."

Instructors often establish patterns of interactions with varied rationales for their actions. As examples, these might include:

Interaction	Rationale
Academic only	- Reserve socializing for outside class - Don't socialize with students
Social only	- Students must work independently--discover the answers for themselves - Instructor not sure of the material, doesn't want to be put "on the spot"
Academic & social	- Helps to get to know students - Students feel more comfortable asking questions

Space and Proxemic Patterns

Hall (1966) contended the cultural dimension that man creates has grown to the point that it shapes man's behavior. The environment people create along with the natural environment interact to mold each other. Hall's research indicated that "man's sense of space is closely related to his sense of self, which is in an intimate transaction with his environment" (p. 63). The importance of space and the proxemic patterns within culturally defined space are reflected in the management and interactions within any territorial space. Proxemics, in Hall's terms, are used to "define the interrelated observations and theories of man's use of space" (p. 11). Proxemic patterns derived from observation can provide clues to cultural

differences and attendant differences in social meaning from group to group. Thus various patterns of fixed space (e.g., the laboratory) and the social and personal distance of individuals operating within the space (e.g., interaction) can provide clues to behavior within the setting. Hall contended that most of the cultural dimensions are hidden from view and that to understand the real interrelationship it must be understood that "people cannot act or interact at all in any meaningful way except through the medium of culture" (p. 188).

Grounded Theory in Research on Teaching

Three ethnographic studies of teaching that explore teacher perception (Janesick, 1978) and teacher-student interaction (Cooper, 1980; Florio, 1978) are relevant to the research reported here. Each study provides insights into the management of effective learning environments and suggests implications for instructional improvement through a better understanding of the social and cultural dynamics of the classroom.

In an ethnographic study of a teacher's classroom perspective, Janesick (1978) studied a sixth-grade teacher using the theoretical constructs of symbolic interaction (Mead, 1934). Because symbolic interaction is characterized as a process of interpretation, the observational study focused on the teacher's interpretation of the classroom environment.

> . . . For the interactionist, a perspective is a reflective socially-derived interpretation of that which he or she encounters, an interpretation which serves as a basis for the actions which he

> or she encounters, an interpretation which serves as a basis for the actions which he or she constructs. The person's perspective is a combination of beliefs and behaviors continually modified by social interaction.
>
> In the classroom, the teacher acts and thinks in a particular way. In the terms of the interactionist, the teacher develops a classroom perspective, a consistent way of thinking and acting in a classroom. That perspective enables the teacher to make sense of his or her world, to interpret it, and to construct his or her actions within it. (Janesick, 1978, p. 3)

Janesick's descriptive picture of the teacher's world revealed five elements of the teacher's perspective: (1) concern for maintaining a sense of groupness, (2) the goal of respect and cooperation, (3) the concern for planning and organization, (4) the role of teacher as leader, and (5) teaching style. Both external and internal contextual variables influenced the perspective and resulted in adjustments in teaching behavior. The study suggested that "teaching remains an individual enterprise dealing with present oriented situations in the classroom." The teacher's classroom perspective became the "curriculum of the classroom" (p. 22). Janesick's study supported the notion that the teacher's perception of role and management of the setting are influenced by external and internal factors. This concept is key to the development of the interactional model developed in the study.

Another recent ethnographic study by Florio (1978) investigated how children "learn to go to school." Although the study focused on the interaction in a kindergarten/first-grade classroom, the implications revealed in the study are important to college learning environments as well. Interested in the interaction that occurs in the classroom, as well as the interactional competence of participants,

Florio investigated verbal and nonverbal communication in the classroom setting through participant observation, videotape, and viewing sessions with the teacher.

Contending that norms for appropriate interactional behavior must be learned just as language is learned in social life, the study explored the contextual shifts within the dynamics of the classroom social setting and found that "interactional competence is, in the truest sense, acquired by doing" (p. ix). Children learn about what interactional behaviors are appropriate in various settings and situations by participation. Shifts in activities are jointly accomplished and are cued by changes in language and/or use of space by participants. The teacher, as organizer of the classroom learning environment, plays a major role in the process.

An interesting finding of the study, which certainly is important to the investigation of the college laboratory, revealed: "There is more than one way to be a teacher or a student, both across and within time in the classroom" (p. 153).

By focusing on a classroom event or interactional context such as "work time," Florio analyzed the varied contexts that made up the work-time activities with resulting teacher and student behavior shifts. Florio suggested that by the sharing of interactional events children become competent classroom participants. Changes in contextual features such as time and activity create different demands on participants. As teacher and students pass through changing phases of activity together, roles change and there becomes "more than one way to become a teacher or student, both across and within time in

in the classroom" (p. 153). Because there are also major shifts from teacher-centered to student-centered learning in the college laboratory, there also may be a need for students to "learn how to function in lab." This is exemplified by the fact that many older students have a period of adjustment when returning to school, and the science laboratory can be particularly frightening for those unfamiliar with the context of student-centered learning. In a sense, they are newcomers just as the kindergarten children are newcomers to an educational setting. Gradually, in interaction with teacher and peers, they acquire the norms for appropriate behavior in the lab.

Florio suggested the need for further research on the relationship between teaching style and the academic and social learning of students:

> What might be most interesting to discover are the ways that successful teachers use "instructional combination" of styles in relation to such contextual variables as the time of day in school and the nature of the subject being taught and the social identities of the students. (p. 157)

The recognition by the teacher of "patterned variation" (p. 159) in teaching style ultimately allows the teacher to improve the cues for contextual shifts. This conscious improvement in interaction is accomplished by a fuller understanding of the classroom event.

> The ethnography of classroom interaction makes it possible by means of intimate, extended contact with the teacher and children for the researcher to learn a good deal about their social world. But it is also a powerful tool by which the teacher can bring to conscious reflection some of the information which she/he takes into account when making decisions about classroom organization, academic tasks, and the competence of students. . . . (p. 162)

With the growth and diversity in higher education, there is a growing need for research on effective college teaching. The third ethnographic study examined the interactive dynamics of the instructional process (Cooper, 1980). Focusing on the classroom of an effective college instructor, Cooper developed a descriptive model of teacher and student interaction. The study explored questions of teacher role and behavior patterns, ultimately developing a descriptive model of the dynamics of the instructional process.

Cooper suggested analyses of the instructional process have a variety of implications for both instructional development and for further research in classroom interaction. For educators involved in instructional development, a better understanding of the instructional process would allow:

1. Diagnosis of instructional systems to identify and understand problems and strengths.
2. Design and development of instructional systems with input from participants.
3. Faculty improvement via inservice training using models to analyze and suggest strategies for change.

Cooper also supported the findings of other ethnographic researchers who have studied classroom interaction. The findings suggested:

1. The teacher's verbal and non-verbal behaviors influence the instructional process and the subsequent interpretation of the instructional event.
2. The participant's common recognition of the changing structure of the event is correlated with changes in use of space.
3. While the teacher orchestrates the event, it is an orderly, joint production of all class participants. (p. 195)

When teacher and student roles were examined, the study also supported the notion that:

> . . . there are various situationally determined and socially negotiated teacher and student roles in classroom interactions. The shifts in roles can be described and analyzed in terms of the part of the class the participants are "in," the focal activity, and the moment to moment changes in the event. These changes may be academically oriented (the students are or are not understanding the subject matter), socially oriented (the students are or are not involved in the instructional process, or the instructor and students are involved in non-academic or humorous exchanges), or managerially oriented (the business of the course is the focal topic). In examining the intricacies of these changes in the event and shifts in roles, the instructor's pronominal usage and use of space turned out to be reliable indicators of the social relationships. (p. 196)

The study clearly illustrated the value of including students' perspectives in the process of analysis. The "school culture" became an important factor in understanding behavior within that specific setting (p. 196). In the analysis of behavior within the community college, "school culture" is also an important consideration.

Recognizing the limitation inherent in studying one classroom and one instructor, Cooper concluded:

> Future research can be suggested in four general areas: a continuation of descriptive studies of the dynamics of instruction in order to develop and compare models of effective instruction, diagnostic studies of instructional systems in order to use the inquiry process and methods to improve instruction in particular classes, evaluative studies to explore the use of the inquiry process and methods in order to make administrative decisions, and comparative studies to look for and to test relationships in order to determine if they hold in different situations. (p. 197)

Important to this study is the notion that the experienced teacher orchestrates the event, but the final social event is a joint construct of all participants. Also, the use of a model to

analyze instruction allows not only diagnosis, but also is an important tool for comparative research.

In the next chapter we shall move from literature to the dynamic social setting of the community college laboratory, examining the interactions of the actors within three similar yet unique settings.

CHAPTER FOUR

THE STUDY

The Laboratory Environment

The Setting

Lakeside Community College is a large midwestern two-year institution with a tradition of academic excellence. Although the college was initially founded in 1914 as a two-year transfer program for a major state university, in the past twenty years the mission of the college has continually evolved to meet the changing needs of the community service area. The original college bulletin of 1914 carried the following statement:

> The work of the college may develop into other fields of service in the future. It will be its best policy to meet the demands of the public as rapidly as its needs are manifested. (A Self-Analysis, 1974, p. 2)

Today's mission and goals reflect that change.

> College Mission to offer quality educational instructional programs, services and other activities for the needs of the community.
>
> College Goals
>
> 1. To provide curriculums and programs that serve the needs of the community.
> 2. To create an atmosphere of support and trust in which all persons have the opportunity for growth.
> 3. To manage the finances of the college through responsible fiscal planning.
> 4. To encourage student, staff and community involvement and active participation in activities of the college.

5. To promote positive and productive relations with the community.
6. To provide and maintain supporvie services to the staff and students to improve instruction. (November 1981)

The curriculum has expanded to include a variety of two-year technical and public health degree programs, along with a broad range of community service activities. No longer is the college primarily a transfer college, but has become a multifaceted program reaching out into the community it serves. The college philosophy and objectives outlined in the Lakeside Community College Faculty Handbook (1979) reveal a community-based, yet strongly traditional, program.

> Philosophy and Objectives--Lakeside Community College seeks a level of distinction in its faculty, its student body and its educational programs which will provide quality higher education for the youth of this community. To this end, all of the College activities, curricular and co-curricular, are directed; and to this central purpose, the College devotes its resources--human, financial and organizational.
>
> The College believes that modern society requires of its leaders not only the basic human understandings, knowledge, and values which a liberal education is intended to supply but also the professional and applied skills which an increasingly complex civilization demands. In specific objective, therefore, the College endeavors to help the student prepare himself/herself for the inevitable broad range of his/her responsibilities and accordingly develop a vocation or profession.
>
> The liberal arts and pre-professional curricula are intended to develop and stimulate the student's understanding of the scientific, social, and cultural forces among which he/she will live, and to acquaint him/her with the significant ways men have interpreted these forces. This exploratory education provides a sound basis for intelligent living and citizenship. And the applied arts and sciences curriculums offer many one and two-year specialized programs for those who wish to prepare for positions in business, industry, and community service.
>
> The educational programs of the College, then, provide a solid foundation for advanced study at senior educational

> institutions, and provide opportunities in both vocational and community service training.
>
> In keeping with this statement of general objectives, and in performance of its functions, Lakeside Community College recognizes clear obligations to its students, its alumni, and the community, and will constantly seek more effective ways of meeting these commitments. (p. 2.1)

The quality of students graduating from Lakeside has long been recognized both in the community and among four-year institutions accepting transfer students (A Self-Analysis, 1974). Unlike some community colleges, Lakeside is not considered a "last chance," but a "smart beginning" to a college career.

> I'm glad I stayed at Lakeside for my first two years. Many of my friends had problems adjusting to a large school. Two dropped out--one went to a small four-year school, the other is back at Lakeside. The small classes were important to me. (Informal student interview, 3-17-81)

The school is located in the center of a large metropolitan area. The urban campus consists of seven large buildings in the city center and several satellite educational centers. Recently the college has embarked on a building construction and renovation program. A new multipurpose fieldhouse, learning center and library, and recently completed student center have given the campus, serving over 4,500 full-time and 5,000 part-time students, a much-needed facelife.

In a recent report (President's Report, 1981; Appendix F), it was revealed that the total number of metropolitan residents served by all college programs and services number almost 38,000 individuals. Included in this number were traditional college students, apprenticeship students, community service participants, and people attending workshops and seminars.

Lakeside's values are expressed in its motto, "A tradition of excellence." The College has endeavored to hire high-quality faculty and maintain a high ratio of full-time to part-time instructors. Full-time faculty and administration number 245, while the number of part-time faculty, although rising in recent years, numbers 158. This ratio is reversed from that of many community colleges (Office of the Budget, 1980) and has traditionally, along with small class size, been a selling point for the College. Recently the President of the College has appointed a task force to study ways of maintaining the "excellence" in light of drastic funding cuts. In the 1981-82 State of the College address, the President emphasized the importance of the instructor in the educational process.

> Lakeside Community College is known for its excellence. . . . You as individual faculty members have created that reputation by the way you teach, the way you listen, the way you care for your students. . . . There is a perception of excellence about the College which is consistently spread by word of mouth throughout the entire community. . . . Without exception, the number one compliment I receive about the College year in and year out centers directly on a compliment for an individual instructor and his or her positive influence on a student at a critical time in his or her development. . . . (p. 23)

Clearly, the relationship between teacher and student is an important aspect of the Lakeside Community College program.

The Actors

Three instructors.--Although the study involved over 180 students, the focal research participants were three life science instructors: John Masters, Edward Jennings, and Margaret Cooper.[1]

---

[1]Pseudonyms.

Although one instructor, John Masters, was the primary focus of the study, Edward Jennings and Margaret Cooper were selected for the study to allow comparison and triangulation. It became important in the study to observe a variety of individual interpretations of role, management, and ultimately teacher-student interaction in the laboratory. Edward Jennings was selected because he taught the same course, thus the same "student type," but in a very different manner. Margaret Cooper was selected because her setting was similar to the other instructors, while her course and students electing the course were quite different.

1. John Masters. At 30, John is the youngest of the instructors observed--in fact, the youngest in the life science department of sixteen full-time teachers. With his wife and young son, John lives in the historic area of Lakeside. He is actively involved in the local heritage group and is restoring his nineteenth-century home. He is tall and good looking, with a dignified air that belies his age. Graduating with an M.S. from a large state university, his experience included a graduate assistantship in anatomy and work for a public health agency before coming to Lakeside Community College. In his seventh year of college teaching, he is currently in charge of coordinating the human anatomy and physiology curriculum for the life science division. In conjunction with his newly begun Ph.D. program, he has prepared an illustrated lecture guide for students. With an eye toward an administrative position in the health-education field, he is also enrolled in nursing classes with an additional degree in nursing a possibility. He has a desire to be knowledgeable

in all facets of health care and feels a nursing degree would expand career possibilities. Although taxing at times, his daily shift from the role of teacher to that of student has been, in his opinion, most rewarding.

Philosophically, John is committed to providing a very positive learning environment for his students. He, although younger than many of his students, plays the role of mentor especially to the returning student (Figure 6). He often remarks that "the older student needs self-confidence builidng and understanding." With encouragement, many of these students come to his office for personal or academic help, and some even call his home for the support they need. When asked about the reasons students seek him out, he commented,

> Some of the older ones [students] are a little bit insecure and don't know what's going on, so I tend to pay more attention to them and I think that gives them the feeling I'm a little bit more interested in them, so they tend to open up more. A lot of these people are just dying for someone to talk to. (Interview, 3-6-81)

When questioned about the phone calls he received at home, he continued,

> Usually they don't call for a specific thing; usually it's for a kind of hand-holding thing: I'm just beside myself, or I just don't know where to begin to study for these bones, where do I start? It's not specific things like: Is our test next week at 8:30? or What's the difference between this and that? Generally, it's more of an emotional thing. (Interview, 3-6-81)

Figure 6.--John--Interacting with older students.

2. Edward Jennings. In his late thirties, Ed is married and has four adopted children. Tragically, his son was permanently handicapped in a tractor accident several years ago. Ed is an avid horseman, and with his family lives on a farm about twenty minutes from the city. He is very active in the 4-H program and a prime mover in the handicapped riding program. Before moving to Lakeside, he taught physical science in a high school outside Chicago.

Ed is a very sociable person, which is reflected in his philosophy of teaching. He enjoys joking with students and maintains a light atmosphere in the classroom. Committed to the community

college, Ed feels that the quality teaching and size of the classes are important in his success. Ed takes time after class or during office hours to explain or clarify concepts (Figure 7).

Figure 7.--One-to-one explanation after lecture.

Ed has taught both general biology and anatomy and physiology for the College but currently spends most of his teaching load in the year-long anatomy-physiology program. Although anatomy and physiology were not Ed's original subject area, he has become the staff expert in CPR training. Recently, he teamed with John to present a very successful inservice program for the College staff on "the heart" and CPR procedures.

3. Margaret Cooper. One of three women in the division, Margaret Cooper is one of the most highly respected instructors in the College. She holds a Ph.D. in biology as does her husband, who also teaches in the department. Her husband teaches general biology for nonscience majors, while Margaret teaches the pre-med and pre-dent students both Comparative Vertebrate Anatomy and Embryology. An avid gardener and skier, Margaret is very energetic for a woman in her late fifties. Originally from the East Coast, Margaret has been with the College twenty-two years. Her pre-professional medical and dental students have little trouble getting into medical or dental school with her favorable recommendation.

Margaret's philosophy of education is tied to a strong traditional standard of excellence, and her presence in the classroom is commanding. Although known as a "tough" teacher, she has the respect of her students, who often, later in their careers, list Margaret Cooper's classes as one of the reasons they succeeded. In her classes she sees herself as a "guide." When interviewed, she remarked that "the instructor knows exactly what the student should learn, and sees to it that they master the material" (Informant survey, 5-15-81).

Although slim and of average height, she presents an imposing figure in the classroom. Donning a white lab coat and surgical gloves (Figure 8), her image is one of a professional expert often impressing students with her comprehensive scientific knowledge.

Figure 8.--Margaret--Professional expert.

The Students

Like pebbles on a beach, all students may seem alike until one looks closer and finds each one unique. Despite the uniquenesses, broad categories will be used in the study to describe the students of Lakeside Community College. Although it is difficult to define the typical student at Lakeside, two larger groups include the "older returning student" and the "traditional high school matriculate."

Unlike many large four-year institutions, the student population of community colleges is typically older. In the case of Lakeside,

the average age of students is approaching thirty. Many of the older students enrolled are married or returning students whose education after high school was delayed. Whether full or part-time, these students often have special pressures or outside commitments that influence their college career choices. Some have delayed their education for three or four years, while others may not have been in a classroom for fifteen years or more. Time, family, age, economics--one or more of these very special factors may influence a returning student's college career. In a recent Lakeside Community College Update published by the President's office, the following "student profile" facts were given:

> Students range in age from 17-71 years old, with the median age approaching 30.
>
> The student body is almost evenly split between residents and non-residents.
>
> Over half of our student body take at least one course through the Evening College.
>
> More than 55% of the students take additional academic work at a four-year institution.
>
> More than 75% have at least a part-time job; many working in a full, 40 hour per week job while attending the College.
>
> The College enrolls over twice the number of State Tuition Scholarship students as any other State Community College.
>
> Women have outnumbered men students over the past three years.
>
> More students are college graduates seeking training for a second career. (1981, p. 3)

Lakeside also has a large number of what are called "traditional students"--those continuing their education directly out of high school and planning to transfer to four-year schools upon

graduation. Again, these students cannot be easily categorized. For some, economics keeps them in their own community for the first two years of college. For others, the larger universities may not have accepted them due to grades or other deficiency. But for many, Lakeside offers a quality two-year program with small classes taught by highly qualified teachers. Many parents in the community choose to have their sons or daughters move into the college experience through the highly respected two-year program. Although the glamour and social life are not as alluring for many students, the academic offerings at Lakeside are judged equal to, and for some students better than, the freshman classes at large universities (Field notes, 4-20-81).

The last large group of students is those who may fall into either of the two categories listed above but are enrolled in a technical or two-year terminal-degree program rather than a transfer curriculum. These students comprise one of the fastest-growing populations of the community college and are rapidly changing the definition of the typical community college student.

The pre-professional science student.--The students observed in the study were all pre-professional science majors both in terminal and transfer programs. Those taking Human Anatomy and Physiology are largely in the health-related curricula, including advanced degree and licensed practical nursing, X-ray technology, radiology, pre-dent, and pre-med; biology and other science transfers also take the class, but they are always in the minority. Embryology and Comparative

Anatomy students are traditionally pre-med or pre-dent, with an occasional biology major electing the courses.

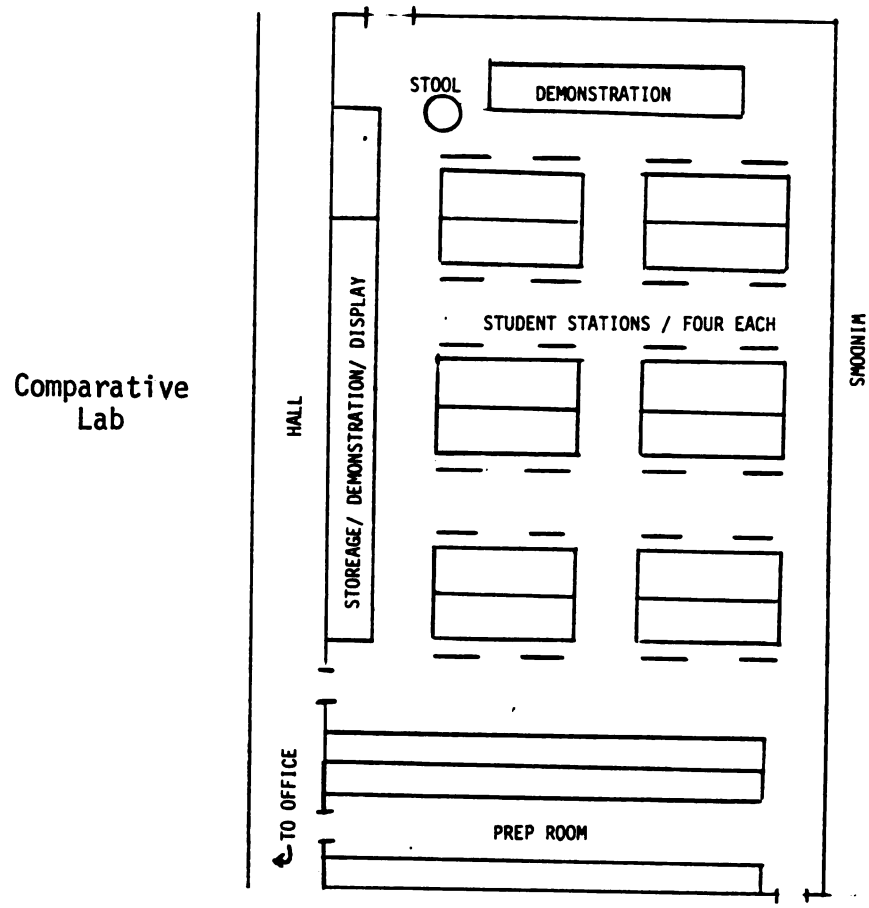
At Lakeside, from 250 to 300 students are enrolled in the year-long Anatomy and Physiology sequence, while only about thirty to forty students elect the more specialized Embryology and Comparative Anatomy.

The Laboratory

The life science laboratory classrooms at Lakeside Community College are very similar in design. The number of lab stations limits all classes to twenty-four students, in comparison to lecture classes, which may run as high as forty (small compared to the 200-plus lecture classes at many universities). Figure 9 illustrates the general layout of the laboratories observed in the study.

Designed about six years ago with input from the teaching staff, the human anatomy and physiology areas of the life science division occupy what was once the college library. The classroom and instructors' offices sill have the ornate woodwork, although otherwise they are modernized. The new lab is supplied with updated equipment as well as furniture.

The comparative lab is housed in an older wing just down the hall. The lab tables are of the older style, but are very functional. (Figure 10). Many specimens and models are on display in the wooden cabinets that fill the side wall.



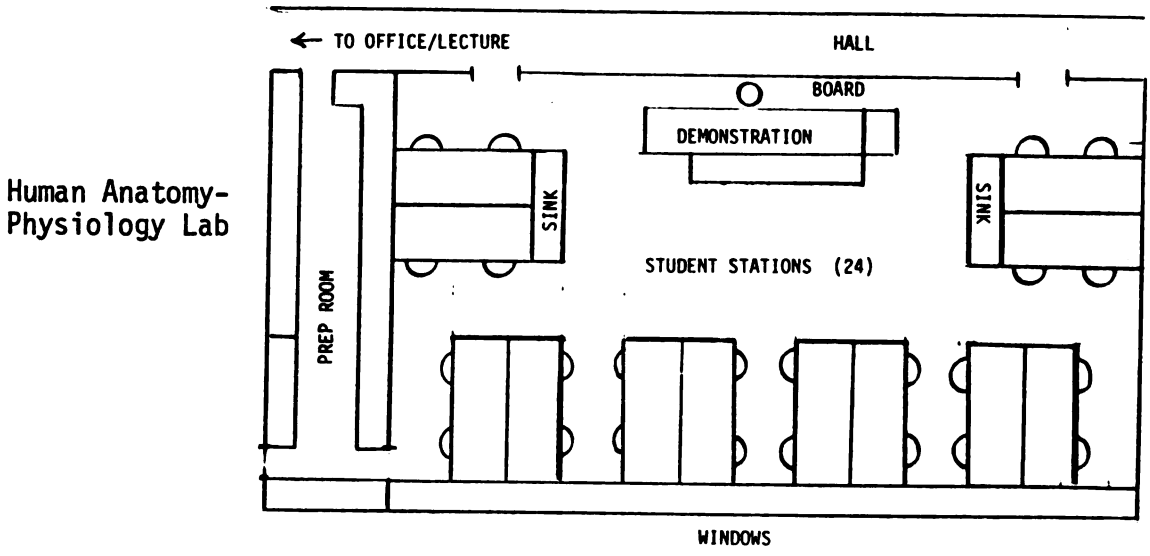


Figure 9.--Comparative anatomy lab and human physiology lab.

Figure 10.--Comparative anatomy and embryology lab.

In each laboratory a large instructor's demonstration table with blackboard and projection screen is located at the focal front of the rooms. The focal front of the newly designed anatomy-physiology lab is toward the long side of the room, while in the older labs such as used in the comparative classes, the focal front is located at the end of the room. An array of biological specimens, charts, and other related teaching aids is located on the walls or in cupboards along the sides of each room. A large bank of windows stretches across the

length of each room. A prep room for storage of chemicals, preserved specimens, and equipment is attached to each laboratory for easy access.

A short distance down the hall are both the instructors' office and lecture room. The close proximity of the instructors' office to lecture and labs of both classes allows for greater potential student-teacher interaction (Figure 11).

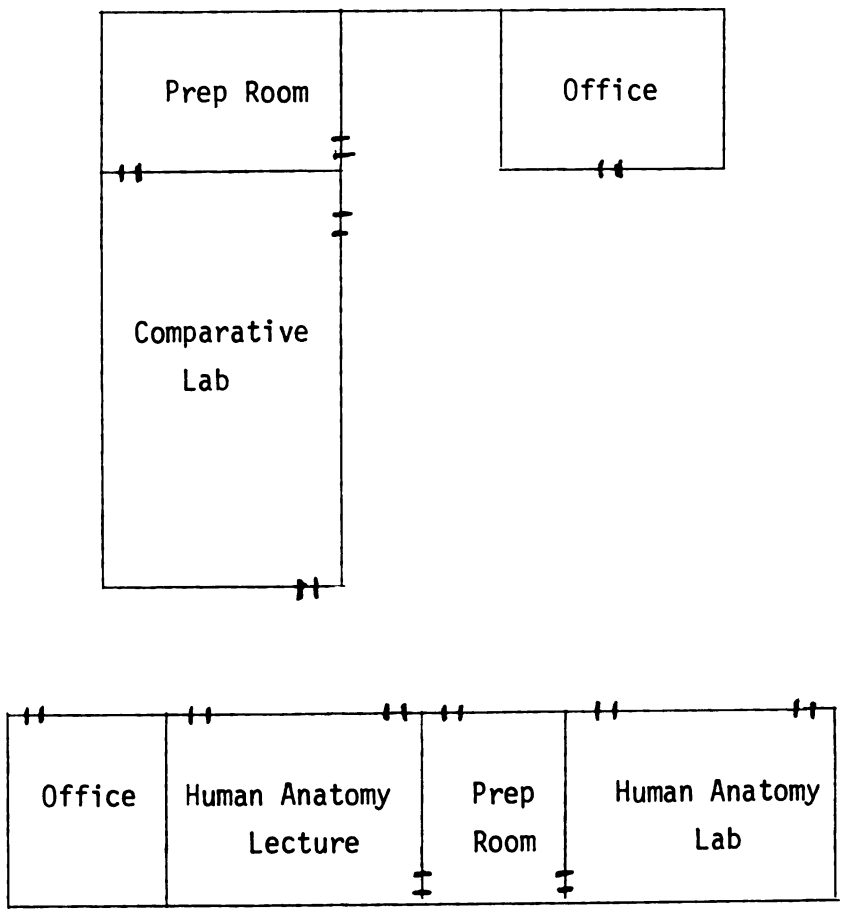


Figure 11.--Floor layout.

The anatomy and physiology prep room becomes a second home for students reviewing or making up work before every test. As many as fifteen people may be crowded into the 8 x 10 foot room on test days. When any of the four anatomy instructors enters the prep room, he/she is deluged with questions, not only from their students but also from those of other instructors. Some instructors have been known to avoid these areas around test time, while others make themselves available for questions. Students have commented, "We appreciate the time some instructors will take to answer our questions," or "Just having the correct structures pointed out to us helps us remember later" (Student survey, 5-12-81). In contrast, because no other students use the comparative anatomy lab, those students rarely use the prep room, which is reserved for the instructor or lab assistant. They instead may be found in the lab itself, reviewing or working independently.

At the individual lab tables, which usually number six with four stations at each table, students have available to them the materials and equipment necessary for each exercise. Depending on the exercise, they range from microscope and slides, preserved specimens, and dissecting kits to stethoscopes, chemical test kits, and live specimens.

Live specimens in human anatomy and physiology are limited to one lab partner being the "guinea pig" for the other, as illustrated in Figure 12. Here the student is listening for water to pass through the cardiac region of her lab partner's stomach (Field notes, 2-18-82).

Figure 12.--Lab partners as "live specimens."

Students also come up with their own laboratory "science" equipment. During the Urinalysis Exercise, with encouragement from their lab instructor, the anatomy-physiology students brought in unique containers for their individual urine samples. Included were a "Mellow Yellow" can, a transformed salad dressing jar labeled "Piss and Vinegar," and what students considered the most creative, a squirt gun (Field notes, 4-6-81).

The very "professional" comparative anatomy students also had their day of fun when preparing their preserved cats for dissection.

The cats were dripping wet after their new owners washed off the noxious preservative. The instructor provided each student with old "found combs" so that they could part the hair along the dorsal side of the cat. It was important that the initial cuts were in the correct location to facilitate later observation of underlying tissues. Several students hurried off to the chemistry lab for hair dryers, and within minutes future doctors and dentists were blow-drying the wet fur of the cats, creating a meticulous part down the back. The instructor commented that "every once in a while a bit of fun helps to lighten the mood of the otherwise demanding course" (Informal interview, 2-5-81).

The Office

The office is a personal as well as professional space for instructors. As Hall (1966) described the dynamics of space, he noted, "Individual patterns of use and need for space are of particular interest when analyzing relationships in any setting." Most instructors in the life science division share office space with their fellow staff members. Shared offices are divided into two to five separate areas, some locked cubicles, others a more open arrangement. Although one might suspect the three instructors who occupy private offices may have higher status, in fact, for most, the arrangement has evolved due to sociability or subject-matter openings. Most of the instructors enjoy the company of their peers, for the shared offices offer a time for both social and professional intercourse. It is interesting that even the department chairman shares one of the five smaller offices on the main floor.

Margaret Cooper occupies one of the largest private offices adjacent to her laboratory classroom. In Margaret's case, the arrangement is due, in part, to professional status, but also to her very private nature. The office could easily accommodate two instructors, but no one would intrude on her well-defined space. In contrast, Ed and John share their open office with the third anatomy-physiology instructor in their group. The 15 x 15 foot office is divided only by book shelves, allowing a great deal of interaction. The decorations on the walls reflect the personal taste of each instructor. Ed's corner is filled with family mementos, a painting done by a former student, and plants. John's reflects his love for the art nouveau of the thirties.

Because the office of Ed and John is located next to the lecture and laboratory rooms, students move freely between the spaces. Because they have been encouraged to come to the instructor's office for both academic and personal needs, both John and Ed often are visited by students. It is common for students who have graduated to return to share personal successes or frustrations with the real world. All instructors at Lakeside are required to be available for five scheduled office hours. However, all three instructors are in their offices more than the required time, and students were welcome to drop in at any time.

The Lounge

"Keep Out! Teacher's Lounge!".--The hand-painted sign on the door makes it clear that the makeshift science teacher's lounge

is off limits to students. In reality, the zoology prep room and storage space for audiovisual equipment, the "lounge" is a meeting place for ten o'clock coffee break. Crowded into one end of the 10 x 15 foot room are a table, six chairs, and one over-stuffed swivel chair. The ten o'clock group varies from six to ten participants out of a total department of sixteen full-time instructors. Three of the nonparticipating staff will drop in on occasion, while two never are seen. Originally formed to help staff communication, the group was noted for a grand display of desserts. Each group member would provide "goodies" for the week, until recently, when the department chairman suffered a mild heart attack. Since then, the group has dropped the daily goodies in favor of an occasional cookie for health reasons.

Each of the three instructors in the study participates in the group, but in very different ways. Margaret is an occasional visitor, for most of her duties are in the afternoon and she often arrives around the ten o'clock hour. Ed, on the other hand, rarely misses the social break. He often was observed in the center of the conversation telling stories of his farm or 4-H exploits (Figure 13).

John visits the group about three times per week and remains on the fringe of the conversation, choosing to listen. As he sits on the corner cabinet, he only occasionally makes a comment on the social banter. When asked about his involvement in the group, he commented that he dislikes coffee and is concerned about his "boyish figure," but he is very aware of the need to maintain visibility. "I have little to say to the group," he confessed, "for they are

philosophically and personally very different than I" (Informal interview, 3-17-81).

Figure 13.--Ten o'clock coffee.

The conversation, although for the most part social, occasionally is directed toward common student problems and unusual classroom events. Academic frustration and school politics are discussed more often at contract times. The Dean of Arts and Sciences occasionally drops in on the group to share a cup of coffee and extend his visibility to the otherwise isolated staff. Both he and the department chairman see the social peer-group interaction as vital for morale and department unity.

The Actors in the Setting

Margaret.--For Dr. Margaret Cooper, embryology and comparative vertebrate anatomy occupy the major teaching load fall and winter semesters, respectively. Lecture is scheduled for two one and one-half hour classes, immediately followed by two three-hour labor sessions. Teaching both the lecture and lab sections, Margaret spends the better part of her teaching day with the same group of students. There is a sense of community that develops among the group, especially the lab groups. They study and suffer together through the year-long sequence, and most are involved in the extracurricular pre-med club. The two afternoons a week they meet, they can be seen taking their break as a group in the cafeteria. Easily recognized by their long white "doctor's" coats, they mix little with other students on these days (Figure 14).

Typically, there is no visible behavior change on the part of students when Margaret enters the lab until she moves to her stool in front of the room and asks the class to turn to the appropriate page in their lab manual. The social conversations and academic chatter quickly break as the students turn their attention to the instructor.

The time between the lecture and laboratory portions of the comparative anatomy class gives Margaret a chance briefly to get away from the students and have an often-solitary cup of coffee, for the staff coffee room has few late-afternoon visitors.

Figure 14.--Pre-med lab partners.

As we sat one spring afternoon over a cup of coffee, Margaret shared with me some of the personal perspectives that guide her teaching. "My students are going to be professional people one day," she commented, "and image and attitude are very important for prospective doctors" (Field notes, 3-12-81). She continued to share examples of how she attempted to influence her students. She did not hesitate to suggest that a student needed a haircut or clean lab coat to project a better image, but always with a professional tone rather than one that put the student down. "My course is very difficult for many of the students," she continued, "and I try to guide the students

through the materials to be studied." She wanted to be certain that every student observed and understood the intricate laboratory dissections. She called it "verbally guiding students," and following up the verbal directions by going from student to student to see that the students observed exactly what was supposed to be seen. In the informants survey (Appendix E), she also commented on the reasons for the methodology employed:

> Much of the material is too difficult to expect the students to understand on their own. Lab manuals usually don't give enough help, nor do students care to read a lot of directions. [Sample in Appendix B.] Laboratories are most important in courses like Embryology and Comparative Anatomy. Students need hands-on experience to tie in what has been said in lecture (Survey, 3-12-81).

As Margaret returns to her lab from her short break, the students have already donned their long white lab coats and are preparing the materials for the day's dissection. Most of the students have been in the class the previous semester and need little direction in preparing their own materials for the day's dissection.

Each of the laboratory sessions is similar in format. Margaret reads the manual and the students follow along (Figure 15). Methodically reading and pronouncing the often utterly complex scientific terminology, Margaret's dry sense of humor many times makes the seemingly impossible possible. Students' eyes dart from text to specimen, checking the comparable parts. After completing one part of the exercise, Margaret then goes from table to table asking questions and pointing out the relevant structures. She calls the students by their surnames--"What is that structure, Mr. Rypma?"--or when addressing the

entire class, usually uses the term "folks"--"Okay, folks, find the optic pedestal. . . . It looks like a golf tee!" (Field notes, 2-5-81).

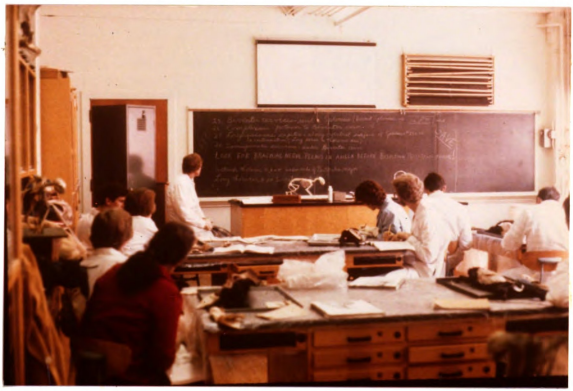


Figure 15.--Introducing the day's lab.

Directing the class to find a structure such as the reproductive organs in the shark, her methods is clearly illustrated:

T: "First feel for the ishialthial bar."

S: (Each student checks his or her shark, noting the sex.)

T: (Instructor begins moving around from table to table to double-check the sex.)

"Any siphon sac?" she continues as she moves to the next table.

"Okay, feel the metatyrigion in the male?"

"Do you see it?"

"Okay, no feel . . . see and feel."

S: (The students nod as they find the structure, cross-checking between students at the same table.)

T: "Anyone having trouble?"

(The teacher then moves to one student to check the structure and answer his question, then moves back to her stool in front to continue.) (Field notes, 2-5-81)

Margaret's strong emphasis on the use of student senses--"to see," "to feel"--is consistent in all lab exercises. Because each student dissects his or her own specimen, they are forced into having a truly "hands-on experience." She also gives a great deal of personal reinforcement: "That's the way," or "There you are . . . fine . . . that's good." But the reinforcement is not given in a warm, maternalistic mode, but in the cooler, professional manner of an expert rewarding a correct response from a protégé (Field notes, 2-5-81).

Margaret's classes normally contain academically oriented students who are highly motivated (characteristics many educators do not equate with community college students). As she walks about the room checking the students' progress, her erect posture and demeanor give her a very formal appearnace. The pre-professional science students also have special needs to which Margaret, as lab and lecture instructor, attends. Although the students are often academically oriented, they are not always as mature as they might seem. Her management of the class is modified to account for the demands of the

curriculum and the needs of the students. When new scientific terminology is introduced, she spends a great deal of time emphasizing correct usage and pronunciation.

In addition, there is another factor that greatly influences the management of her class. Margaret has a reputation to uphold, in terms of the quality of student transfers from her class to medical or dental school. Her recommendation is praised. For with an outstanding recommendation from her, students have little trouble transferring into state medical or dental schools. Many local doctors received their first training with Margaret and now send their duaghters or sons to Lakeside, even though they could go directly into larger four-year institutions.

Ed.--Recently, Ed Jennings has taught the first lab section of the week, which has meant setting up the equipment for the eight o'clock Monday morning group. Having taught the lab for many years, he is very familiar with the need of every lab session. As the group drifts in on Monday morning, he is busily moving from the prep room to the lab, setting up slides, charts, and other equipment. He engages in social conversation (in contrast to academic conversations) with several of the students before class, sharing with them some of the ongoing events on his farm. One day, for example, a steer escaped just as Ed was attempting to load him onto a truck for the slaughter house, resulting in a "Keystone Cops" chase. Another frantic weekend was spent rescuing a valuable horse from drowning in a muddy creek. The trauma was as great for Ed as it was for the terrified horse.

Most of the casual conversation centers on the activities of the instructor but occasionally includes students' exploits (Field notes, 1-26-81).

Ed conducts his class in a social, conversational style, often using personal or everyday examples and common language rather than purely scientific language to explain concepts. His tone of voice and relaxed posture add to the easy conversational style. Typically, he gives a very complete introduction to the day's activities. This may include a set of 35mm ectachrome slides that complement the microscope slides or dissection, a mini-lecture on the anatomy or physiology concepts that may not have been covered in lecture, or a demonstration of equipment or test procedures. The introduction lasts from fifteen to thirty minutes at the beginning of the two-hour lab session; then the students are expected to work independently on the day's tasks. Ed is available to answer questions during the remaining time. Because most of his students are in nursing or health-related curricula, Ed contends that "it is important for them to learn how to follow written direction and work independently on the assigned tasks." He is available for questions and makes it known he will help when asked, but he does not often initiate help to students. When asked what he sees as his major role in the lab, he commented:

> My role is to introduce the laboratory material and outline the procedure, then provide assistance with student questions.
>
> My students are going to be expected to follow directions and work independently in their future jobs. Lab gives them an opportunity to work in small groups or solve problems alone; it's all good experience for when they're out in the

> real world. Failure here [in lab] can be a learning experience; failure out there can be fatal. (Field notes, 2-2-81)

Among students, Ed is known for his wry sense of humor. During one lab exercise, students were asked to measure their partner's rib cage diameter at several locations and also get up on the lab tables, then lie down to have their blood pressure taken. He joked that all chest sizes were confidential as he demonstrated the procedure on himself, then continued his instructions by hopping up on the lab table to demonstrate the dignified way to lie down--especially if students wore skirts. That particular morning he only received a few chuckles, and he commented that "it really is early!" Because there always is a variety of students in classes, some approve of his humor, while others feel he could be more serious (Field notes, 2-23-81).

Unlike Margaret Cooper's lab, students in Ed's lab are not held accountable for the day's lab material, except on tests. In all the anatomy physiology classes, the previous week's answers to the exercise are posted so that students can correct their work. A few students always leave the lab early and rely on the posted answers rather than completing the exercises themselves. They must attend class, but little is said if they leave early. While Margaret's labs meet six hours a week, the anatomy-physiology classes only meet for one two-hour session. Ed shared one of his major concerns with lab:

> Some lab experiences are limited by what I'll call "repeatability." We are moving through [the lab] large numbers of students, and our time is limited to two hours. We have little time for open-ended work or technical demonstrations. (Interview, 5-12-81)

Not only Ed, but also students, believe that having the same instructors teach both the lecture and laboratory classes results in a great deal of coordination between the two experiences. Ed was part of the original team that planned and wrote the lab exercises and feels that this has helped to strengthen both the program and the teaching quality.

Because Ed encourages independent work, the students either develop strong working relationships with their lab partner or partners, or else tend to be loners. It is very often the loner who leaves the lab early, while the lab partners tend to "suffer it out together," relying on the strength of group knowledge to help them through (Figure 16).

Figure 16.--Four heads are better than two.

John.--One of the best descriptions of John Masters' teaching is "highly orchestrated." His labs are organized, controlled, and highly interactive, both in terms of teacher-student and student-student contact. The learning environment he creates is highly supportive while challenging. He is seen by students as an expert and facilitator who is also willing to counsel or just sit down and talk to students, as seen in Figure 17.

Figure 17.--Informal professional counseling before class.

The amount of introductory material and interaction varies from lab to lab in relation to the complexity or technical nature of the material presented. To clarify troublesome parts, he often

demonstrates to small groups, encouraging questions and providing moral support.

The two-week lab sequence on bones exemplifies the typical strategy John uses in the laboratory. As lecture instructor as well as lab instructor for the Friday afternoon anatomy-physiology lab, John determines the amount of introductory material based on what has been already covered in lecture. To introduce the lab, John sits at the demonstration table directing students seated at the lab stations to follow along in their lab manuals or to note the models either at their own tables or on display (Figure 18).

Figure 18.--John--Introducing lab.

John: Start with the axial skeleton [each team had its own one-half skeleton]. I want you to interact with your classmates. . . . Teach it to someone else, it's going to be more fun.

Please use pointers [he continued]. They're real bones, no pencils or pens, please! [Noting the difference between real and plastic bones.] Please be careful, lacrimal grooves become lacrimal craters [laughter]. (Field notes, 2-13-81)

During each lab, John helps students clearly identify tasks, warns of problem areas, and encourages group work (Figure 19).

Student: We'll never learn all these bones! [Many students nod agreement.]

John: [Grinning sympathetically] Expect a lot of work. It only takes four to five weeks to learn--but the test is in two weeks. [Laughter] You'll be surprised you can do it. I'll see you in the prep room, but 65 percent can be done at home. (Field notes, 2-13-81)

After several more minutes of background instructions, he turned the class over the students to identify individual bones and structures. Cycling around the room, stopping at each table, he engaged both in academic and social conversation with groups. Although he might leave the room for short periods of time, John made himself available to students and checked each group at least two times during the period.

At lunch one day, he shared what he saw as his role in the lab:

I want to develop self-confidence in my students. The material is difficult and requires a lot of memorization. I want to reduce the frustration level--attitude is very important. I enjoy working with women and feel I understand some of their special needs. It makes me feel good to help them succeed--that's what it's all about. (Informal interview, 2-13-81)

Figure 19.--Clarifying a point.

The Researcher in the Setting

One of the major goals of the laboratory experience is to expose students to the tools of science and reinforce specific concepts introduced in lecture. The physical setting of the instructional laboratories varies in relation to course needs. The lab may be a

collection of physical paraphernalia--microscopes, test tubes, and preserved specimens, but it also is people--teachers, students, and in the case of ethnography, the field worker (Figure 20).

Figure 20.--Researcher in the setting.

No researcher can deny that there is some effect of the researcher on the situation observed. The researcher effects on the labs observed were as varied as the personalities of the instructors. The role the researcher played in Margaret Cooper's lab was primarily that of an observer, whereas in the labs of Ed Jennings and John

Masters, there was a dual participant-observer status. Although there were times when the researcher mingled with Margaret's students during lab, because of the highly structured nature of the exercises, the opportunity for real participation was limited. This very fact helped to distinguish their different teaching styles.

There seemed to be little behavioral effect on either students or the teacher as a result of the presence of a researcher. They were so engrossed in their tasks, they paid little attention to the researcher. Their behavior was consistent throughout the semester's observations.

In contrast, the involvement in both Ed's and John's classes was highly interactive. Moving freely from the role of observer to participant, the researcher was privy to more of the subtle nuances of the setting.

Each of the instructors was familiar with the general purpose of the study--observing interaction in the laboratory. To triangulate the data further, students from previous semesters were interviewed to uncover possible behavior changes due to the presence of the researcher.

As might be expected, Margaret's format was unchanged, but there was an initial increase in student-teacher interaction in Ed's lab. This increased interaction returned to a more typical mode after several weeks of observation. Ed would announce to the whole class several times during the lab exercise, "If you have any questions, I'll be here to help." When encouraged, students did ask for

more help. After several weeks, Ed actively sought out interaction less frequently, returning to student-initiated interaction.

In John's lab, which was more interactive by design, there also was an initial increase in interaction. A former student reported that John, in a previous semester, had left the room more often. When asked whether his behavior changed due to the presence of the researcher, he said, "Yes," and commented, "I enjoy having you (the researcher) around." John later reflected he also was more conscious of his interaction but had not really changed his mode of interaction. Realizing the positive effect interaction can have, he used a great deal of interaction in all his labs. He contended that "leaving a class at the proper time was important to encourage students to work independently at times, but it also is important to be available for students when they need help" (Informal interview, 9-10-81).

None of the behavior modifications, such as the conscious effort to interact or encourage interaction, was contrary to the goals or basic method of the teacher, but in some cases enhanced the teacher's ability to evaluate and/or examine personal teaching techniques. In the exit survey, Ed reported:

> Q: Do you feel the interaction between teacher and student could be improved? Please explain.
>
> A: Yes, often we assume that if students do not request help, that they are having an adequate experience. Possibly during the time [lab] we could move about more asking direct questions and spot checking scopes, etc. (Appendix E)

In the previous section, the laboratory environment of three community college instructors was examined. The rich qualitative

data reveal a complex social setting jointly created by the teacher and students. In the following section, a theoretical model of teacher-student interaction derived from the qualitative data will be described.

Descriptive Model of Teacher-Student Interaction

To develop an explanatory model of what is happening in the laboratory, the native's interpretation of the events should be interfaced with the research's view of the events (Lutz, 1981). As observable patterns emerge from the actual phenomenon, grounded theory can be applied and tested (Glazer & Strauss, 1975; Yinger, 1978).

Role

The importance of examining roles within the framework of an organization has long been recognized (refer to Role, Chapter Three). The institution defines roles with inherent obligations and expectations; however, institutions are created by human consensus. Once established, they provide a framework or context subsequently occupied by participants. Roles then provide places for living, breathing individuals to act.

Because role is a dynamic social process, it becomes a highly interactive phenomenon often shaped by the personality of the occupant. When individuals assume a role, they do so in an individual style. Because the forces that shape role are dynamic rather than static, the interactive processes that create and shape role are ongoing. Roles do not exist in vacuums but in highly interactive

social contexts. The relation between role and social context is mutually constitutive in that roles are prescribed to some degree by social institutions and created in face-to-face interaction by individuals who assume them (Cicourel, 1972). Consequently, by the very nature of these individuals--their needs, personalities, values, and past experiences--institutional roles are humanly refined and shaped. We can see the setting, we can observe behavior, but the transaction that occurs between creates the "ethnos" (Getzels & Thelen, 1960).

The major focus of the study was the teacher-student interaction in the laboratory setting. Role as a theoretical construct and an instructor's variation or improvization within a role guided the analysis, for through observation the teacher's perception of the role seemed a pivotal factor determining leadership and management patterns and ultimately teacher-student interaction. Although each student in a laboratory has a well-defined set of tasks presented in the laboratory exercise (Appendix B), the instructor plans for what will happen in the setting and becomes the manager of the social and academic interaction.

College instructors, as professionals, have a degree of freedom in the management of the learning environment. Introductory science lecture classes, which contain a large volume of factual and conceptual information, are most often taught by lecture. Questions and discussion are often limited both by time constraints and the number of students in the class.

Laboratories, on the other hand, provide an environment where the personality and needs of the instructor can play a dramatic role in determining varied management and interaction patterns. Just as a seasoned actor improvises within a role, teachers play out variations of their role within the laboratory setting. Richard Burton and Sir Lawrence Olivier are not the same Hamlet with every performance, nor are three seasoned college instructors the same actors on the laboratory stage. Beyond that, these instructors are not working from anything quite so prescribed as a Shakespearean script.

With qualified, experienced teachers, it is not normally a matter of right or wrong management scheme, but it is a matter of maximizing the effectiveness of the role within any management pattern to meet the needs of both the teacher and students. For the three teacher informants, the role of laboratory instructor varied with the individual. As the descriptions demonstrate, John saw himself as a mentor/facilitator, Ed saw his role as resource person, while Margaret saw herself as an expert/guide. But what factors caused three experienced teachers to see their role so differently? The answer is clearer as the process of role formation is examined more closely. For the purpose of this study and the model, role is the dynamic realization of social status with inherent rights, obligations, and behavior expectations. Although commonly institutionally defined, roles are in fact complementary and interlocking, deriving meaning from related roles (Griffith, 1979; Guba, 1958). Because role is not static, an individual's style within a role is continually negotiated. And for that very reason, roles can change through time.

This is of particular interest to educators, for it is possible to intervene to change or modify role to meet situational needs.

What follows is a theoretical model of teacher-student interaction that examines role along with the resulting leadership-management patterns as they relate to teacher-student interaction in the laboratory setting (Figure 21).

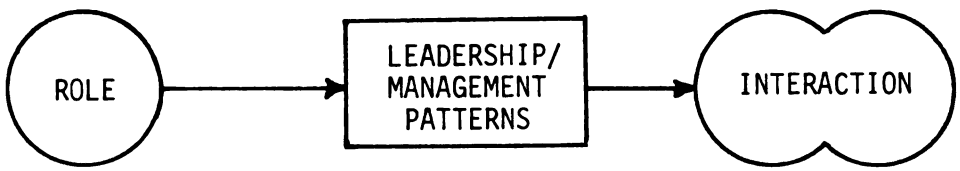


Figure 21.--Linking role to interaction.

Role Influences and Formation

Role is both intricate and unique--intricate in that a myriad of factors influence the ultimate expression of the role and unique because individuals occupy the roles (Goffman, 1967). Figure 22 illustrates how the external/extrinsic factors of the social setting and the internal/intrinsic factors of the individual are interfaced to collective create the role of a college instructor.

In education, roles are defined by the institution, perceived by the instructor, and modified by other external or internal forces. The expressed role is the outcome of the myriad of factors that shape it (Figure 23).

The study suggests the following examples of external and internal forces operating within the college setting that directly or

indirectly influence the expression of teacher role. Although some of the forces are specific to Lakeside, many others are common to college environments in general.

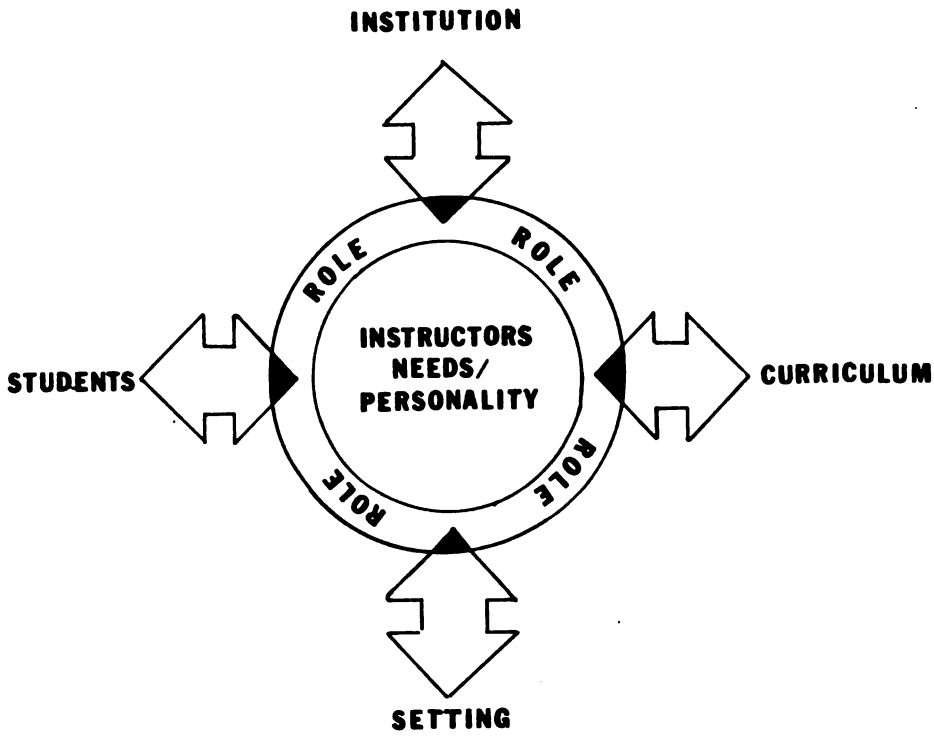


Figure 22.--Extrinsic and intrinsic role influences.

Extrinsic forces.--The EXTERNAL or EXTRINSIC FORCES that impact role include the institution, curriculum, setting, and students. (Refer to Figures 22 and 23.)

1. Institution. The institution contributes to one definition of role by means of the following:

Mission and goals of the college

Vocational or academic standards

Instruction as major focus

Negotiated contract

Department autonomy and evaluation

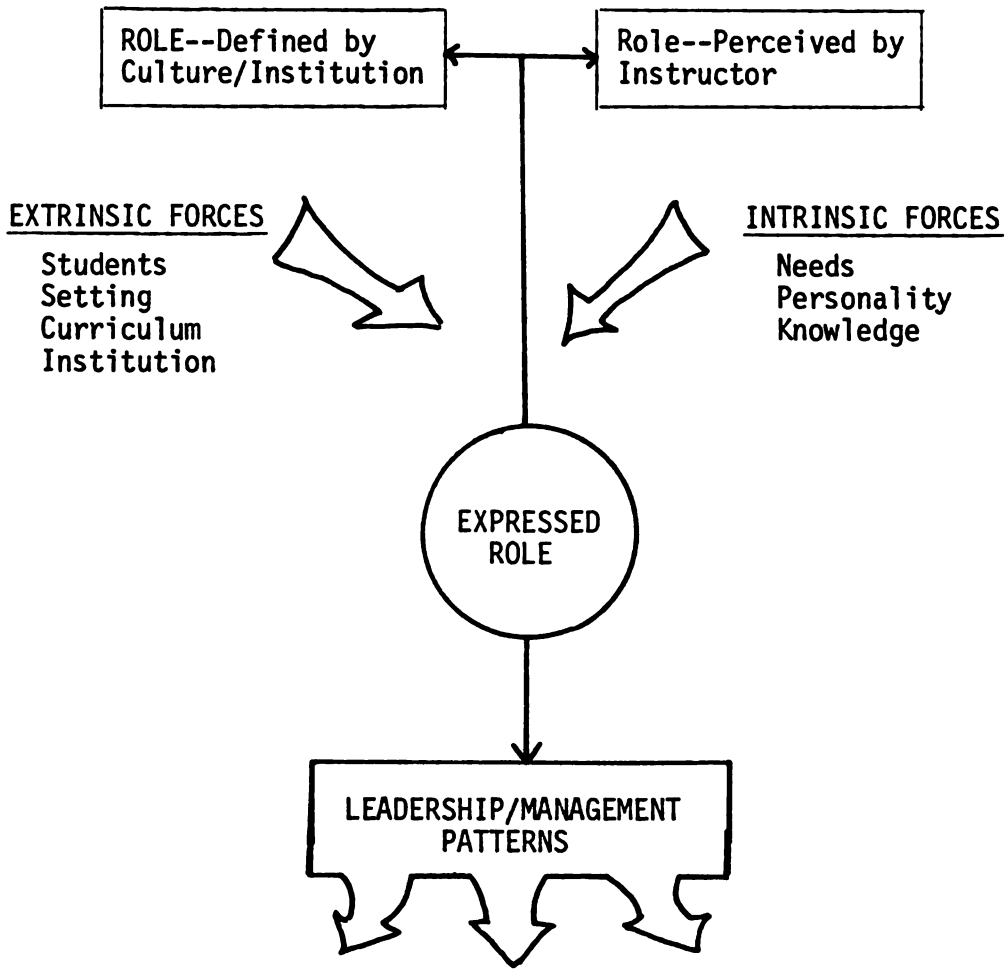


Figure 23.--Role formation.

With a philosophical aim of maintaining a "tradition of excellence" within the broad framework of the college mission and goals, the administration and staff of Lakeside are faced with a variety of dilemmas.

The student population in general is changing. The traditional programs and modes of instruction do not always meet the more varied needs of the shifting student population. Many instructors have voiced concern with working with the "new traditional" student. Complaints like "students aren't prepared" or "they lack responsibility" are common over morning coffee (Field notes, 4-24-81).

Maintaining academic standards for both the transfer and vocational student is also a challenge for the institution. Pressure from four-year institutions and from professions such as nursing groups and hospitals to maintain standards is reflected in the program requirements. Lakeside has done a follow-up study of graduates (A Self-Study, 1974) to determine the success of graduates, with positive results. (Refer to Table 1.)

As primarily a teaching institution, Lakeside places the quality of instruction high on the list of priorities. The number of full-time staff and the resulting high instructional costs place the institution in a position of limiting program growth to insure job security. With continued funding reductions, the institution will be faced with the choices of hiring more part-time faculty, laying off tenured staff, raising already high tuition rates, and/or cutting programs. Each of these options would ultimately affect instruction and the face of the institution.

Department autonomy and self-evaluation impact instruction. For example, seniority often influences who teaches courses. In the past, the way courses and hours were assigned was not always "fair" or "consistent" between and within departments (Field notes, 11-17-81).

Table 1.--Follow-up study of graduates.

ASSOCIATE DEGREE NURSING

1. Admissions by year for the past five years:

Year	Number Admitted
1969	33
1970	44
1971	60
1972	66
1973	64

2. Graduations by year for the past five years:

Year	Number Graduated
1969	15
1970	16
1971	28
1972	28
1973	45

3. Number of students passing or failing state board examinations each year for the past five years, comparisons with national means. (National mean is 500)

Year	Statistics	
1969	15 wrote 14 passed 1 failed	Fifty-two (52%) percent of the tests taken by the graduates were above the national mean.
1970	16 wrote 16 passed	Seventy-eight (78%) percent of the tests taken by the graduates were above the national mean.
1971	28 wrote 27 passed 1 failed	Seventy-eight (78%) percent of the tests taken by the graduates were above the national mean.
1972	28 wrote 28 passed	Seventy-five (75%) percent of the tests taken by the graduates were above the national mean.
1973	45 wrote 42 passed 3 failed	Eighty-four (84%) percent of the tests taken by the graduates were above the national mean.

Total Number Who Wrote -- 132
Total Number Who Passed -- 127

Of the total number of tests taken by the graduates in the four years, seventy-one (71%) percent were above the national mean.

Total Number of Failures -- 5

Of these five (5) students four (4) failed one sectional test and one (1) failed two sectional tests of a total of five (5) sectional tests taken. Each passed the failed sectional test(s) the second time.

Today, the contract plays a greater role in assigning hours and establishing individual responsibility. For example, teachers are assigned a full-time load of thirty contract hours per year; additional hours are considered overload. Instructors are expected to have at least five scheduled office hours per week and to attend specific department functions (Appendix F). The contract and Faculty Handbook specifically spell out the responsibilities of all instructors, while the department determines specific roles within that larger framework.

2. Curriculum. The college laboratory curriculum contributes to the definition of role by means of the following:

Team laboratory concept

Technical or conceptual information

Link with lecture and lab material

Observation clearly demonstrates how roles of instructors are influenced by the curricula. By the very nature of the laboratory setting and student-centered experiences, instructors are often bound by pre-determined lab exercises, team-taught lab sections, or faced with coordinating lab with lecture content.

Several laboratory courses at Lakeside use commercial lab materials as is the case in both embryology and comparative anatomy. But many other laboratory classes use exercises developed and written by a team of instructors.

The anatomy classes use teacher-prepared laboratory exercises (Appendix B). Margaret, using a publisher's manual, often adds

to the already technical dissection materials and finds it necessary to "walk" students through the exercise to insure they can properly identify each structure (Field notes, 2-5-81). She also "talks" them through the terminology to insure proper pronunciation.

In anatomy, the exercises are written to allow more student-centered activity. The instructors introduce the day's lab, then expect students to read through and do each task outlined. The labs are often broken down into two exercises for each system--one related to anatomy, the other to physiology. Each lab instructor is expected to move students through the day's pre-arranged exercise. There is little time within the time framework to add, but several instructors have chosen to delete portions; for example, the introductory slides. When students realize they are missing a portion of the lab, they often feel "cheated" and complain. Students surveyed shared these feelings:

> It [lab] could be improved if the instructor would have showed us the slides he was supposed to and explain things more, and if he would have stayed in the room instead of leaving so that when we had a question, he was not there.
>
> It was noted that in other labs that I occasionally visited--the instructor was available and involved with the students. This close working relationship provides an atmosphere of incentive and learning. Each instructor should meet course requirements--if slides are available and scheduled to be shown--then this is the desired mode of instruction that should be met. (Student survey, 5-12-81)

When labs are team taught (several instructors teaching the same lab but at different times), there is yet another external pressure on the instructor. Material must be prepared for the week's exercise, clean-up, and other housekeeping tasks must be attended to

for the next instructor's lab, and tests must be team written and set up. For example, there may be as many as four different instructors in the same anatomy-physiology teaching lab during any given semester. Instructors must plan and work together to insure a smooth transition from one group to another.

John, being the technical leader of the anatomy-physiology team, orders materials and assigns individual tasks to other instructors. Ed, having the first lab on Monday, is in charge of setting up the week's lab.

The problem of coordinating lecture and lab is yet another external concern and is most often attended to by the lecture instructors. But several times throughout the year, that task is shifted to the lab instructors. If the lab and lecture are not synchronized, the task of introducing new concepts becomes part of the duties of the lab instructor. This means a greater amount of time has to be spent in teacher-centered orientation and lecture, producing a shift from the more typical student-centered format.

This shift rarely occurs in Margaret's class because she teaches all course components. But it does occur several times in the courses of the anatomy-physiology class. Certainly the curriculum does influence teacher role, but outside of an occasional need to introduce additional material, the format is predetermined and consistent.

3. Setting. The actual laboratory setting contributes to the definition of role by means of the following:

Good basic equipment and materials

Small classes

Location near offices and lecture rooms

As an external force, the setting also influences teacher role, but unlike the other factors, once defined, the physical components (e.g., the lab, equipment, and other physical structures) and time frame change little week to week. The instructors feel the laboratories are well designed and adequately equipped. Lab classes are limited to twenty-four, which allows ample time for teachers to interact with students in a two- or three-hour time frame. This was demonstrated during heart and sheep-brain dissections when John was able to interact with each lab group at least twice, first identifying the basic structures and then returning to each group to have the students identify the structures and to answer questions (Videotape, 9-10-81). The physical layout of the classrooms, laboratories, and offices allows teachers and students to move easily from one setting to another, maximizing the opportunity for interaction. Students frequently call or drop in during scheduled office hours. It is not unusual for students working in the prep room to ask their instructor or any other available instructor for assistance. John and Ed jokingly commented that at times it was diffficult to get any "work" done because of the frequent interruptions (Informal interview, 2-27-81).

4. Students. The laboratory students also contribute to the definition of role by means of the following:

Heterogeneity--age, academic background

Career orientations

Outside obligations

The students at Lakeside were described earlier as a heterogeneous group. This is particularly true of the Human Anatomy-Physiology student. Many older students have special needs that must be addressed. They tend to be insecure about returning to school and are very competitive about grades. Students must receive good grades either to qualify for or remain in the nursing or other career programs. The backgrounds of students in the class also run the entire range from those with a strong science background to those who have never had a laboratory course and cannot even spell "laboratory." For many, the Anatomy course is very demanding, and they are anxious to get through it and move on to their professional courses. For others, the goal is to learn as much as possible, and these individuals question and demand attention constantly.

For the pre-med and pre-dent students, the task is to get good enough grades to qualify for acceptance into a professional school. The competition is stiff. Most of the students are directly out of high school with a relatively good background; therefore, there is less need to address individuality, but there is a need to prepare students for the rigorous courses yet ahead of them.

For most students at Lakeside, even the younger students, college is not a full-time job. They have many outside obligations such as a family and full- or part-time jobs. The high percentage of older returning females is particularly evident in the

anatomy-physiology classes. John even keeps several children's toys in his office for his students when they bring little ones to school with them. It's not unusual to find children playing at their mothers' feet in the prep room (Figure 24) as they review for an upcoming test.

Figure 24.--Classroom visitors.

Intrinsic forces.--the INTERNAL or INTRINSIC forces that impact role include the instructor's individual needs, personality, and knowledge (refer to Figures 21 and 22).

1. Instructor's needs. The instructor's needs contribute to the definition of role by means of the following:

Recognition

Self-esteem, acceptance

Self-actualization

The needs of the instructor are key in determining behavior. Most often the salary and working conditions meet basic needs of professional educators, but other needs that help enlarge the role also must be met. For example, John was concerned about his visibility after not being recognized by the Vice-President of the college at a school function early in the year. To improve his visibility, he then became actively involved in the inservice program, which resulted in a later committee appointment. This recognition was very important to John. At the end of a course, he received the following note from a grateful student. As he showed it to me, his pride was obvious (Field notes, 3-18-81).

> John,
>
> I have enjoyed this class very much. You have a very effective way of blending "caring" and "authority." This "blend" has been instrumental in making my re-entry into education a positive one. Thank you much. Hope to see you in the fall.
>
> Marlene

John often commented about the number of students who were grateful for his encouragement. The sentiments were echoed by three students who joined me for lunch one afternoon. The three older women who were in the nursing program drove in daily from a small

town thirty miles away. Their praise of John's teaching methods and genuine concern for his students was nonstop.

The personal need to grow intellectually is demonstrated by both John's and Ed's willingness to continue their own professional growth either by taking classes or by attending seminars.

All three instructors bring with them into class a broad range of professional experiences they often share with students both during lecture and laboratory. The need to feel successful is important to each instructor, while the source of the feeling clearly varies.

2. Instructor's personality. The individual instructor's personality contributes to the definition of role by means of the following:

Values, beliefs

Social interests

Family, background

The individual instructor's personality has a definite way of creeping into each facet of an instructor's role, giving it a unique quality. The belief about student outcome is not uniform even among teachers who teach the same course. While one instructor may feel it is a lab instructor's job to make people think, asking many probing questions, another may feel teaching students to follow directions and observe is more appropriate. Ed, commenting on the heart-dissection lab, felt the less pre-explanation the better, for his past experience had shown students understood the material better if they read the lab sheet as they worked (Field notes, 2-2-81). Values and personal beliefs about a teacher's role in shaping student behavior

may be as simple as demanding correct spelling or as complex as demanding abstract reasoning and problem solving using the conceptual information learned. Students "pick up" on what they perceive is important to the teacher and the most successful "feedback" appropriate behavior.

Personality interacts with aspects of the social setting to shape the face-to-face encounters in the classroom. While John actively encourages group interaction and sharing tasks, often choosing one student to demonstrate to others, he also socializes with students during lab. He often sits down before lab to chat with a group or takes time in his office just to sit and talk to students. (Interestingly, John considers himself a very "private person," but is very willing to listen and attend to students' social and personal needs.) Margaret's socializing most often occurs outside the formal classroom in more relaxed nonacademic settings. She sponsors the pre-med and pre-dent club and annually takes groups on field trips or invites them to her home for a party at the end of the year. Ed, on the other hand, jokes and socializes in class with the entire group but rarely on an individual basis or outside school. His horse stories and 4-H experiences are the key to many of his social encounters.

Just as background and family demands affect student behavior, so too do they impact teacher role. While Margaret has no children, John with a two-year-old and Ed with four adopted children bring with them family experiences and an expanded awareness of the demands of students with family pressures, but also their own family frustrations.

When the pipes broke in Ed's house this winter, many of the problems related to this two-week ordeal crept into the classroom. Telephone calls, repairmen, and a multitude of details were on his mind as he went through his daily instructional duties. Frustrations from outside the job can and do affect anyone's performance on the job. Students were aware of his frustrations as well. On St. Patrick's Day, Ed received a small flower arrangement with a "pipe" attached. The note read: "Hope this finds all your pipes holding water now!" (Field notes, 3-18-81). An empathetic student was well aware of the teacher's needs in this case.

3. Instructor's knowledge. The instructor's knowledge also contributes to the definition of role by the following:

Training

Experience

Most college instructors bring with them to the classroom a strong academic background in their area of specialization. Although they may know the subject-matter content, the ability to teach that information to others is not as universal in the college classroom. Even an outstanding teacher in one environment may not always be as effective if the environment changes. Margaret's instructional approach is very successful with the homogeneous student population she teaches, but would that same method work for the human anatomy group? Experience working with any curriculum or student group seems a key factor in how a teacher behaves in the laboratory. Teachers learn what "works" or "doesn't work" for individual lessons and groups

of students. Learning the "trouble spots" and how to recognize and address them comes with experience. Therefore, change in teacher role or behavior is a result of adjusting to ongoing needs of both the curriculum and students, and ultimately those of the teacher.

Each of the above intrinsic factors is set within a larger cultural and community framework. Culture influences the array of external forces and certainly plays a major role in the development of the individual.

The extrinsic forces of the institution, curriculum, setting, and students individually and collective impact the role of the instructor. Interfaced with the INTRINSIC FORCES--the instructor's individual needs, personality, and knowledge--the interaction results in the expressed role that can be observed in the laboratory.

Role Variations

Roles are dynamic, for there are many variations instructors can play within the institutionally prescribed role (Garrison, 1968; Goffman, 1961; Knapp, 1962; McKeachie, 1962). Role, Goffman contended, is the "typical response of individuals in a particular position, while the actual role performance of an individual in that position will depend on the complex forces working on the individual" (p. 93). Role variations or expressed roles (see page 98) often go beyond the typical or normative aspects of the teacher role. Although not intended to be exhaustive, the variations may include:

AUTHORITY--As the arm of the college or university, the instructor has the power to set up the learning environment.

EXPERT --With a knowledge of subject matter, the instructor is regarded as an expert in the field.

FACILITATOR--The instructor facilitates the learning within the learning environment.

PROFESSIONAL AGENT--Instructors let students know what and why learning is important, including what it's like in the field.

EGO IDEAL --Instructors are role models; students think of the instructor as a professional in the field.

MENTOR --The instructor is a friend as well as a counselor and teacher.

PERSON --Involving the most risk, the instructor reveals himself as a person.

The role variations of authority, expert, and facilitator are expected by the institution, while expanding role by including the others is more dependent on the character of the individual in the role. Role seems to be defined not only in response to institutional and instructor needs, but also, at least for some instructors, is influenced by needs of individuals or groups of students.

The instructors in the study saw their major rights and duties in lab as follows:

John--To reinforce with hands-on types of experiences the lecture material, and to go into more detail where lab is more appropriate, such as identification of muscles, organs, etc.

Ed --To introduce laboratory material, outline procedure, and provide assistance as student questions arise.

Margaret--To guide the student through the materials to be studied. (Teacher survey, 5-12-81)

Each instructor's view of the teacher role and its expressions was congruent with his/her actual behavior in the lab. Observation supported John's perceived role as a mentor/facilitator, Ed's as a resource person, and Margaret's as an expert/guide.

However, the students surveyed had a complementary yet more diverse perception of what the teacher's role should be in the laboratory. They offered the following characterizations:

> Supervise--give help when needed, circulate through lab.
>
> Guidance--point out "physically" the things we've learned in lecture.
>
> . . . to guide, but not to lecture.
>
> . . . to explain things thoroughly and to stay in lab and help with questions.
>
> . . . learning facilitator.
>
> Present the material, define unclear points, participate with students.
>
> . . . to assist the student in meeting lab objectives.
>
> . . . to encourage and stimulate students' own thinking, but to "give answers" if absolutely necessary. (Student survey, 5-12-81)

When interviewed, John discussed his feelings about socializing with students (Appendix C).

> Q: Do you socialize with your students--purely social, like going out for a glass of wine?
>
> A: Not very much. I have in the past; I've gone out to the bar with the girls [students]. We have a good time, but most of them want you in a particular role. A few people you can do that with, but I'm cramped for time so I really don't do a lot of socializing. The majority of them, even though they call me "John," are very friendly. . . . You're here [in school] and there is something about being here, and being in a defined situation. They can come and talk here, where if you go out and socialize with them, you're intruding on this other life of theirs. I think it would be like socializing with your therapist. Kind of like that. I have a certain role and it's defined, and I think they find some security in it. . . . Maybe I do.

Finding security and satisfaction in a role appears to be a key factor influencing both management patterns and ultimately teacher-student interaction. For John the role of "mentor" to the older student includes developing orchestrated student-centered activities during which teacher-student interaction is maximized during individual and small-group activities. Figure 25 illustrates how positive feedback from the student-teacher interaction reinforces the role as "mentor" for John.

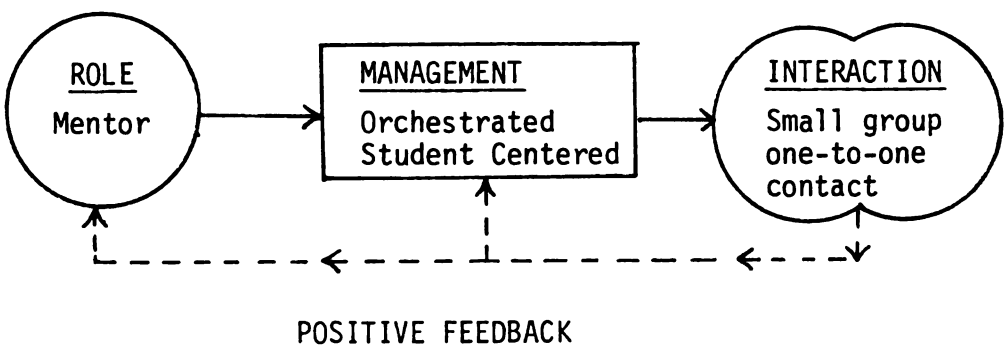


Figure 25.--Role feedback--John as a mentor.

In a descriptive model of interaction, feedback is an important consideration. Whether the feedback is positive or negative, it allows information to return to the instructor. This information can either reinforce existing roles or management patterns, or even cause adjustment in behavior. If the feedback is positive, the interactive behavior may increase, while if the feedback is negative an adjustment in behavior may be necessary.

Leadership-Management Patterns

The development and enactment of the teacher role is a complex process and is the foundation for the leadership and management patterns constructed in the laboratory setting. (Refer to Figure 25.) These various patterns ultimately create learning environments where the majority of teacher-student interaction will occur. In this section the various leadership management patterns will be examined as they operate within actual classrooms. The management patterns are a result of shifting "participation structures." The participation structures (after Phillips, 1972, p. 377) are the possible variations in structural arrangement of teacher-student interaction within the teacher-controlled framework of classroom interaction.

Experienced teachers develop instructional routines, or roles, based on successful past experience; "what works" for them influences future strategies. As with the three instructors observed, the choice of teaching modes reflects the basic needs of the individual instructor expressed as actual behavior in the setting.

Social scientists like Weber (1942; Wrong, 1970) and others have characterized leadership style as autocratic, democratic, or laissez-faire. It would appear these narrow categories are too rigid, while the nomothetic, idiographic, and transactional styles of the Getzels-Guba Model (Getzels et al., 1968) are more appropriate to describe leadership because they interface the individual with the social structure. The Getzels-Guba model suggests three leader types:

NOMOTHETIC LEADER --normative control, with emphasis on institutionally defined requirements, rules, and procedures.

IDIOGRAPHIC LEADER--personal style, with emphasis on needs and personality of each member, e.g., human relations, satisfying individual needs.

TRANSACTIONAL --leadership varies with circumstances, exhibiting characteristics of both a nomothetic and idiographic leader, depending on situation.

The model of teacher-student interaction presented here is based on the premise that role and leadership style are more dynamic processes. Like any life system, there is constant feedback adjustment and potential change. Getzels et al. suggested a transaction, but it appears necessary to go even further explaining not only what role and style are but why and how they are negotiated within a setting. In most life systems, a dynamic equilibrium exists; there is interaction and change, yet also a stability. An important outcome of the model is the ability to produce a multifaceted picture of what is happening and to potentially examine ways to intervene to improve teaching.

The success of a leader (e.g., teacher) often lies in the ability to adapt their behavior to meet the demands of each unique environment (Gates, 1976). Leader behavior refers to specific acts that a leader engages in while directing or coordinating the work of his group. Leadership style is related to the underlying needs of the leader that motivate his behavior (Fiedler, 1969).

Participation structures constituting management patterns.--From the data gathered in the study, distinct management patterns evolved, but the pattern established by an instructor varied little

between labs. The patterns are produced by shifting participant structure during the class session. Management patterns were closely linked with leadership style and ultimately teachers' needs. The patterns were important to examine because they also influenced teacher-student interaction. Figure 26 shows the three typical participation-structure variations used by the instructors in the laboratory, and the three participation-structure types are characterized in Table 2.

The following examples from the study illustrate the three participation structures:

1. Type 1--teacher centered. Occurring most often during the formal lecture class, the teacher-centered format also occurs in the orientation frame of the laboratory class. The instructor, usually at the demonstration table (Figure 27) commands the attention of the group. Although there are a few questions, joking comments, or laughter, the function of this pattern is academic or procedural. Both John and Ed use this strategy at the beginning of each class, although Ed's orientation tends to be lengthier. The teacher is the center of the interaction.

2. Type II--teacher-student interplay. The controlled interplay between teacher and student is used most often by Margaret in her labs. The teacher-student interplay is characterized by the teacher controlling the flow of the exercise. Margaret reads the manual and describes the task, then asks students to identify the structure on their own specimen. The transitions from "listening" to "search and find" are smooth. This strategy is useful for the complex

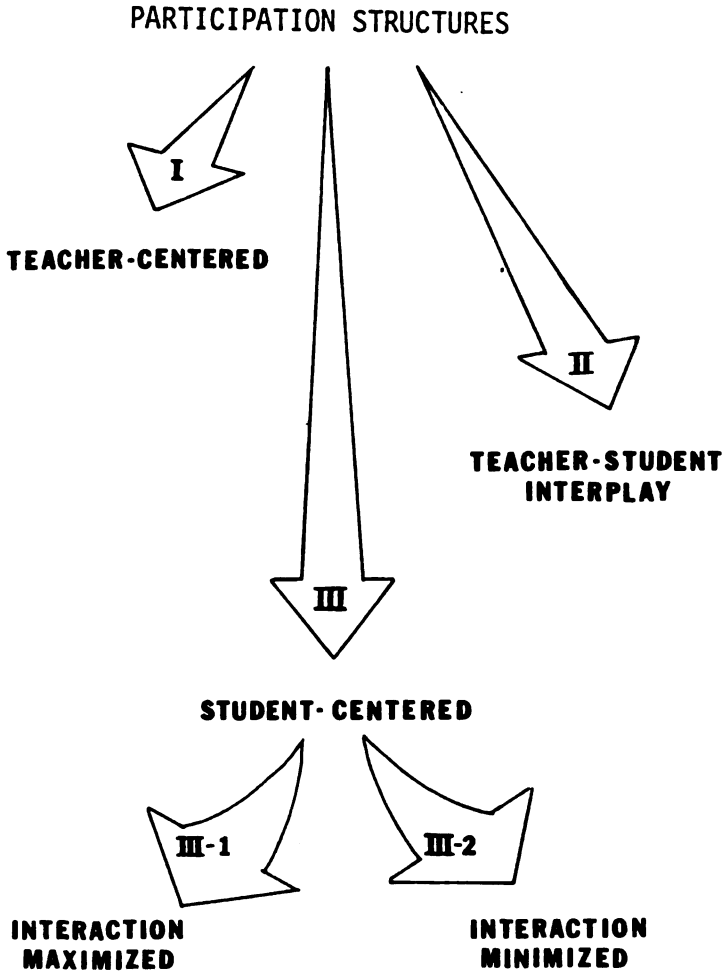


Figure 26.--Participation structures constituting management patterns.

Table 2.--Three participant-structure types.

TYPE I - TEACHER CENTERED	TYPE II - TEACHER-STUDENT INTERPLAY	TYPE III - STUDENT CENTERED
FOCUS: on the teacher;lecture, introduction or procedural directions; one-way interaction dominant.	FOCUS: exchanges between teacher and students; teacher directed student activities; whole group activities.	FOCUS: on students; individual or small group activities. TYPE III-1 Interaction maximized; small group or one-to-one interaction; teacher involvement high. TYPE III-2 Interaction minimized; independent student work; student initiated interaction only.
INTERACTIONAL ROLES: Teacher - Set stage for lab; prepare students; demonstrate Student - listen to instructor; ask questions; take notes	INTERACTIONAL ROLES: Teacher - guide learning; control flow of exercise Student - listen to teacher; follow directions as given	INTERACTIONAL ROLES: Teacher - serve as a facilitator or resource person Student - learn independently; be a team member

Figure 27.--Teacher-centered management.

task at hand. Even when students are given a more lengthy task, Margaret hovers over the groups, reinforcing and spot-checking progress (Figure 28). Although there is an interplay, the teacher remains center to the interaction. Margaret appears dominant in her labs but feels the interaction occurring is student centered (Interview, 3-12-81). Certainly, her focus is continually on the students and their assigned tasks.

3. Type III--student centered. Probably the most variable of the participation structures, the student-centered context allows for the greatest variation in teacher role. Teacher involvement or interaction might range on a continuum from highly interactive

Figure 28.--Teacher-student interplay.

(Type III-1) to little or no interaction at all (Type III-2). Whether an instructor maximizes or minimizes their interaction, the focal center of this frame is the individual student or student group (Figure 29). On the continuum, John tends to maximize the interaction, while Ed tends to minimize it. The varied behavior appears a function of their perceived roles and personal needs.

Three Management Patterns

As previously stated, observation reveals that instructional strategies are manifest in patterns of the aforementioned participation structures, varying greatly between instructors but showing little variation day to day within an instructor's lab.

Figure 29.--Student-centered management.

examining the complete cycle of participation used in the classroom (Figure 30), individual management patterns emerge. Management patterns are created as instructors shift from one participation type to another during a laboratory session. Each instructor demonstrates a distinctive pattern, and variations deviate only slightly from exercise to exercise and these patterns are internally related to the ones that these teachers negotiate for themselves.

During any laboratory exercise, there are shifts from one participation type to another. Both teacher and student behavior is adjusted as the focus changes. Both verbal and nonverbal signals may be used to initiate and/or maintain the shift, e.g., sitting on a stool

in front of the class or moving from behind the demonstration table. Students early in the course learn to interpret context cues and adjust their behavior according to established norms (Gumpertz, 1971). Although each instructor develops basic patterns, these patterns were shown to be altered as a result of either external or internal influences such as curriculum or past experiences with the lab exercises. Clearly, teachers and students collectively create the patterns within the framework of the learning environment.

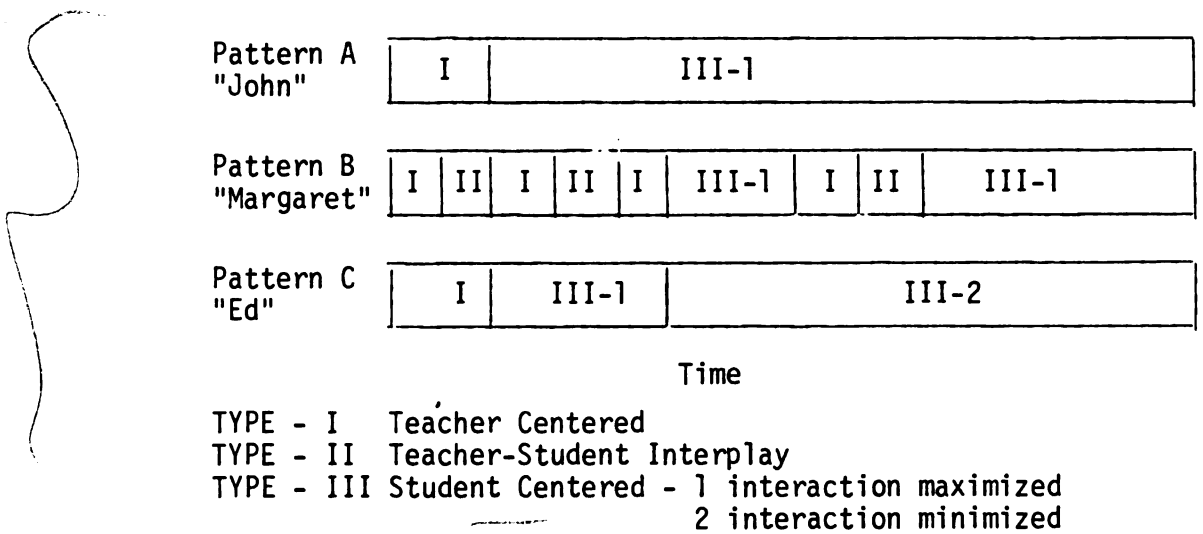


Figure 30.--Three patterns of lab instruction--produced by participant-structure shifts.

To illustrate the three patterns shown in Figure 30 more clearly, it may be helpful to examine the three patterns as they actually occur in lab. Pattern A occurs most frequently in John's lab, Pattern B in Margaret's lab, and Pattern C in Ed's lab.

Pattern A.--The following management pattern, which occurred during the "heart dissection" lab, was the typical pattern of John's lab (Videotape, 9-16-81).

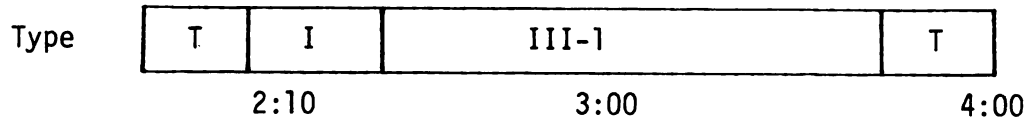


Figure 31.--Pattern A--John's lab.

2:00-2:12 TRANSITION: Teacher prepares for day's lab, brings in specimens and models.
Students wander in slowly, socialize and get material out for dissection.

2:12-2:28 TYPE I: Teacher gives brief procedural directions for dissection (most of the structures were just discussed in lecture), then announces, "I'll be around to each group."
Students listen and ask questions.

2:28-3:12 TYPE III-1: Teacher moves from demonstration table (cue) to the first group on his left, then moves from group to group pointing out structures and giving dissection pointers (average time 3-4 minutes per group).
Students working in pairs, follow along in lab manual finding structures (?). Some students listen in to the instructor as he orients other groups, but most are involved in student-centered investigation.

3:12-3:35 TYPE III-1: Teacher makes quick second round of groups; length of contact variable, depending on number of student questions.
Students either ask for additional clarification (mostly older students) or work independently.

3:35-3:45 TYPE III-1: Teacher available as needed; carries on both academic and social conversations. Gives general procedural directions to whole group.
Students continue dissections and socialize.

3:45-3:50 TRANSITION: Teacher socializes and continues to answer questions, begins clean up.
Students leave as they finish; some remain and socialize.

Pattern B.--This constantly shifting pattern was typical of Margaret's laboratories. Note how the role of the instructor creates a very different instructional pattern. The lab is a three-hour dissection of the "nervous and muscular systems of the shark" (Field notes, 2-5-81).

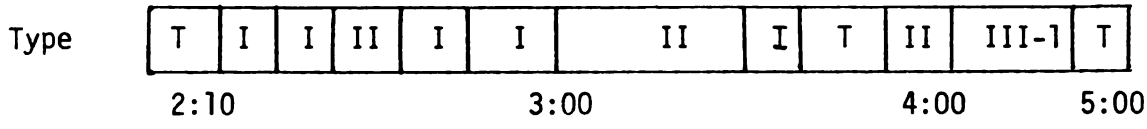


Figure 32.--Patern B--Margaret's lab.

2:00-2:12 TRANSITION: Teacher prepares for the day's lab, hands out models and comments casually with student groups about specimen.
Students put on lab coats and gloves, pick up specimen for dissection (in pairs). Socialize.

2:12-2:15 TYPE I: Teacher moves to stool (cue) at front of room and announces, "Okay, let's go!"
Students sit down and begin to direct attention toward the instructor.

2:15-2:30 TYPE I: Teacher directs students' attention to page in lab book, reads direction for dissection, and comments on each anatomical part, directing students to "look" and "feel."
Students follow along in lab manual and glance at each part as directed.

2:20-2:25 TYPE II: Teacher walks around table to table to check dissection progress, asking general questions and directing students to point out each structure previously listed.
Students nod as they point to structures and cross-check between other students sitting at the same table.

2:25-2:41 TYPE I: Teacher after asking, "Anyone having trouble?" holds up model of next structure and reads on in the manual again, directing observations. Teacher moves around the room reading and directing, constantly checking progress. Verbal reinforcement common.
Students follow along, dissecting and observing as they go. Quiet conversation between students.

2:41-3:00 TYPE I: Teacher draws diagram on the board for entire class, then reviews structures previously covered, writing larger words on the board and gives definitions using terms like "remember" or "can you find . . ."; teacher uses large shark jaw (20" across) to point out structures.
Students attend to board and compare their specimen with the model.

3:00-3:30 TYPE II: Teacher moves to window and begins reading from manual (cue). She reads, directs, then moves around to check progress and repeats sequence. Teacher constantly checks to see if students are finding structures, comments like "that's good," "everyone got it" common before she moves on in the text.
Students follow along but now move around the room to check other students' work; quiet conversation. Very intense concentration, some frustration at finding difficult structures.

3:30-3:35 TYPE I: Teacher lightheartedly gives students a way biologists memorize the cranial nerves using a funny saying.
Students listen but can't quite understand the connection and start laughing.

3:35-3:51 BREAK: Teacher takes a break in teacher's lounge.
Students either go to cafeteria or socialize.

3:51-3:55 TYPE II: Teacher using model directs students to pull off skin to observe muscles, lists structures to observe.
Students follow directions as they are given.

3:55-4:45 TYPE III-1: Teacher moves from group to group, occasionally making a comment to the entire group.
Students work more independently in pairs; several follow along as the instructor dissects and comments with other groups. Students may help each other and move around freely.

4:45-5:00 TRANSITION: Teacher announces clean-up but continues to work with students.
Students clean up and leave a few at a time.

Pattern C.--This pattern, most often employed by Ed, is illustrated in the summary of the two-hour exercise on "digestion" (Field notes, 2-2-81).

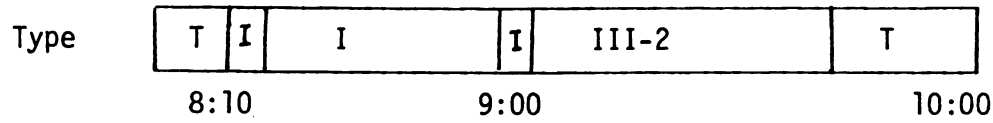


Figure 33.--Pattern C--Ed's lab.

8:05-8:11 TRANSITION: Teacher prepares lab materials and slide projector; socializes occasionally.
Students socialize and read over lab materials as they arrive.

8:11-8:14 TYPE I: Teacher moves to demonstration table, begins to take roll, then announces "slides will begin."
Students help pull shades and give full attention to screen and teacher.

8:15-8:50 TYPE I: Teacher gives introductory lecture using slides; discusses structure and function of each structure.
Students listen and a few take notes; toward the end of the slides, attention wanes.

8:50-9:00 TYPE I: Teacher gives procedural directions, clarifying lab exercise directions.
Students listen and a few take notes, ask few questions.

9:00-9:45 TYPE III-2: Teacher moves from front table (cue to shift) announcing "Any questions? Okay, cats are in back . . . go to it."
Students move from their lab tables as the instructor talks or begins to prepare materials for observation. During the remainder of the lab, the instructor occasionally gives a procedural direction to the whole group but otherwise is involved with personal tasks. Students work independently or in small student groups. Some begin to clean up and leave at 9:30 and most have left by 9:45. The instructor answers an occasional question when students initiate interaction and brings in hand-outs and other instructional aids during the class.

9:46-10:00 TRANSITION: Teacher socializes with several students. Students clean up or socialize; students from next lab arrive early.

Although Ed's lab management patterns were generally consistent, there were times when groups of students demanded more attention by asking many questions. In the physiology lab on the heart, which is activity oriented (Field notes, 1-26-81), Ed was kept very busy answering questions and interacting with one group of four students sitting together at a lab station. Five times during the lab session he moved to their table to respond to questions. Other groups not requesting information or help were not approached. It would appear that the leadership management patterns once established create a milieu and, although influenced by other factors (curriculum, students), this milieu creates the basic learning environment. The importance of the learning environment will be explored further in the subsequent analysis.

Situational Leadership Style

Situational Leadership Theory (Hersey & Blanchard, 1976) suggests that leadership style is based on an interplay of two types of behavior: Task Behavior--unidirectional instructions from leader, and Relationship Behavior--two-way communication between teacher and student providing socio-emotional support. These independent factors range from high to low and can be applied together in a learning situation depending on the task-level maturity and needs of the learner. Some learners need more task direction, while others need

more support. The more effective leaders manage the two, depending on the situation.

John, in particular, adjusts his interactive behavior to accommodate heterogeneous student needs. He often attends to the special social and emotional needs of the older returning student. Margaret, who views her students as needing less emotional support but requiring a great deal of scientific task directions, uses a more homogeneous task-oriented instructional approach. The following are examples of each instructor's style:

John's style.--John is particularly adept at using student group leaders. Often the group leader would ask a question or respond to John's offer for assistance. The following sequence, Figure 34A-E, illustrates the interaction (Field observation 4-10-81).

Figure 34-A.--Approaching the group.

John approaches the group to answer a question on location of a muscle group. His posture indicates a position outside of the group. He is gaining entry. He frequently used comments such as: "How y'all doing?" "Need some help?" or "Let's see what you know so far."

Figure 34-B.--Small-group lecture.

He then moves into the group, and several other students join in to listen. Mary, to John's right, is the group leader. A returning student, Mary is at ease asking questions and helping the others in her group.

Figure 34-C.--Personalizing small-group interaction.

John explains a simple way to remember the muscle group, based on his college experience. He repeats it several times slowly and succinctly.

Figure 34-D.--Role transition.

He then asks Mary to repeat the sequence. The group helps if she gets stuck. Only after the sequence is understood does John leave the group. Before he calls on Mary to teach others, he is confident that she not only is able, but also is willing to undertake the task.

Figure 34-E.--Student as teacher.

Mary then is asked to help with identification of the muscle group for another student from outside her group.

The skillful use of teacher-student, then student-student interaction is common in John's teaching strategy. John's interactions are not chance encounters but planned interactions to build confidence and enhance learning.

Although not the basic question of the study, student role shifts in John's class were interesting during the student-centered frame. Some students assume a passive independent-learner role, while others become either group leaders or followers (Figure 35).

Figure 35.--Student role shift to group leader.

Ed's style.--Ed's strategy of encouraging independent work during the student-centered portion of the lab minimizes the teacher-student interaction. Although Ed is very knowledgeable and comfortable with the content of the lab, he does not seem as comfortable initating interaction. Often he jokes and comments on social events to the whole group during the introduction, but he rarely engages in extended interaction during the student-centered frame. Although he asks for student questions, he does not encourage them either by initiating contact or by his physical presence. Often he avoids contact (e.g., eye contact, moving from table to table) by becoming

busy with other tasks or paper work. When asked a question, he always answers in a helpful, friendly manner (Figure 36), but then moves away quickly. Rarely does he engage in small-group demonstrations.

Figure 36.--Answering student questions.

Judy's a very sociable woman of about 27. Like Ed, she had an interest in horses. She would often try to engage Ed in conversation on various topics, with mixed results. In the cafeteria one afternoon (Informal interview, 4-10-81), she confessed she thought perhaps she was too demanding and made Ed uneasy. She said it was nothing personal, she just enjoyed people and felt bad that he might feel uncomfortable. Figure 37 shows Ed and Judy discussing a

laboratory procedure. Ed's body indicates a "pulling back" stance, which may reinforce Judy's evaluation.

Figure 37.--Personal space.

Hall would suggest Ed's personal space may be threatened, and because of personality and needs, for Ed it may be important to preserve the appropriate distance. Ed's use of personal space is reserved, in contrast to his joking, friendly manner when engaging the whole group.

Margaret's style.--In Margaret's case, posture and, to a lesser extent, proxemic shifts contribute to an air of authority and control. With some groups, her posture and control, which appear

rigid and aloof, may not be appropriate, but with the pre-med students the interactive role of expert-authority is accepted and respected. Figures 38 and 39 show various postures and attitudes. Note her critical stance as she double-checks student work. She is commanding and demanding, just as her course is, and just as the medical and dental professions will be for students.

Figure 38.--Overseeing dissection.

Hands on hips, she often gives students an oral quiz covering the new anatomical structures to be identified in the day's lab exercise. In Figure 39, Margaret double-checks the sex of the shark

(Field notes, 2-51-81). She guides them through the steps: "Any siphon sac?" "Do you feel the metatyrigian in the male?"--constantly reinforcing them with comments like, "That's good"; "That's the way, folks."

Figure 39.--Quizzing students.

These examples illustrate the fact that leadership management patterns and style do create very different interactive settings.

The association of participation structure and teacher-student interaction can be illustrated by plotting the two factors of interaction and management (Figure 40).

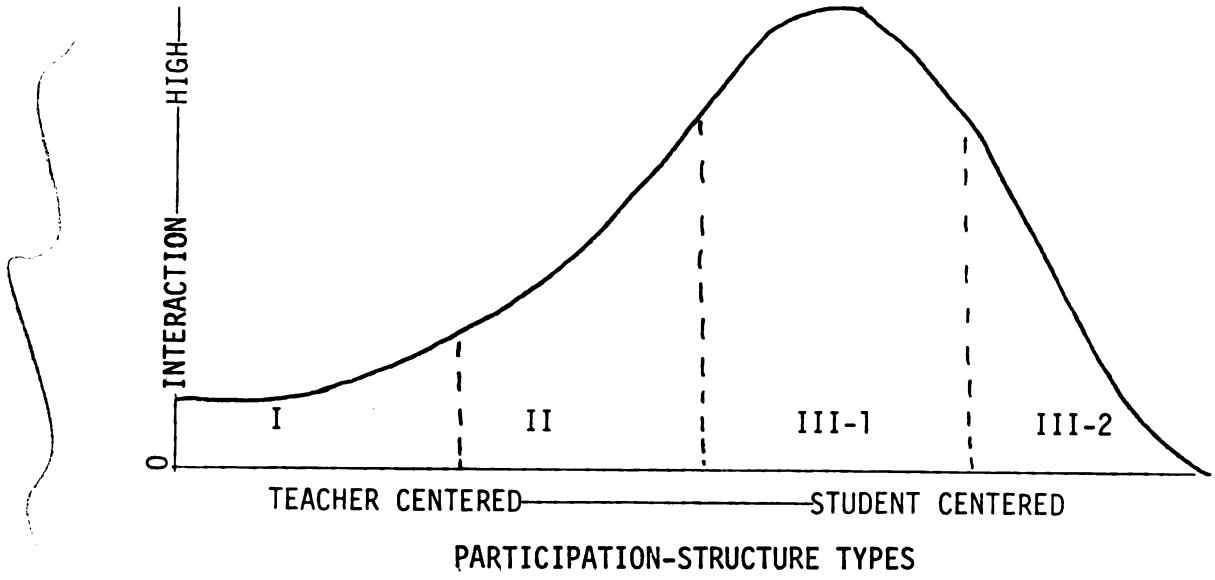


Figure 40.--Levels of interaction in the laboratory setting.

Linking Participation Structure to Interaction

As we have seen, the shift from one participation-structure type to another is often characterized by definite shifts in posture and spatial position by both teacher and student. Students learn to recognize proxemic shifts as cues to change in social context and immediately adapt their role within the setting. In Margaret's class it may be when she sits down on the stool in the front of the room. In Ed's and John's class, it is often when they move from behind the demonstration table into the students' arena. The shifting of the teacher's role from expert-authority to that of facilitator-resource is recognized immediately. As teacher roles and tasks change, so, too, do those of the student.

In the first two parts of the analysis, the instructor's role and leadership-management patterns were explored. Role created jointly by the myriad of external and internal factors was expressed in the actual management patterns, typically called "style." This style is more than an attribute of personality; it is also a function of the situational context and negotiated teacher-student interaction. Although variations on the management theme did occur, the three instructors observed each had his/her own individual style, and over the two semesters demonstrated consistent leadership-management patterns.

Both role and management are important, for they create the setting within which interaction occurs. In the last section of the analysis, the focus will be the interaction that occurs in the laboratory setting (Figure 41).

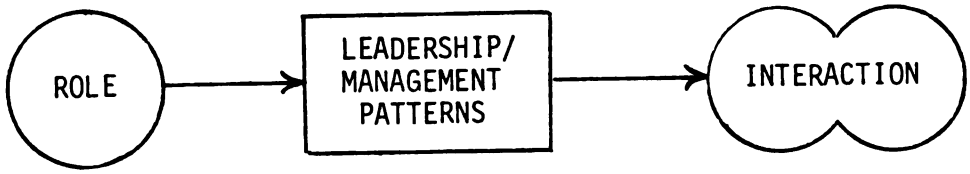


Figure 41.--The setting for interaction.

Brophy and Good (1974) examined student-teacher interactions and suggested the need for "more research in which the investigator works cooperatively with the teacher . . . by observing him naturalistically and then discussing events with him" (p. ix). To be most

useful, according to Brophy and Good, research, however theoretical, should be useful to the teacher.

To examine teacher-student interaction in the laboratory setting, it was necessary first to explore the dynamics of role formations and resulting leadership-management patterns with the three teacher informants, for it is within this complex social structure that interaction occurs. Although the patterns of interaction that occur in lab are primarily shaped by the teacher, students influence the teacher's behavior in the interactive process.

Observation and participation in the laboratory as teachers and students were engaged in day-to-day activities revealed general patterns of interaction that were created by the teacher. Within the general patterns, however, more subtle patterns were jointly created by the teacher and individual students or groups of students.

The opportunity to observe the collaboration of teacher and students in face-to-face interaction occurred most often during the student-centered portion of the laboratory session. Although the opportunity for students to interact with instructor was theoretically equal, variations occurred due to both teacher and student needs. For example, John's conscious effort to interact with the older students, building their confidence and giving moral support when needed, created a teacher-initiated variation within the pattern. During Ed's lab, the variations were most often initiated by very outgoing students or groups of students who demanded more attention and interaction.

To summarize the model and its implications, the following portrayal of actual teaching is offered from field notes. The following are snapshots of interaction in the laboratory. The first scenario is an example of orchestrated interaction in John's laboratory (Field notes, 4-10-81).

"Sheep Brain Dissection"

John recognized that the sheep brain laboratory exercise posed special problems for the students, which he addressed both in his method of presentation and planned interaction. During the introductory lecture and procedural directions, attention was given to listing the anatomical parts of the central nervous system, emphasizing unique qualities of each part. He advised the groups to do a very complete external identification before attempting the dissection of the brain, warning, "You must learn the superficial structures well before you cut the brain, or you'll become disoriented." He then announced to the group, "I will come around to help you with the identification." Although he did want the lab groups to attempt to find all the structures, past experience had proven that most groups needed guidance through this exercise. John said he purposely made himself unavailable or did not encourage interaction after giving the procedural directions, to allow the students an opportunity to at least attempt the identification. Those students who did find the structures would be used as group leaders to help reinforce identification while quizzing the groups. But as one frustrated student complained, "All those white stringy things sticking out of the grey brain look alike."

After the groups worked independently for about fifteen minutes, John announced that he would be coming around to the groups and began to do the circuit from table to table. The teacher-student interaction during the small-group lecture was carefully planned and orchestrated. Selecting the beginning group carefully, he moved into one of the slower groups, which included two older women. (In his judgment, returning students often need special attention.) Fortunately, they were sitting at one of the end tables of the lab so that the selection of their group was not obvious to the class. By starting with the slower group, John knew that they would have additional time to join other groups and hear the identification as many times as needed. Although John spoke very distinctly, he said that he tried not to talk above a normal voice for two reasons. He did not want to disturb the other groups, but also he wanted the students to move into the discussion physically. After doing an initial identification of all the structures and functions, he repeated the sequence, quizzing the students as he proceeded through the task. Students who could identify the structures repeated the names or functions. Occasionally there was a choral response. While quizzing the students, an attempt was made to reinforce correct answers, making sure that each student saw and heard the description.

Mara, who was typical of the younger nursing students, said, "He's so intelligent. If the teacher shows the groups what they are supposed to see, it really helps. Some students 'sneak' into other groups to hear the explanation more than once. Those standing behind can't always see, but at least they can hear" (Field notes, 4-10-81).

After the circuit of the lab tables was complete, John repeated some of the more difficult structures for another group of older women with whom he had also been working closely. According to John, many of the older returning students who came into the class four months earlier with many problems were progressing very well with the special attention they were receiving.

Although John did not provide such a controlled teacher-centered identification for most labs, on several occasions the nature of the laboratory exercise and experience demanded that he modify his teaching strategies to meet the students', and ultimately his own, needs.

In the next scenario, the focus of the interaction shifts from student groups within the formal laboratory to the interaction that occurred primarily outside class between John and an individual student who had very special needs (Field notes, 2-20-81).

"Tears and Bones"

Sitting alone at the base of the human skeleton, Phyllis leafed through her notes. Tears welled up in her eyes as the frustration grew. Not only did she have to recognize and name over 100 bones, but also identify all those "funny markings" called processes. As John approached her, the tears began to flow. Like so many older students with families and other obligations, the challenge of returning to the role of student was almost overwhelming. "How can I learn all these?" she pleaded as she held up the stack of pages. John comforted her with both words of encouragement and an empathetic hug.

Although three years her junior, John maintained a professional, yet fatherly, attitude as he reassured Phyllis. Listening to both her academic and personal problems, his concern was genuine.

When interviewed, John explained that the problem started when Phyllis's lab partner, Jan, no longer could tutor her. As a result, Phyllis felt hurt, abandoned, and frustrated. John described his role in the interaction:

Q: Tell me about the two women that you have in your afternoon class; the one that was having health problems and overwhelmed by the other woman asking her for too much help--How did that all start?

A: Well, they were lab partners and lab partners generally get to know each other a little bit better and sometimes study together. The studying for lab kind of went over into studying for lecture. They compared notes, got together and studied together. It just kind of snowballed. Jan, who is a better student, found it was sapping time from her other obligations--her family and her studying. It was bringing her down, so she had to gracefully get out [of the situation] without hurting Phyllis's feelings. I think we accomplished that; between the three of us we kind of worked around that. They are still lab partners and are still being friendly and in a working relationship; it's just not such a time-consuming thing for Jan.

Q: What did you see your role in helping to solve the problem?

A: My focus was to keep the one woman's self-esteem up. Because I could see that if she was dumped by Jan, it would have just crushed her. When I walked into the lab and found her sitting on the floor half in tears at the foot of a skeleton, she didn't know where to begin. She was lost. She couldn't study with Jan because she said, "Hey, I'm gonna be busy today, I can't." So she was just kind of beside herself, lost, forlorn. I could see that if she felt that way it was just gonna interfere with her learning. So I sat down on the floor with her and we talked about not being able to study with the other person. I explained that Jan had a health problem and had to have surgery [which made those look like they were the really big things and that it wasn't her]. It was these other things, to try to build up her self-confidence a little bit.

Q: Did it make you feel good as a teacher--that's part of your role?

A: I feel that's part of my role with these people because I can't teach them unless I can put them in a mental state so that they can learn. I could stand up there and talk to them till I'm blue in the face, and it would just go in one ear and out the other if they don't have a good positive image of themselves and a good attitude. Somehow I think I perceive that better in some of the older women and older students. They express their needs better. For instance, some of the younger women will come up to me and they'll just blush. They try and talk to me and they can't, they just blush. They can't talk to me; I kind of scare them, I think. I'm an authority figure, yet I'm not as old as they're used to in college instructors. They are just out of high school; they think all faculty are old croney people.

Q: You're not an old crone? [laughter]

A: No, not yet. [laughter] (Interview, 3-6-81)

Phyllis not only finished the class, but finished with an A on her last laboratory exam. Although many of her personal problems still remain, she shared with me an "increased self-confidence" that carried over to her microbiology class and her new part-time job in the college administrative offices (Informal interview, 11-8-81).

Both the orchestrated whole-group interaction and the one-to-one interaction that are so much a part of John's management style create a learning environment where both student and teacher benefit. Students gain in the areas of confidence and attitude, which appears to affect student academic maturity and grades. For John, his role of mentor and facilitator is reinforced, which is an important factor in reinforcing his management style. John is reaping some of the intangible benefits in his expanded role of teacher in the laboratory.

Feedback

John's personal desire to act as mentor and counselor to the older student, and the resulting pride in being able to effect a positive change in both their attitude and academic accomplishments, make him feel successful in his chosen role (Informal interview, 11-9-81). The resulting positive feedback reinforced not only his role but also his management patterns (Figure 42).

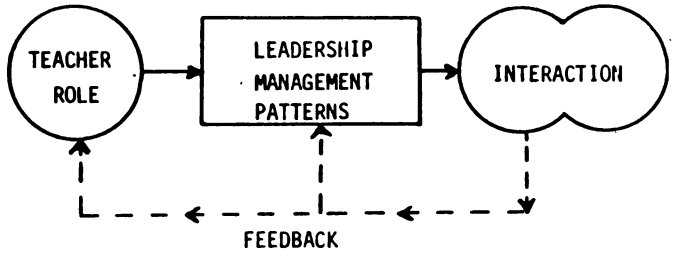


Figure 42.--Reinforcing role and management patterns.

John was very candid about his interaction with the older students and was quick to report when they did well on tests. "I'm so proud," he said, "they are so much more confident--they know they can do it." However, because of the "extra attention" given to the older students, he had to be especially careful not to ignore the needs of more typical students. There seemed to be no resentment; in fact, the younger and older students often worked in lab groups as peers (Informal interview, 11-9-81).

To support the notion that the interaction may be having not only a positive effect on attitude, but also may be reflected in

grades, the final grades of John's students in one anatomy lab were compared. The grades of five returning students whom John identified early for supportive interaction were compared with those of the rest of the class. Although the entire class average improved throughout the semester, the improvement of the five was more dramatic. They began with a D average (below the class average) and finished the semester with a solid B average (above the class average) (Field notes, 12-15-81).

Clearly, interaction between teacher and student is jointly produced, and this interaction results in feedback to both teacher and student as illustrated in Figure 43.

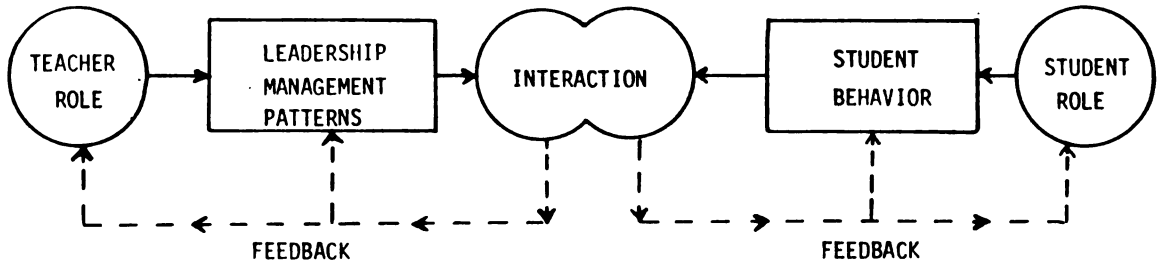


Figure 43.--Model of teacher-student interaction--two-way feedback.

The study suggests the behavior of both teacher and student can be reinforced in either a positive or negative way. In either case, behavior is adjusted depending on the feedback. For example, John encouraged students to ask for help, expanding the opportunity for interaction. When students did ask for help and John met the request in a positive way, the students requesting help, as well as

those too shy to initiate the request, felt free to interact. As the semester passed, the teaching and learning interactions became commonplace for all participants.

It is erroneous to assume that the teacher-student interaction is the only interaction factor impacting students. For some students, the student-student interaction and resulting support system is as important as the teacher-student interaction. Linda and Joan were good examples of two older students who found support in one another. Both Linda and Joan were among the group of returning students John focused his attention on, and often visited John's office to ask questions or just socialize.

"Together We Struggle"

Rarely seen apart, Linda and Joan were co-workers at the nursing home. Working as aides, together they decided to return to college for nursing degrees. Although they both felt the lab environment John created was very helpful and supportive, they agreed that the most beneficial interaction for them was that of student-student. They commuted, studied, struggled, and faced frustration together.

Both teacher-student and student-student interaction helped both women feel positive about their lab experience. In an interview (11-10-81), Linda and Joan described their "terror" in their first days in lab. They both shared a feeling of frustration not only working with laboratory equipment, but also being in competition with "young gals who knew what they were doing." Because John had

announced to the whole class his willingness to discuss problems and answer questions not only during class but also during office hours, the two frustrated women went together to discuss their plight. They were not certain they could have approached John alone, but together they dared visit John in his office.

John sat down with the women and listened to their problems, then reassured them they were not alone. He then followed up by continuing to build their confidence. In time, working as a team, Linda and Joan became more independent in their laboratory, relying more on each other than on reinforcement from John, but they never were afraid to ask a question or seek out John's help when needed.

It is important to note that teacher-student interaction, however beneficial, cannot meet every student's needs. Because there is only a limited time for teacher-student interaction both during class and outside class, other interactive relationships such as those that occur between friends or lab partners can also enhance learning. John's encouragement of teamwork and promoting student leaders expanded interaction beyond the laboratory. Joan and Linda were friends before they took anatomy, but many friendships between lab partners developed in each of the classes observed.

Importance of Interaction

There is general agreement between both teachers and students interviewed that interaction is beneficial. Both peer interaction and teacher-student interaction are important components of the labs taught by the instructors in the study.

When surveyed, 139 anatomy students responded to questions regarding their perception of laboratory interaction (Appendix D). Although they saw small-group and individual instruction as most beneficial, they saw lecture/introduction type of interaction occuring most often. The student survey supports the notion that a variety of interactive patterns is beneficial to students; however, different students have different needs.

Each of the instructors also saw small-group and one-to-one as the most valuable teaching modes in the lab but treated interaction very differently by the very nature of their management strategies. The instructors saw a positive interaction as influencing both the knowledge gained and attitude toward the laboratory experience. By improving attitude, the knowledge gained could also be enhanced (Figure 44).

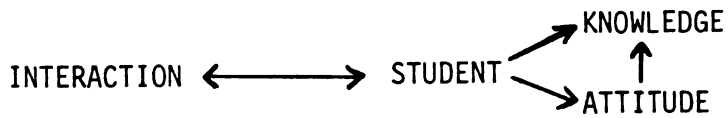


Figure 44.--Student interaction--attitude-knowledge loop.

Once the attitudinal problems such as lack of confidence and fear of a new environment were reduced in John's students, they were better able to approach the task of learning. This pattern supports the Situational Leadership Model of Hersey and Blanchard (1979). By helping students over attitudinal hurdles, learning is facilitated.

The amount of task versus relationship behavior on the part of the teacher is in direct relationship to student maturity. The "hand holding" early in the year in John's class later was replaced by independent learning as student "maturity" increased.

One might think most teacher-student interaction is positive, but the research demonstrated that this is not always the case. One of the values of ethnographic methods is that the "serendipitous effect" of field work may expose important information not written into the study. The following scenario (Field notes, 4-18-81) is such a case.

"You're on Your Own"

A fourth teacher, whom I shall refer to only as Ron, became important in the study as a source of disconfirming evidence to the notion that all interaction was beneficial. Because his interaction was minimal and directed at only a few select students, it seemed to be a negative influence in the laboratory.

Ron was teaching anatomy-physiology lab due to an overload of classes. He was not part of the regular teaching team usually teaching general biology or a one-semester anatomy class. Being thrust into a new social setting with students already "conditioned" by one of the regular lab instructors the previous semester, the following situation developed.

Although rumors and student comments on teachers and teaching methods are not unusual, those surrounding Ron were increasingly troublesome as the semester evolved. Students in his lab began to

compare their class with those of other instructors, expressing a growing frustration and dissatisfaction. Ron did not teach any of the lecture sections, so his students complained to their lecture instructor.

According to reports, Ron presented a brief introduction at best, then turned the lab over to the students. He often wandered the halls or busied himself with work for other classes. He rarely interacted with his students, except on a social basis with what he referred to as "bright" students. The frustration was evident not only in students, but in Ron as well. One morning he dropped in to John's and Ed's office to socialize during his lab. He commented to John, "Those students are so dumb. . . . They can't follow simple directions. I can't believe what a mess they're making of their urinalysis tests!" (Field notes, 4-18-81).

Leadership and guidance of any kind seemed lacking in Ron's classes. Student frustration was high and had a decided impact on the students' attitudes, as demonstrated by these responses on the student surveys (Appendix D):

> He never shows the introductory slides like the rest of the labs get. We might as well not even have an instructor.
>
> The instructor wasn't in the room very much. I found it [lab] quite useless. I really didn't learn anything.
>
> There was no instruction or assistance.
>
> The lab material is very beneficial--but without proper instruction, no knowledge is gained.

When interviewed, a student expanded on her personal experience in Ron's class (Field notes, 5-2-81):

Student: Lab is a waste of time!

Interviewer: Why do you say that?

Student: He's never there to help. Even when he is, you ask him a question and he'll say, "If I tell you, it's like doing your work--find it on your own."

Interviewer: Isn't that true?

Student: Sure if it was all the time. All we want is help when we can't do it ourselves.

Interviewer: What have you done about it?

Student: Oh, I either sit in on another lab or don't bother to go to class and do it on my own.

Interviewer: Can you do it?

Student: Well, my lecture grade is an A, but lab is B- or C+; it's hurting.

Although Ron's classes scored several points lower than the other instructors' groups on an average, the significance of the lab scores may or may not be statistically valid, for the variables were not controlled. But certainly the descriptive, survey, and interview data are strong. The attitudes of students toward lab were definitely affected. In contrast, from all the other labs, students' comments were far more positive:

> I enjoyed lab. The teacher did a nice job of explaining and helping me understand.
>
> When there was a problem with identification, the instructor pointed out what was supposed to be observed.
>
> It [lab] is important because it clarifies, expands on, and completes what is presented in lecture.
>
> It really helped in lab to have the instructor right there--explaining things if need be, chatting with you to make you feel comfortable. As far as my lab went, it was just super.

Ultimately, the effect on student attitude may have longer-term impact than that of test scores. Student attitude is reflected not only on the class, but may also influence the students' perception of the program and school. The students' self-concept and attitude toward learning in the laboratory setting also can be influenced. Both the quality and quantity of interaction are important. Too little interaction or inappropriate interaction as demonstrated in Ron's class may result in negative feedback.

Because no teacher works in a vacuum, many outside pressures and/or internal insecurities can influence the instructor's role and management of the classroom setting. Whether Ron lacked experience teaching the course content, did not feel part of the regular anatomy team, or just had a very different philosophical outlook concerning his role in the laboratory setting, the learning environment he created made sense to him. However, for his students the interaction often produced a negative, rather than positive, feedback loop while it reinforced Ron's perception of the students and course (Figure 45). What is important is not just the quantity but the quality of interaction, as evidenced by the negative feedback.

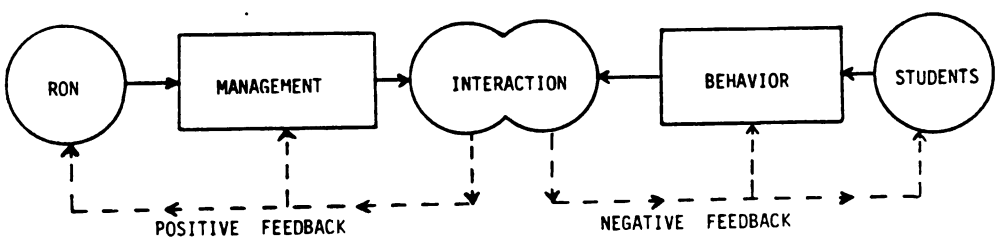


Figure 45.--Positive and negative feedback.

As students became frustrated with the lack of interaction or refusal on Ron's part to give specific help in doing the exercises, they began to exhibit one or more of the undesired behaviors:

leave class early

stop asking for help

request transfer to another lab

seek help from other instructors

stop attending lab

lose respect for equipment

gripe about course or instructor

The resulting behavior of students only reinforced Ron's perception of the students as "dumb" and "immature." Just as John's perception of role and management was reinforced by feedback from students, so too was Ron's--but with very different results.

With growing concerns about Ron's management of the laboratory, the department chairperson finally intervened. Working with Ron and the other anatomy instructors, he helped Ron clarify his role in lab. Working more closely with students, soon the complaints and other related problems were dramatically reduced (Field notes, 3-18-82).

Roles and management patterns may change, depending on the myriad of variables in the environment. The study suggests that there may be less change as a teacher develops a "teaching style." The importance of helping inexperienced teachers or new teachers identify the most productive role and management patterns is a challenge not only for administrators but also teaching institutions.

Summary of Findings

Interaction in the laboratory is not an accident but a complex social encounter. In the study we moved from an examination of role, to management patterns, and finally to teacher-student interaction. From an analysis of the qualitative data and an expansion of other models of interaction, the study suggests:

That role is a function of the transaction between the extrinsic factors--institution, curriculum, students, and setting; and the intrinsic factors of the instructor's personality, needs, values, and attitudes;

that the individual instructors' perception of role is a major factor in determining leadership/management pattern in the laboratory setting;

that the role-determined leadership/management pattern affects the amount and type of teacher-student interaction;

thus the amount and type of interaction is a function of the instructor's perception of his/her role in managing the learning environment.

In addition:

that the value of interaction is recognized by both teachers and students.

that increased teacher-student interaction may have a positive effect on students both academically and psychologically.

that interaction may increase if there is a positive feedback to the instructor's needs.

that small-group and one-to-one interaction is perceived to be the most beneficial type of interaction both by teachers and students.

that (insufficient or inappropriate) interaction may also result in a negative effect, particularly on attitude.

that feedback from teacher-student interaction can modify behavior in the role.

The qualitative data suggest the importance of interaction but also reveal the broad range of interactions possible within a very complex social setting. Certainly, it is not just the quantity of teacher-student interaction, but the quality of the interaction. Further, the study suggests the importance of a clear definition of role for both teacher and student, the adoption of a leadership-management pattern with which the instructor feels comfortable, and the use of good context cues. The implications for both practitioners and institutions involved in teacher training as well as possible areas for further research are the focus of the concluding chapter.

CHAPTER FIVE

DISCUSSION AND IMPLICATIONS OF THE RESEARCH

Discussion of the Findings

Recently, my daughter Michelle, who is a junior at one of the large state universities, came home for a break. Being aware of my research, she occasionally shared "professor stories" with me, and she shared the following:

A standing ovation is a rare event in the college classroom, but Michelle said one of her professors received such lauds from his large-group lecture at the end of the term. What the students appreciated was that he communicated on a personal level, even with a group of well over a hundred. Unfortunately, Michelle's other instructors, both professors and T.A.'s, didn't receive such high grades. In her opinion, many of her professors, particularly the T.A.'s, didn't know "how to teach." She commented that in the final exam in physics lab, many of her classmates left after ten minutes because the exam didn't even cover the material they studied in lab (Field notes, 4-20-82).

Certainly, both good and bad teachers can be found at any level of education. Yet, because many college instructors are never schooled in teaching methods, a need for improving teaching exists on most campuses today. Whether the problem is an inexperienced teacher, an experienced teacher out of step with students or changing

curricula, or a good teacher who wants to become better, knowledge about what is happening in the teaching and learning environment would be helpful in improving teaching in higher education.

The college science laboratory is a special teaching and learning environment because of its unique potential for interaction. Although the methods or instructional strategies of the three teacher informants in this study may or may not be generalizable to other instructors or settings, the Model of Teacher-Student Interaction developed here could be used as a heuriotic to examine the teaching of other instructors in other settings. The study suggests a broad range of interactive possibilities, each of which "makes sense" to the actors involved.

The importance of studying the classroom as a social unit has been demonstrated by Florio (1978) and Cooper (1980), exploring the instructor's roles in the interrelationship between teacher and students, the instructional process as well as the importance of contextual shifts contribute to our expanded understanding of what is happening in the classroom. In this study, ethnographic methods were used to look at teacher-student interaction in terms of a grounded analytical model that could be used to explore other laboratory classrooms as well. Improving instruction through improving interaction can be accomplished only with a full understanding of what is happening and why. The next step then could involve development of strategies for change.

The Interactive Model

To develop a descriptive model of interaction that occurs between teachers and students in a college laboratory setting, it has been necessary to examine the factors that shape the dynamics of interaction. The social context includes not only the physical setting and curriculum, but the jointly produced rights and obligations of teacher and students. Thus to examine fully what is happening in lab, the key factors of teacher role and leadership-management patterns become essential components of the model (Figure 46).

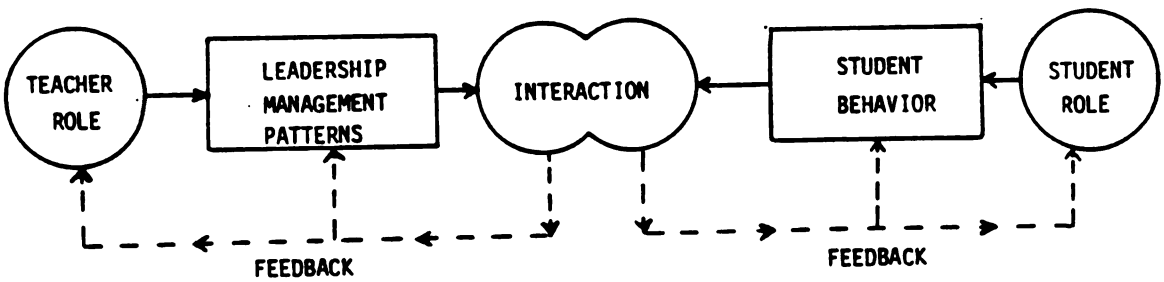


Figure 46.--Model of teacher-student interaction.

Role, which is shaped by a myriad of factors, including both intrinsic and extrinsic forces, influences specific behavior within the setting. The teacher's perception of role shapes the leadership style and management patterns in lab. For the student encountering the setting, learning how to behave and interact in lab is an important part of the learning process.

Leadership-management patterns that teachers employ in lab influence both the amount and type of interaction. The patterns

identified in this study range from a very teacher-centered lab where the instructor talks or walks students through exercises, to a student-centered lab in which students are basically on their own. The study suggests most instructors develop their own management pattern; in addition, variations on the basic pattern occur as a result of adapting teaching strategy to situational variations. The experienced and most adpative teachers take into account students, curricula, and, of course, their own needs.

The science laboratory setting offers college instructors an opportunity to interact with students in a variety of ways. The interaction can benefit students and teachers alike as they jointly create the teaching and learning environment. Although the study supports the notion that there is no "one best way" to teach a laboratory or interact with students, it does suggest the importance of maximizing interaction between teacher and student(s) within any management style.

Since individual instructors may create teaching and learning environments that are, in fact, very different, the amount and type of interaction does vary. What seems important for both teachers and students is a clear definition of role and adopting a leadership-management pattern with which the instructor feels comfortable. However, it also follows that if the instructor wishes to maximize the interaction in the setting, students should also have a clear picture of not only their role, but also that of the teacher. The teacher, as leader and manager of the environment, can help clarify roles, rules, and expectations for the students.

There are many ways to play the role of teacher in the laboratory. A teacher may be a model, mentor, facilitator, or other, depending on her/his individual personality and needs and on the instructional purposes at hand. Helping students overcome the initial insecurities so often part of student-centered learning, "turning students on" to the wonders of science, or just "being there" to guide or facilitate the learning process, instructors can be an important part of the science laboratory. This appears especially true for the introductory courses observed, although one might expect it is true for most undergraduate courses as well.

Unfortunately, many instructors are not actively engaged in "teaching" in lab, thus are missing opportunities to interact with students in meaningful ways. Perhaps this is a result of a narrow view of what a teacher's role is in lab, employing a leadership-management strategy that limits interaction, or simply of inexperience. Whatever the case, the study suggests instructors who do interact frequently with students enhance the learning environment not only for their students, but also for themselves. The three instructors who were the informants in this study were of the opinion that one-to-one and small-group interaction was vital to the lab experience. The three seasoned instructors, although employing very different management strategies, each interacted with students in meaningful ways. What was important about their interaction was that it was congruent with their individual perceived roles and goals for their classrooms. Equally important was the fact that the instructors established guidelines (e.g., rules, expectations, goals) for

not only the students but also for themselves. Each instructor let his students know immediately what the teaching-learning environment would be like, including basic participation guidelines. Yet clearly, as in John's lab (pp. 127-33), room for flexibility based on student needs or maturity was also allowed for. The difference between a teacher leaving the room and the students feeling "abandoned," and a teacher leaving the room and students cuing in to "We're on our own now, but help is available if a real problem comes up" was established by the instructor early in the course.

The problem of managing the teaching and learning environment is more different for the neophyte than it is for the seasoned instructor. For the new teacher, discovering "what works" may take time. For many new teachers or T.A.'s, laboratory instruction is based only on previous college laboratory classes. Unfortunately, many college laboratory courses are not taught by experienced teachers but by other students, so models of effective laboratory instruction are often lacking.

Two very different problems exist for the seasoned teacher. First, the "sense of the setting" may by crystal clear to the instructor, but for students unless the signposts of verbal and nonverbal communication are made clear, the "sense of the setting" may take longer to acquire. It would appear that if the goals of the learning environment and lines of communication are established early, both teacher and student might move on to teaching and learning more quickly and effectively. The second problem for experienced teachers lies

in expecting "what worked" in the past with one group of students to work as well today with the shifting student population now entering college.

An additional problem for higher-education teachers is the peculiar nature of their clientele, i.e., the older, returning students. These students have needs that must be addressed by higher-education teachers. In the Journal of Science Teaching (Webb & Carras, 1981), a general profile of the "older students" describes some of the specific characteristics. In summary, older students lack confidence and experience considerable anxiety early in their college experience. In addition, older students appreciate well-defined objectives and spend more hours in formal study than others, achieving a higher level of performance in final course assessments. Bringing with them a greater social maturity, they become active participants in the classroom, and importantly, they do not see themselves as problems.

The community college has experienced the influx of older returning students perhaps more dramatically than the large universities. The terminal one- and two-year programs are attractive to older students seeking rapid entry into the work force. John and Ed, teaching the nursing and health-related students, are faced with this group most dramatically. Through conscious interaction and a supportive teacher and learning environment, John has been particularly adept at addressing the needs of the mature student. The master teacher "opens doors" to learning. McKeachie et al. (1962), in a review of research on laboratory instruction, concluded that the

effectiveness of laboratory teaching depends on the particular way in which the laboratory is taught. They also concluded that the research suggests that decisions about teaching methods do have an effect on total climate.

Another problem facing higher-education teachers and administrators is that when economic times put pressure on instructional budgets the tendency has been to relegate the laboratory to a secondary instructional setting either by using T.A.'s or reducing instructor contact credit. To assume there is no need for instruction in lab because it is supposed to be a "student-centered" setting is erroneous. The study supports the notion that instruction and interaction in lab are important and that the teacher should not be replaced by T.A.'s or, if T.A.'s must take on this responsibility, they should be trained (perhaps by apprenticing with seasoned laboratory teachers).

It would appear for both teachers and students to participate most effectively in lab, a clear picture of not only what the participation structure will be, but also why, is essential. Through the use of a descriptive model, a picture of both "what is happening" and "why it is happening" from the point of view of participants can be explored. The goal would be a better understanding of the event with an eye toward improving teaching and learning. Certainly, self-analysis or peer analysis could provide instructors a valuable tool for creative professional growth. Even a master teacher can improve, especially in light of an ever-changing educational milieu. A descriptive analysis of the learning environment through use of the

model has implications for both teacher training (including T.A.'s) and professional staff development. In the following section, the implications for teachers, teacher trainers, and educational researchers are explored.

Implications for Teacher Education

Analyses of both the rich qualitative and quantitative data provide support for the Model of Teacher-Student Interaction. Teacher perception of institutionally defined roles does result in a variety of leadership/management and behavior patterns. These patterns allow for a variety of teacher-student interaction possibilities. The interaction, perceived as important both by teachers and students, does have implications for improving both student attitudes and academic success; however, it also has implications for not only improving laboratory instruction, but also increasing job satisfaction.

What are the implications for science laboratory teachers? The study suggests through analyzing the classroom setting using the model of interaction:

1. A better understanding of role in terms of both external factors and internal personality and needs would be helpful in clarifying role expectations in terms of personal needs.

2. A variety of leadership/management patterns can be used effectively in the laboratory setting. The choice should be a function of the multiple factors of teachers' perceived role, curriculum demands, and student needs.

3. Each leadership/management pattern, if clearly defined, provides unique opportunities for teacher-student interaction.

4. The value of the interaction can be reflected both in student academic progress and attitude, and by interfacing objectives with interaction, both the teacher and student can enjoy positive feedback or satisfaction.

5. Ultimately, if the laboratory instructor can identify what is happening in the setting, strategies for improving the teaching and learning within the setting can be recognized and, it is hoped, applied.

The researcher, especially the ethnographic researcher because of the intimate relationship developed with the natives he/she studies, has an obligation to share the implications of the findings. In doing so, the natives can benefit from a multidimensional picture of the setting. Rich in the nuances of setting, ethnography provides an increased awareness of the classroom life. The goal of analysis is not necessarily to change management patterns in the laboratory, for they "make sense" in terms of the natives, but to improve in strategies for interaction within the situational frames created by individual instructors.

To share the findings with the informants, in the case of this study, meant not only the three teacher informants but also the other instructors at Lakeside who were interested in improving laboratory instruction. During both the fall and winter inservice programs, the findings were presented in a presentation on "Effective Laboratory Instruction." The Interactive Model, a segment of videotape from John's class, and an exercise on management style were included. The use of the Interactive Model as well as related exercises for analysis of "what's happening" in lab also has implications for teacher training as well as further research.

Based on experience in sharing the findings at Lakeside, a model for inservice education has been developed. Figure 47 graphically illustrates the potential outcomes of a teacher inservice based

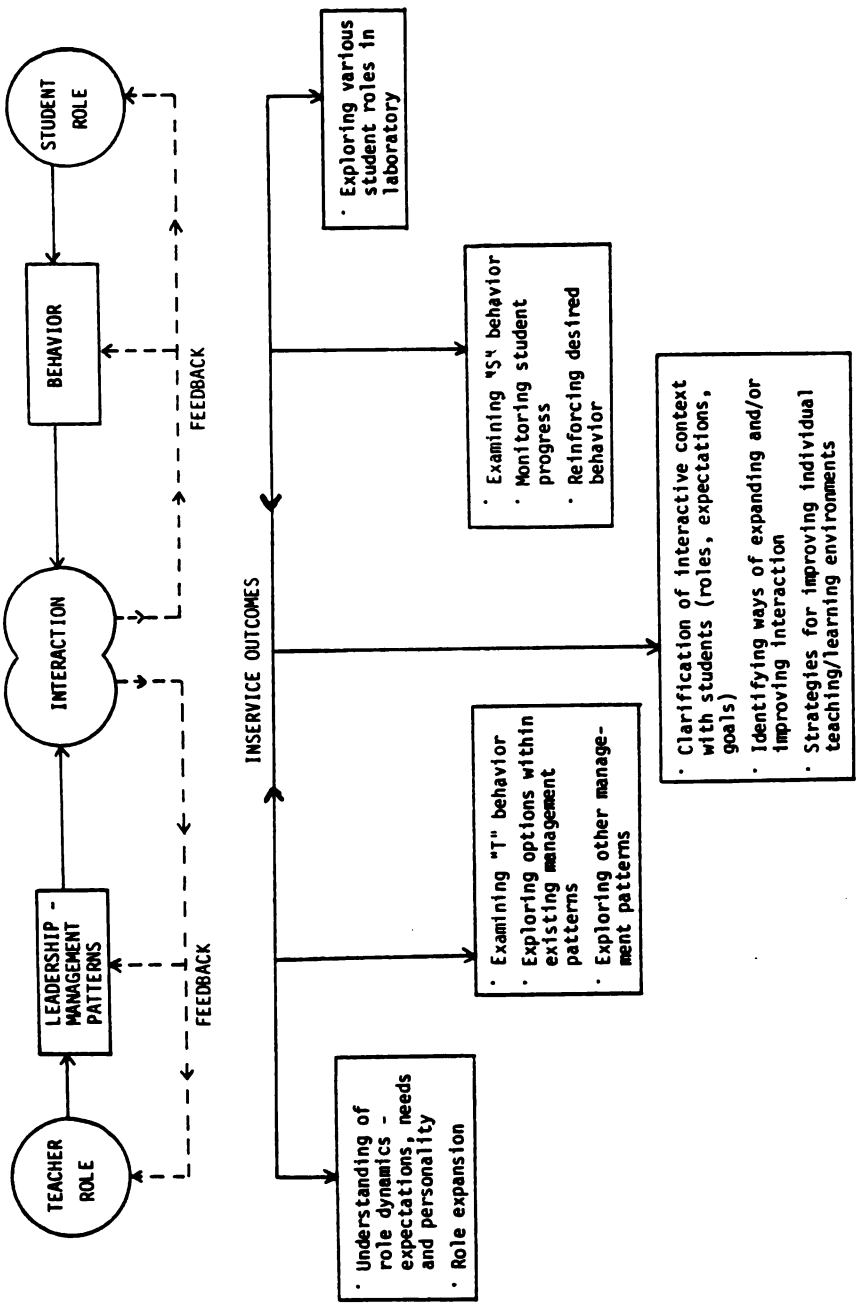


Figure 47.--Potential outcomes of teacher inservice based on model.

on the research reported here. The inservice might include exploration of role, management patterns, and interaction, but also techniques of how to look at what is happening from an expanded perspective. For experienced teachers, an inservice would focus on their own laboratory environment. For prospective teachers or T.A.'s, an inservice could help clarify role, explore various management patterns that work for experienced instructors. The desired outcome from such an experience would be a greater awareness of the complex social setting that exists as teachers and students interact in lab, and planning strategies for improving interaction and instruction.

Implications for Further Research

The college science laboratory setting is an environment that demands further research. The study was limited to life science laboratories in a community college. There appears to be a need for continued research in the following areas:

1. Descriptive studies that focus on other science areas, i.e., physics, chemistry, earth sciences.
2. Descriptive studies in four-year institutions, particularly the large universities where laboratories are taught by instructors with varied backgrounds.
3. Additional studies that focus on community college instructors in the laboratory setting.
4. Studies that focus on the factors that affect the quality of interaction.
5. Application and testing of the Model of Teacher-Student Interaction in any of the laboratory settings above.

Continued research can not only help the researcher develop the working model into a tool for use by the practitioner, but could

also explore other facets of the social context of the laboratory setting such as student-student interaction or controlled studies that explore the effect of interaction on grades or attitude. Finally, such research will contribute to our understanding of the complex processes of teaching and learning in their social contexts.

The Next Step

One of the most exciting aspects of research, particularly ethnographic research, is the intimate relationship that develops between the researcher and both the subjects and the setting. Not only to help the teacher informants see their setting more completely but to share the findings with other instructors at Lakeside has given the study more meaning.

Because the model is just emerging from the data, continued research is necessary to support and refine it for future application. Recognizing the validity of this direction in research, Lakeside Community College has funded a continuation of the research into other labs throughout the college.

The next step for the researcher is to develop strategies for applying the Model of Teacher-Student Interaction. To take that step, however, it will be necessary to take time to think and reflect. What better way for the researcher to do this but to rent a wooden boat and go fishing with her father at Angel Lake.

APPENDICES

APPENDIX A

SAMPLES OF FIELD NOTES

DATE: 1/26/80, TEACHER CODE: 01, OBSERVATION CODE: 0102

COURSE: Human Anatomy and Physiology, TOPIC: The Heart,

NO. STUDENTS: 22

TIME: Observation 8:00 - 10:20 a.m.

Class 8:05 - 10:00

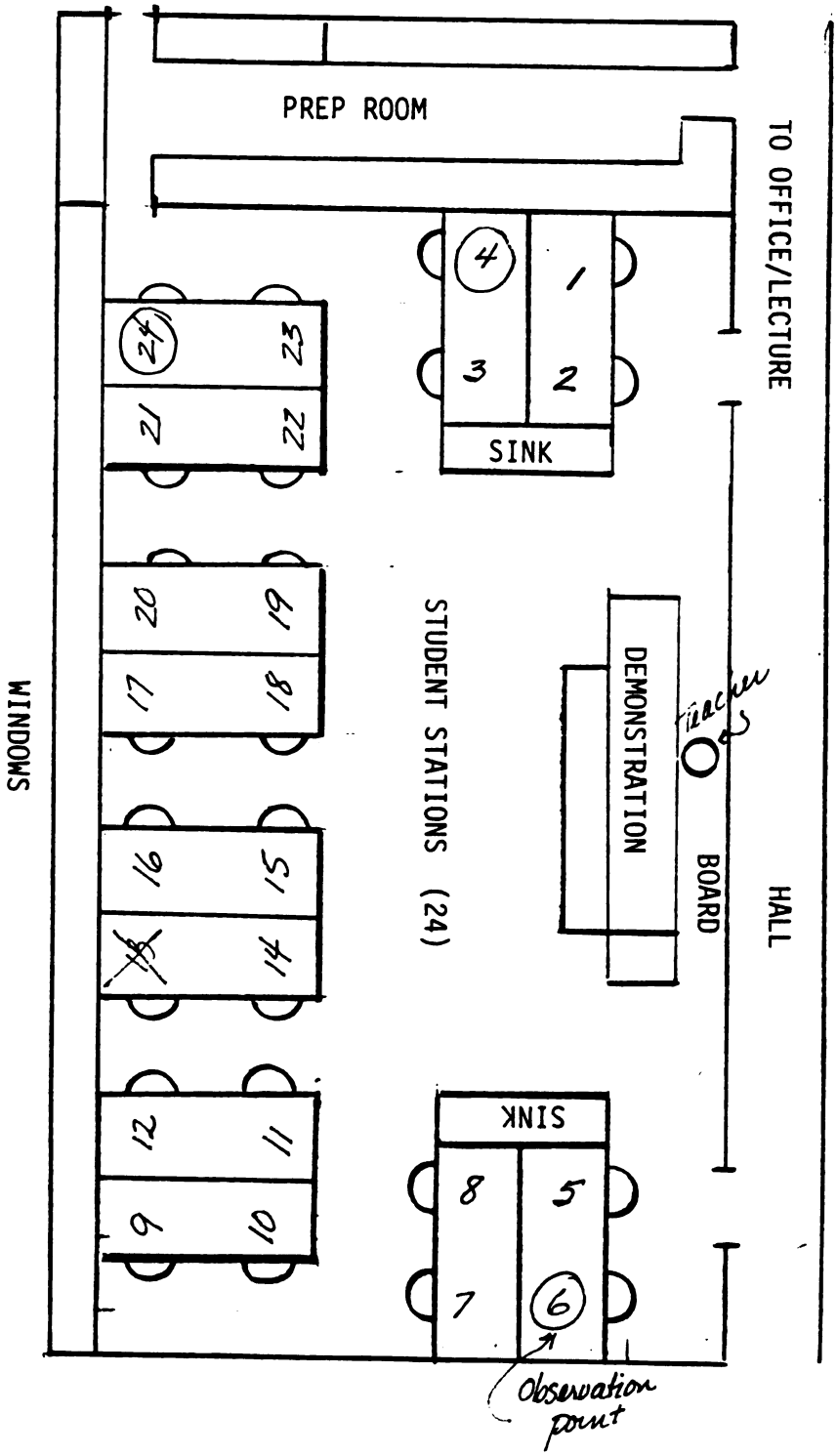
ON

Setting: Anatomy Lab (see illustration)

Newly designed lab (teacher designed) with a variety of instructional models and materials. Four students/ lab table - 24 maximum. Difficult to see screen/ overhead from front table seats (1, 2 - 5, 6).

Students: Twenty-two - female
Age range 18 - 50 (approx. 4+ 30); majority
Nursing or alied health majors
Second semester students
Students familiar with laboratory proceedures

Instructor: Male, approx. 40 M.A. Biology
Has taught this course several years
Outside interests - 4H Handicapped Program, raising horses and working his farm


PREP ROOM
TO OFFICE/LECTURE
4
1
3
2
SINK
24
23
21
22
20
19
17
18
STUDENT STATIONS (24)
DEMONSTRATION
Teacher
BOARD
HALL
WINDOWS
16
15
14
12
11
9
10
SINK
8
5
7
6
Observation point

TEACHER CODE 01

ON PRE CLASS

8:05 Students drifting in. Social conversation at two tables, discussing nursing experiences. Most are using this time before class to read over lab materials.

8:08 Teacher enters room and gets out instructional materials (slide projector and models). Little reaction from students observed. Students continue to enter room. Instructor turns on slides and darkens room. No formal beginning, teacher moves to front table shile talking and begins.

8:10 Instructor asks class to excuse him today - had to pull horse out of mud in his creek - he explains tramatic experience (both for he and the horse) (he appears a bit tired and disorganized). Social/personal exchange.

8:11	1. Heart Diagram	Slides related to lab exercise
	2. Pluck - internal chest organs teacher points out structure on the diagram of internal organs	
	3. Heart - black lung	Some reaction
	4. 3/4 turn of heart	Part of thoracic aorta
	5. Posterior	
	6. Open view heart	Students observe intently - few questions. One student enters late. All focus on screen.
	7. Aortic semi lanars	
	8. Bi cespid value	
	9. Cx heart	
	Heart slides continued	All very interested in slides.
	10. Damaged heart - hypertrophy	Instructor points out structures - reads scientific information from script.
	11. Myocardial infaretion	

12. Hypertrophy of lumen 13. Cardiac muscle (micro) 14. Cx aiterics 15. Artery occlusion 16. Artery - coronary - arterio sc. 17. Starvation 18. Aorta 19. Opened aorta 20. Damaged aorta - as. 21. Aorta wall 22.-24. Tunica 25. Artery/vains 26. Staining techniques 27. Artery/vein/nerve 28. Staining walls 29.-30. Artery 31. Lymph vessle with valve 32. ____ Omit	Student changes slides as directed by instructor - "next slide" Points out that heart damage isn't just a problem of old age. A few students take notes as instructor talks, but most just listen. Instructor lectures and expands on information related to health problems and unique characterists of slides. Students loosing some interest.

8:30 Directions for Dissection:

Sheep Hearts - Instructor gives basic directions for dissections. Keeps the directions specific yet "light". Directs students to look at models. Follow lab exercise guides; 1 heart/2 students. "Don't cut yourself - we only have one bandaide!" (humor)

Teacher continues to give directions as students begin to move around the r-om gathering materials for exercise. "We will also look at the cat... look at demos from previous faculty demonstrations (inservice)."

Demos include "veal pluck" and dissected hearts with lables. Good variety of materials available to students.

Groups begin to work immediately either observing specimen to be dissected or those on display. Students read over prepared materials and directions. Conversation quiet and on task.

8:42 Instructor leaves room to put on lab coat. Goes from group to group to point out heart structures. Students very attentive in small groups.

8:44 Instructor asks whole group to observe location of vena cava then returns to group demonstration.

8:45 Instructor moves on to second group. Points out to small group variations in sheep heart - continues process.

Groups of 2 or 3 probe heart using dissecting tools. Most attaching project without reservation. With heads and bodies, students show an intense interest and involvement with dissection.

Social conversation in one group centers around the type of tests this instructor uses. The room is quiete quiet.

Students are tentative about cuting into the heart. Some find descrimination of vessles difficult. Directions are read and re-read (evidence of independent work). A few groups begin cutting but most are exploring the surface structures. Instructor passes a heart around. As I walk about the room students ask questions.

9:05 Instructor... "If you need any help, just ask". He points out models which might help in locating structurs. "Cut, look, cut, look!" Instructor very willing to help.

Instructor moves in and out of the lab. Students very intent on observing structors. In several groups one person assumes a leader role, in others a team effort (student status).

9:10 Instructor... "You may take hearts with you... here's seran wrap - be careful with cuting edge! You may have enough sheep parts to make a bionic sheep".

Students may or may not hearing the whole group announcements? As teacher moves around the room

he discusses the problem he encourntered with his horse (social) and answers academic questions.

Students seem relaxed with atmosphere and begin to joke a bit and remark on eachothers dissecting technique.

9:20 Fingers probe the heart. Most have made major cuts and examine the internal structure. One group gets the cats out to compare structures.

Instructor... "Put unwanted hearts in green bucket!"

9:25 Some students begin clean up while others still working intently. Students name structures out loud and quiz eachother (student-student interaction).

There is a tremendous number of resources - models, demos, charts and written instructions.

Students seem willing to share information and free to ask questions.

9:30 Transition time for some, others continue to work.

Instructor begins to show structures (ductus arteriosis) to individual students (1 to 1). He makes himself very available to his students.

9:39 Instructor reminds students to look at slides as some prepare to leave. Two students leave. Instructor puts another heart on display.

It is obvious students have had a great deal of experience both with lab materials and dissection. (No overacting to specimens etc.)

9:42 Clean up begins in earnest (with no specific directions). Others leave quietly when finished.

9:50 Students remaining (15) are looking at slides and filling in notes on the lab sheets.

Instructor... "The horse will live... the owner will die". Continuing conversation on the horse incident. Teacher continues to give general directions on microscopic techniques (mix social/ academic).

Noise level in hall increases as classes begin to change.

Teacher continues long social conversation with group of four.

More of the "older student" remain to the end of the class.

Several students have wrapped up hearts to take home.

Students ask researcher questions - there seems to be little observer affect on either the teacher or students observed.

9:59 Students are continuing to work - there is a free lab after this so there is no rush to leave.

10:00 Eleven students remain. Teacher also remains.

10:05 Teacher leaves for break - tells students to clean up when ready.

10:20 Last students leave.

APPENDIX B

ORIENTATION MATERIALS AND SAMPLES OF LABORATORY EXERCISES

COURSE ORIENTATION and INFORMATION SHEET

BIOLOGY 121-122

HUMAN ANATOMY and PHYSIOLOGY

COURSE: Three hours lecture and two hours lab weekly

TEXT: Human Anatomy and Physiology by John Hole, 1st edition, 1978

LAB MANUAL: A Manual of Anatomy and Physiology by Donnersberger, Lesake and Timmons

RECOMMENDED BOOKS: The Anatomy Coloring Book by Kapit and Elson
John Hopkins Atlas of Human Functional Anatomy by Schlossberg and Zuidema

ATTENDANCE: Any student with 9 or more absences during the semester will be automatically dropped from the course. In the event that a class is missed, it is the student's obligation to obtain that material.

ASSIGNMENTS: The entire unit reading is assigned at the beginning of each unit. Students are expected to read the material prior to coming to class, therefore having some basic knowledge of the subject matter. It is the responsibility of the student to study the material even though classes may be cancelled. The reading assignments are listed in the Lecture-Lab Information Sheet.

EVALUATION: Unit exams will be used to test material presented in lecture class. These exams are not cumulative although some concepts will reappear in successive units and could possibly be tested again. These units exams will comprise 2/3 rds of the final grade.

Laboratory test will be given to test material presented in lab. The laboratory grade will comprise 1/3 rd of the final grade.

Oral quizzes or "pop" quizzes may be given in either lecture or lab if the instructor deems it necessary.

A tentative examination date for each unit is included in the Lecture-Lab Information Sheet.

In the event a student is absent for a unit exam, an opportunity will be given to make it up during final examination week. Full credit will be given for the unit exam. The instructor will select a time that is

mutually agreeable to all concerned. No opportunity will be given to make up a second exam. The grade for that test will be zero.

In the event of an emergency, the instructor might be willing to allow the student to take the exam with another class if possible, or reschedule the test at a different time that same day.

May, 1979

DIVISION: Life Sciences

COURSE TITLE: Biology 251 - Comparative Anatomy of Vertebrates (II,4)

HOURS REQUIRED: Lecture 3, Laboratory 6

DESCRIPTION: Comparative study of the major taxonomic groups of chordates; dissection of amphioxus, lamprey, shark, mudpuppy, turtle, bird and cat.

PREREQUISITES: Biology 104 (Zoology); Biology 282 (Embryology) highly recommended. Sophomore standing.

INSTRUCTIONAL OBJECTIVES: Since the course is designed to prepare the student interested in the fields of medicine, dentistry, biology teaching, and biological research with the basic knowledge of the anatomy of vertebrate animals, he should be able to perform the following behavioral objectives:

1. Dissect any vertebrate animal and identify most of its parts.
2. Effective use of dissecting tools and operative technique.
3. Follow the directions and procedures for dissection as given in an anatomy laboratory manual.
4. Correct usage of anatomical terminology.

TEXTBOOKS: A.S. Romer & T.S. Parsons., The Vertebrate Body, W.B. Saunders CO., 5th edition, 1977. Atlas and Dissection Guide for Comparative Anatomy, by Saul Wischnitzer, W.H. Freeman and Co., 1967.

REFERENCE BOOK: Atlas of the Cat Anatomy by Field and Taylor, U. of Chicago Press

COURSE OUTLINE:

LECTURE:

1. Introduction - course organization and aims, attendance, grading, laboratory work
2. Comparative approach to study and methods of study
3. Review of taxonomy and classification of animals
4. Classification and characteristics of the Phylum Chordata
5. Ecology and distribution of animals; zoogeographical realms
6. Review of embryology of the vertebrates
7. Integumentary system - comparative
   a) Skin and epidermal structures
   b) dermal structures
   c) glands
   d) teeth
8. Skeletal system - comparative
   a) dermal skeleton
   b) endoskeleton
   c) Types of bone development and histology of bone
   d) comparision of skulls, vertebral columns, girdles, and appendicular skeletons of representative Classes
9. Muscular system
   a) Structure and function
   b) Nomenclature
   c) Animal muscle groups compared

12. Development of and parts o the organ systems in the amphibian, reptile, bird and mammal.
    a. Digestive system
        1. Regions of tube, mesenteries, and body cavities.
        2. Glands
        3. Pharnyx and derivatives
    b. Excretory system - kidney types and their structure
    c. Reproductive system
    d. Vascular system
        1. Embryonic and extra embryonic circulation
        2. Changes at birth
        3. Heart formation, chambering, circulation
        4. Fate of aortic arches
        5. Types of circulation in vertebrates: single, double, semi-double
        6. Hemopoiesis
    e. Skeletal system
        1. Types of bone formation
        2. Formation of long bones, skull, vertebral column
    f. Nascular system
        1. Development and fate of myotomes
        2. Histological types
        3. Major muscle groups in mammals.
    g. Integumentary system
        1. Skin and structure derived from the skin: hair, nails, scales, etc
    h. Respiratory system
        1. Formation of gill arches and gills
        2. Formation of trachea, lungs and blood supply
    i. Nervous system
        1. Formation of central nervous system
        2. Peripheral nervous system: cranial nerves and spinal nerves
        3. Autonomic nervous system
    j. General histology

LABORATORY:

Lab work consists of two 3-hour sessions a week. Exercise direction sheets are issued to the student at the beginning of each exercise. Labs are scheduled for M-w or T-Th afternoons. The following schedule lists the exercises and the time spent on each.

	EXERCISE	HOURS
1.	Mitosis - Ascaris. Salamander skin, root tip	3
2.	Spermiogenesis - Grasshopper and squash bug	6
3.	Ovogenesis - Ascaris eggs, whitefish	6
4.	Fertilization, Cleavage - Ascaris, starfish	3
5.	Structure of 4mm frog embryo	6
6.	Structure of 7mm frog embryo	9
7.	34 - hour chick embryo	9
8.	Development of chick to 34 - hours	3
9.	48 - hour chick to study	9
10.	72-hour chick	15
11.	Examination and fixation of living chick embryos	3
12.	11mm pig embryo, general histology; micro-technique, slide making and tissue sectioning	18

Drawings are required and graded for each exercise. These are turned in at the end

of the day on which a quiz for that particular exercise is given.

METHODS OF EVALUATION:

All examinations are graded on an absolute scale based on the percentage of correct answers.

Usually 4 lecture tests are given counting toward 2/5ths of final grade. Final exam counts 15th; lab 2/5ths of final grade. Brief answers or discussion type questions are used in the lecture tests. Lab tests or quizes are microscope spot, diagrams to label, drawings to make and short answer questions.

VISUAL AIDS:

Models, Kodachrome slides, micro projector, micorscope slides, sound films.

Laboratory Directions — Circulatory System — Name_____
Lab. Ex. # — Part III Anatomy — Sec._____Date_____

Part I. Introduction, Objectives and Required Materials

A. Introduction

The human circulatory system is an extremely important transport mechnism of the body. It is responsible for the movement of gases, nutrients, hormones, enzymes, and waste products of the metabolism. The system includes the heart and blood vessels. These together are known as the Cardiovascular System. Also included in our study of circulation will be the lymphatic system, including the lymphatic (lymph vessels) and lymph nodes. The laymphatic system is responsible for the return of tissue fluid, etc. and plasma proteins to the cardiovascular system.

B. Objectives

At the completion of this exercise the student should be able to accurately identify the following:

1. The structures present in the heart and major vessels entering and leaving the heart using preserved specimens, models, and drawings.

2. The listed blood vessels (both arteries and veins) using preserved specimens, models, and diagrams of the circulatory system.

3. The anatomical structure of veins, arteries and lymphatic vessels and recognize these as shown on the microscopic histology slides.

C. Required Materials

Text book
Laboratory Mannual
Histology Slides: arteries, veins, and nerve, lymphatic vessels, and heart muscles
Model of the circulatory system and heart
Cat for blood vessel identification
Heart (Sheep)

Part II Anatomy of the Cardiovascular System

A. Heart Anatomy

The heart is a muscular organ which serves as a pump to drive blood through the blood vessels. You will study the heart of the sheep and should be able to identify the listed structures. Your study will also include models of the human heart. You should be able to identify the same structures on the model. The lab dissection guide will aid you in your dissection. Also, see Chapter 17 pp. 572-582 in your textbook.

1. Right ventricle
2. Left ventricle
3. Right atrium
4. Left atrium
5. Mitral (bicuspid) valve
6. Tricuspid valve
7. Interventricular septum
8. Interatrial septum
9. Chordae tendinae
10. Pulmonary artery
11. Pulmonary semi-lunar valve
12. Pulmonary vein
13. Superior & inferior vena cava
14. Aorta
15. Papillary muscles
16. Aortic semi-lunar valve
17. Coronary blood vessels (veins & arteries)
18. Brachiocephalic artery
19. Right & left auricles
20. Opening to coronary sinus
21. Parietal pericardium (if present)
22. Visceral pericardium-epicardium
23. Myocardium
24. Endocardium
25. Ligamentum arteriosum (ductus arteriosus)
26. Foramen ovale (fossa ovalis model only)

23.

B. Blood Vessel Identification

Blood vessels are conducting tubes which serve to connect the heart with the rest of the body. There are three types of blood vessels:

1. Arteries: which carry the blood away from the heart. This is usually oxygenated blood. The exception to this will be the pulmonary arteries.

2. Capillaries: which serve to connect the arteries to the veins. These are microscopic vessels important in the exchange of gases, nutrients and waste between the blood and the tissues of the body.

3. Veins: which carry blood back to the heart.

This portion of the laboratory exercise will be concerned with the identification of the major arteries and veins. Refer to your laboratory dissection manual. In textbook see pp. 589-93.

Remember: The arteries can be identified by the color of latex with which they have been injected. Red latex is used in arteries and blue in the veins.

Identify the following blood vessels on the cat:

1. Arteries

   a. Aorta
      1. Ascending aorta
      2. Aortic arch
   b. Common carotid
   c. Subclavian a.
   d. Axillary a.
   e. Brachiocephalic a.
   f. Brachial a.
   g. Celiac a. & branches - hepatic, splenic, and gastric
   h. Anterior mesenteric a.
   i. Renal a.
   j. Internal & external iliac a.
   k. Femoral a.
   l. Gonadal a. (ovarian or spermatic)

2. Veins

   a. Inferior & superior vena cava
   b. Brachiocephalic v.
   c. Internal jugular v. (not often identifiable)
   d. External jugular
   e. Subclavian v.
   f. Hepatic v.
   g. Renal v.
   h. Common iliac v.
   i. Internal & external iliac v.
   j. Femoral v.
   k. Azygos v.
   l. Gonadal v.

3. Hepatic Portal System

Study the diagram in your lab dissection guide and read the description on p. 608 of your textbook. Identify the following (on diagram only):

Anterior and posterior mesenteric v.
Splenic v.
Gastric v.

4. Human Blood Vessels

Use the model of the human circulation and identify the above vessels on this model.

Part III Histology of the Cardiovascular System

You have now completed a study of the gross anatomy of the cardiovascular system. The following deals with histology of this system. You are to study the following slides and make drawings of each.

A. Heart Muscle Slide - Study the slide which is similar to or the same as the one you studied last semester. Note the intercalated discs, branching appearance of the muscle fibers, and cross-striations. This muscle is also involuntary. Make a sketch for your reference.

B. Now obtain the slide that shows a vein, artery, and nerve in cross-section. Distinguish between each of these. Note characteristic structures of each.

Artery - On this slide note the tunica intima, tunica media, tunica adventitia, and fat cells. Refer to p. 589 in your lecture text, and make a diagram.

Veins - On this slide note the tunica intima, tunica media, tunica adventitia, and fat cells. Refer to p. 593 in your lecture text, and make a diagram.

C. Obtain the slide that shows a longitudinal section of a lymphatic vessel. The lymphatic is the vessel of the lymphatic system that is concerned with the return of body fluids (tissue fluid) and the smaller plasma proteins, etc. to the cardiovascular system. Be sure to note the valve. Refer to pp. 628-629 in your text book.

25.

F. Fill in the following chart, noting structural differences between veins and arteries and lymphatics.

Vessel layer	Vein	Artery	Lymphatic
Tunica intima			
Tunica media			
Tunica adventitia			
Other structures			

25.

Laboratory Instructions Circulatory System Name_____
Lab. Ex. # Part IV Physiology Sec.____Date_____

Part I. Introduction, Objectives and Required Material

A. Introduction

This laboratory exercise is planned to acquaint you with some of the clinical methods for studying the physiology of the cardiovascular system. You will be listening to your heart beat, taking your pulse and blood pressure and doing several tests to determine physical fitness.

B. Objectives

At the completion of this exercise, the student should be able to:

1. Identify the major sights for taking the pulse.

2. Locate the heart sounds at the apex of the heart and determine the rate of the contraction of the heart for 1 (one) minute.

3. Accurately determine the blood pressure reading and identify the factors which exert an influence upon blood pressure.

4. Determine physical fitness by interpreting the data collected through performance on prescribes tests.

C. Required Material

Sphygamomanometer

Stethoscope

Textbook

Butterfly swabs

27.

Part II. Heart Sounds, Pulse, and Blood Pressure

A. Heart Sounds and Beat

Use the stethoscope to listen to heart sounds. Place the stethoscope on the chest over the heart. Listen for the sounds.

1. How many sounds did you hear per beat?_____

2. Describe these sounds_____

3. How many beats per 30 seconds?_____Per minute?_____

4. What do the heart sounds signify?_____

_____

B. Pulse Rate

Place your finger tips lightly over the radial artery and notice the palpations. Count for 30 seconds; double the figure for a per minute rate. Repeat using the brachial, subclavian, carotid, and superficial temporal artery and record your findings for each of these on the chart below.

_____

Artery	Pulse Reading
Radial	
Brachial	
Subclavian	
Carotid	
Temporal	

1. Did you notice a difference in the rate in the various locations?_____

If yes, explain_____

_____

Take your pulse simultaneously in two different locations.

2. Were the rates different or the same?_____If different, explain_____

_____

Using your radial artery, determine pulse rate under the following conditions:

Lying (reclining)	_____beats per minute
Sitting	_____beats per minute
Standing	_____beats per minute

After mild exercise _____beats per minute

After strenuous exercise _____beats per minute

5. Did you notice a difference in the pulse rate under the various conditions?

_____If yes, explain_____

_____

6. Are your heart and pulse rate the same?_____Explain_____

_____

_____

C. Blood Pressure

Blood pressure is the direct result of the pressure exerted by the blood as it passes through the blood vessels. The measurement of the blood pressure provides us with important information relative to the efficiency of the hearts' pumping action as well as the condition of the blood vessels. The systolic reading indicates the force of the contraction of the heart. The diastolic pressure reflects the condition of the systemic blood vessels. Increased diastolic pressure is an indication of decreased elasticity of the blood vessel.

An accurate determination of the pressure is an important part of any thorough physical examination. The results of such a test furnish the physician with valuable information concerning the condition of the vascular system and in addition is often an indication of other body disorders.

The change in blood pressure with age is usually caused by the generalized loss of vessel elasticity, partly due to arteriosclerotic changes (hardening of the arteries) and partly due to atherosclerosis (the increased accumulation of cholesterol and other lipid substances in the blood vessel walls).

Each student should be familiar with the principles of the sphygamomanometer before attempting to use it in the laboratory.

Practice taking the blood pressure on your partner until you are able to detect the systolic and diastolic sounds. This may prove difficult on some individuals, especially if the arteries are located deeper in the tissue.

The following procedure is recommended by the American Heart Association and has been used with excellent results by many physicians and medical workers.

1. Seat the subject in a comfortable position at the table or desk. Flex the arm and see that it is supported on the table at approximately heart level.

2. Wrap the deflated pulse cuff of the instrument snugly, not tightly, around the arm with the lower edge of the cuff about one inch above the antecubital space (anterior part of arm opposite the elbow).

3. Palpate the radial pulse and also ascertain the position of the brachial artery at the approximate level that it bifucates into radial and ulnar arteries. With no air in the cuff, no sounds will be heard.

29.

4. While palpating the radial pulse, inflate the cuff to about 80-90 mm. above diastolic or about 30 mm. above the level at which the pulse can be felt. Increase the pressure to about 160 mm Hg. Deflate slowly and listen with the stethoscope for the systolic sound. The first sound is known as Korotkow's sound. The bell of thestethoscope should be held lightly against the skin at the bifurcation of the brachial artery. The highest point at which the sound is heard with each heart beat is considered to be the systolic pressure. If the radial pulse can be felt at a higher level than the sound can be heard, the pulse level should be accepted.

5. Gradually deflate the cuff and notice that the sound grows increasingly louder. As the pressure is reduced, it suddenly becomes muffled and disappears. This is the diastolic pressure. Usually the change in soundintenisityand the disappearance of the sound will coincide. If there is a difference between the two, both should be recorded. (128/86/78). Pulse pressure may be computed by subtracting the diastolic from the systolic pressure. Mean pressure is the average of the systolic and diastolic pressure.

Do not leave the air in the cuff over 2 minutes as it will be uncomfortable to the individual and will cause a marked increase in the blood pressure. If you must repeat the activity, deflate the cuff, wait a few minutes and try again for a reading determination.

6. Check the blood pressure three times; in sitting, standing and reclining positions. Record the results. At least two minutes should be allowed between each reading since the relaxation of the arterial tonus will cause the reading to be lower each time unless the subject is rested. Record the results on the following chart:

Position	Systolic p.	Diastolic p.	Pulse p.	Mean p.
Reclining				
Sitting				
Standing				

7. Were there differences in the blood pressure readings in the various positions?

_____If yes, explain_____

_____

8. Five factors that have the greatest influence upon arterial blood pressure are:

a. The force of the heartbeat.
b. The peripheral resistance of the walls of the arteries.
c. The elasticity of the arteries.
d. The volume of blood.
e. The viscosity of the blood.

However, the pressure may vary according to the individual's sex, height, weight, etc. In addition to the above factors, it may also be modified by such factors as

the time of day, exercise, body position, excitement, and digestion. For these reasons, one blood pressure reading is of little value, and repeated readings are required to eliminate transitory factors. Recent investigations have resulted in many modifications of the older concepts with their limited ranges of normal arterial pressure. Today many doctors no longer speak of normal blood pressure, but instead use the term normal range to indicate the widened limits into which the blood pressure readings may fall and still be considered normal.

Part III. Cardiovascular tests

A. The Schneider Test for Physical Fitness

The Schneider test or cardiovascular grading system is often employed to determine an individuals state of health or physical condition. By means of a simple step-up exercise, one can obtain an idea of how well the heart is able to adjust to sudden increased demands on the circulatory system.

PROCEDURE: With the aid of your partner, make the following tests. Score points as indicated on the chart at the end of this exercise.

1. Reclining Pulse Rate: Recline for 5 minutes and obtain at the end of the time a resting pulse rate. Recheck your pulse rate in the reclining position. Score points as indicated by the following chart. Record points on summary score chart, Column A.

CHART A. Reclining Pulse Rate	POINTS
50-60	3
61-70	3
71-80	2
81-90	1
91-100	0
101-110	-1

2. Standing Pulse Rate: Recheck your standing pulse rate and score points as indicated by the following chart. Record on summary score chart, Column B.

CHART B. Standing Pulse Rate	POINTS
60-70	3
71-80	3
81-90	2
91-100	1
101-110	1
111-120	0
121-130	0
131-140	-1

3. Pulse Rate Increase on Standing: Recheck your pulse rate in the reclining position and then using chart C below, note the increase in pulse rate on standing. Score points as indicated. Record on summary score chart, Column C.

CHART C.	Pulse Rate Increase on Standing				
Reclin. rate	0-10	11-18	19-26	27-34	35-42
50-60	3	3	2	1	0
61-70	3	2	1	0	-1
71-80	3	2	0	-1	-2
81-90	2	1	-1	-2	-3
91-100	1	0	-2	-3	-3
101-110	0	-1	-3	-3	-3

31.

4. Systolic Blood Pressure Comparison: Recheck and compare your systolic (top figure) blood pressure readings in the standing and reclining positions. Note the changes in mm Hg and score points accordingly. Record points on summary score chart, Column D.

CHART D. Systolic Blood Pressure Comparison of Standing and Reclining P.

Change in mm Hg	POINTS
Rise of 8 or more	3
Rise of 2-7	2
No rise	1
Fall of 2-5	0
fall of 6 or more	-1

B. Harvard Step Test: This test is a valid measurement of general endurance. Exercise by placing your right foot on a bench about 16" in height. Have your partner stand behind you. Raise your body slowly at the rate of 30 steps per minute for as long as possible, (not to exceed 5 minutes), without touching any object, so that the left foot comes to rest by the right. Keep your right foot in position and return to the original position. Immediately upon completion of the exercise, be seated and have your partner check your pulse for 30 seconds and multiply the figure obtained by 2. Record this information on the chart E. Also record on this chart your normal standing pulse rate. Repeat taking your pulse at 30 seconds, 60 seconds, 90 seconds, and 120 seconds after completion of the exercise.

1. Note the point on this chart when your pulse after exercise and normal standing pulse are the same. Go across to the points column and score accordingly. Record points earned on summary score chart, Column E.

CHART E. Return of Pulse to Standing Normal After Exercise

Seconds	Standing pulse	Pulse after Exer.	POINTS
0-30sec			2
31-60sec			2
61-90sec			1
91-120sec			0
2-10min			-1
11-30min			-2

2. Pulse Rate Increase Immediately after Exercise: Compare your standing pulse rate (B) with the increase in pulse rate immediately after exercise (chart E, 0-30 sec). Score points accordingly. Record on summary score chart, Column F.

CHART F. Pulse Rate Increase Immediately After Exercise

Standing Rate (B)	0-10	11-20	21-30	31-40	41-
60-70	3	3	2	1	0
71-80	3	2	1	0	-1
81-90	3	2	1	-1	-2
91-100	2	1	0	-2	-3
101-110	1	0	-1	-3	-3
111-120	1	-1	-2	-3	-3
121-130	0	-2	-3	-3	-3
131-140	0	-3	-3	-3	-3

C. Summary Score Sheet: Record your point data and that of a few of your classmates. Add up your total number of points and compare to the standard below. Columns A-F refer to the preceding sections.

STUDENT'S NAME	A	B	C	D	E	F	TOTAL
1.							
2.							
3.							
4.							

Standard: Perfect record = 20 points
Very Good = 19-17 points
Good = 16-14 points
Fair = 13-8 points
Poor = 7 and below points

ANATOMY OF THE DOGFISH SHARK 2

Skeletal System

The skeleton of the dogfish, like that of other vertebrate forms, supports or protects the softer parts of the body, such as the brain, spinal cord, sense organs, and gills. The skeleton also facilitates locomotion—both indirectly, by providing the basis for the streamlined external body shape, and directly, by providing the structural framework for the fins. Thus in a broad sense the skeleton defines the mode of life of the dogfish.

The skeleton of the dogfish shark (Fig. 2-1) is entirely cartilaginous. It can be subdivided into axial and appendicular parts. The axial skeleton is made up of the skull and vertebral column. The skull consists of the **chondrocranium**, which encloses the brain and sense organs, and the **splanchnocranium**, which is the framework of the jaws and gill arches. The appendicular skeleton consists of the cartilaginous supports of the median (dorsal and caudal) fins, the pectoral and pelvic girdles, and their fins.

Prepared specimens of the skeleton will be studied. Because these skeletons are very delicate and easily damaged by careless handling, they are usually stored in glass jars that are filled with 5% or 10% formalin. It is preferable to study the specimens in their glass containers. If they are removed from the containers, place them in shallow trays with enough preservative to cover them. When moving the specimens with instruments, take care not to perforate or disarticulate the cartilaginous skeleton.

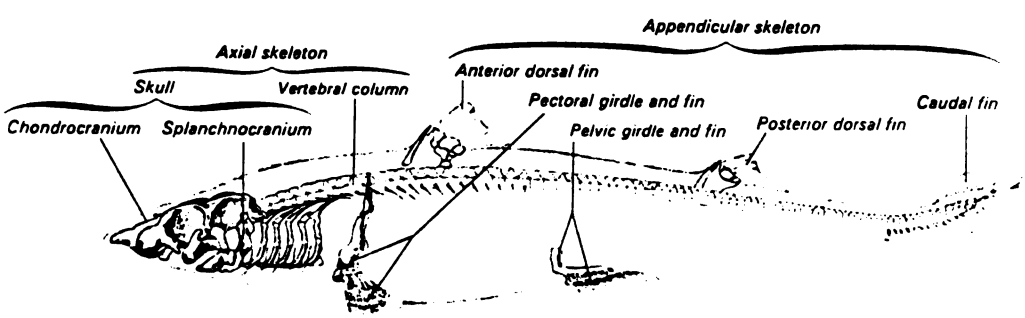


FIG. 2-1. *Profile of entire skeleton.*

A. Axial Skeleton

1. SKULL: CHONDROCRANIUM

This part of the skull consists of a single irregularly shaped cartilaginous mass, the **neurocranium**, which encloses the brain. The olfactory and otic capsules are fused with the neurocranium.

On the *dorsal* side of the chondrocranium are the following features (Fig. 2-2).

rostrum. Scoop-like anterior projection of the chondrocranium enclosing the **precerebral cavity.** This cavity, which opens dorsally, is in life filled with a gelatinous material. The two large apertures located at the base of the rostrum are the **rostral fenestrae.**

olfactory capsules. Rounded swellings located on either side of the base of the rostrum. Their thin walls are readily damaged during preparation and thus may be found to be incomplete.

orbits. Located on both sides of the neurocranium Their anterior limit is demarcated by an **antorbital process** that continues backward as the **supraorbital crest** and terminates as the **postorbital process.**

otic capsule. Irregularly shaped masses, protecting the inner ear that are fused posteriorly to the neurocranium. They are bounded dorsolaterally by the **supraotic crest,** which is a backward continuation of the postorbital process. Each crest terminates in a very small posterolateral projection of the cranium.

epiphyseal foramen. Located in the median line just behind the precerebral cavity. Through it passes the stalk-like epiphysis (pineal body).

endolymphatic fossa. A large deep depression located in the median line in the region of the otic capsules. It contains a pair of small anterior **endolymphatic foramina** and a pair of larger **posterior perilymphatic foramina.**

On the *ventral* side of the chondrocranium are the following features (Fig. 2-3).

rostral carina. Keel-shaped structure located on the mid-ventral surface of the rostrum.

antorbital shelf. Ridge that demarcates the anterior boundary of the orbit.

infraorbital shelf. That portion of the floor of the chondrocranium that extends back as a median ridge from the antorbital shelves.

basal plate. Expanded posterior part of the neurocranium extending back from the infraorbital shelf.

carotid foramen. Located in the median line at the junction of the infraorbital shelf and basal plate.

postotic process. The ring-shaped process located at each posterolateral corner of the ventral surface of the chondrocranium. The openings in these processes are known as the **postotic fenestrae.**

On the *lateral* side of the chondrocranium is one definite structure, the **optic pedicel,** and a number of foramina (Fig. 2-4).

optic formen. A large opening, located anteroventrally in the orbit, that provides passage for the optic nerve (N.II).

oculomotor foramen. Located just above the root of the optic pedicel, it is the opening through which the oculomotor nerve (N.III) gains entrance into the orbit.

trochlear foramen. A small anterodorsally located opening that lies a short distance above the optic foramen. The trochlear nerve (N.IV) emerges into the orbit through it.

superficial ophthalmic foramina. A series of small openings located parallel to and a little below the supraorbital crest. They can also be seen on the dorsal side of the chondrocranium (see Fig. 2-3) Through them pass the branches of the trigeminal (N.V) and facial (N.VII) nerves.

deep ophthalmic foramen. Located just in front of the most anterior of the superficial ophthalmic foramina. A branch of the trigeminal nerve passes into the orbit through this foramen.

trigeminofacial foramen. A large foramen located at the posterior border of the orbit behind the optic pedicel. Through it passes the main branches of the trigeminal and facial nerves. This opening is also known as the orbital fissure.

hyomandibular foramen. Located in the otic capsule slightly behind the trigeminofacial foramen. Through it passes a branch of the facial nerve known as the hyomandibular nerve.

On the *posterior* side of the chondrocranium are the following features (Fig. 2-5):

foramen magnum. Large median opening through which the spinal cord passes.

occipital condyles. Processes located ventrolaterally on either side of the foramen magnum that articulate with the first trunk vertebra.

vagus foramina. A pair of openings located laterally on each side of the occipital condyles. The vagus nerve (N.X), passes through each.

glossopharyngeal foramina. Another pair of openings, each of which is located near the posterolateral corners of the chondrocranium. The glossopharyngeal nerves (N.IX) pass through them.

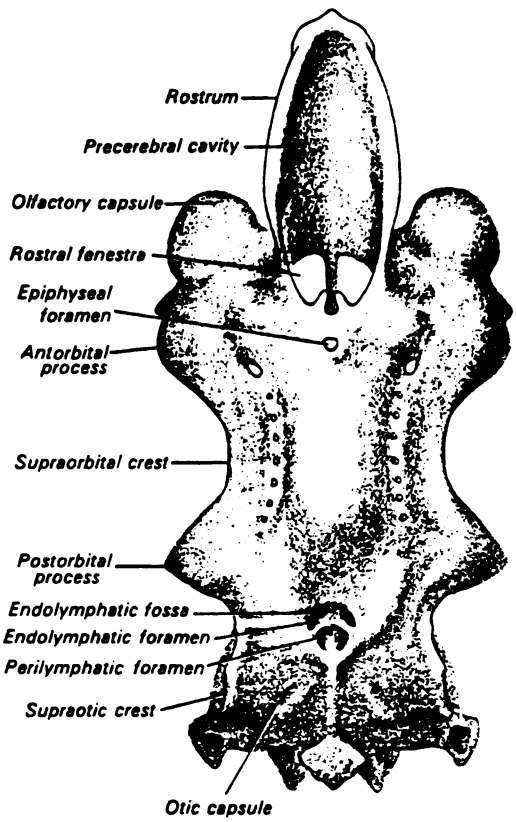


FIG. 2-2. *Chondrocranium (dorsal view).*

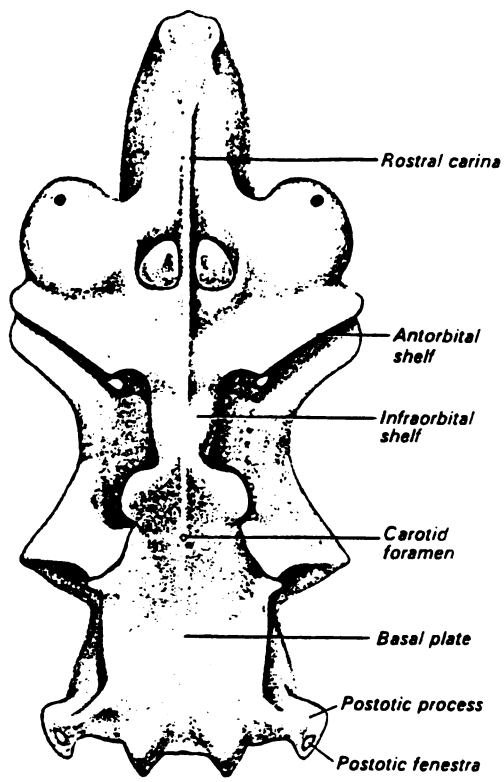


FIG. 2-3. *Chondrocranium (ventral view).*

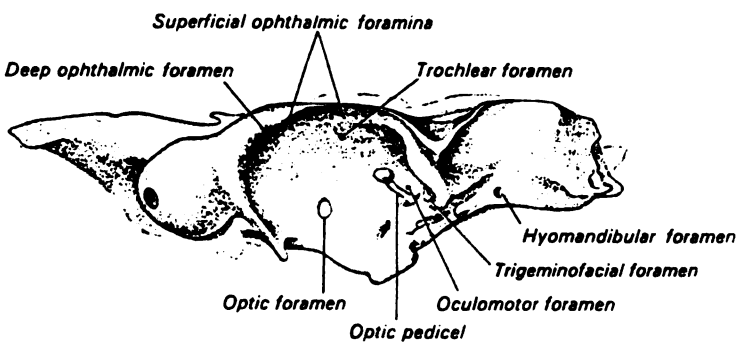


FIG. 2-4. *Chondrocranium (lateral view).*

2. SKULL: SPLANCHNOCRANIUM (Figs. 2-6, 2-7)

The splanchnocranium is the visceral skeleton of the skull. It consists of seven cartilaginous **visceral arches.**

mandibular arch. This is the first, the most anterior, and the largest of the visceral arches. It is modified into two teeth-bearing parts. The dorsal part consists of the two **palatopterygoquadrate cartilages**, which have fused in the anterior midline and have formed an arch that constitutes the upper jaw. Each of the palatopterygoquadrate cartilages bears an **orbital process,** which projects up into the orbit, and a **quadrate process**, which projects up from the lateral end of this cartilage. The ventral part of the mandibular arch consists of the two **Meckel's cartilages** fused at the midline, which together constitute the lower jaw. Arched spine-like **labial cartilages** project forward on each side at regions where the two jaws meet.

hyoid arch. The second visceral arch consists of five cartilages. Laterally, a pair of short **hyomandibular cartilages** articulate with the posterior end of the chondrocranium. These articulate at their ventral ends with a pair of J-shaped **ceratohyal cartilages** whose long arms lie beneath the chondrocranium. They are connected across the midline to a short cartilaginous bar, the **basihyal cartilage.**

visceral arches three to seven (Fig. 2-8). Each of these gill or branchial arches consists dorsally of **pharyngobranchial cartilages** that articulate laterally with short **epibranchial cartilages.** The general pattern for these arches is for epibranchial cartilages to connect with the following series of ventral cartilages: **ceratobranchials, hypobranchials,** and finally median **basibranchial**. Individual differences in the arches are these: the third arch has a single basibranchial; arches four through seven have a common basibranchial cartilage; the sixth and seventh arches also lack hypobranchials and their pharyngobranchials are fused dorsally. Cartilaginous spine-like processes known as **gill rakers** and **gill rays** project from opposite sides of the epibranchial and ceratobranchial cartilages of the gill arches.

3. VERTEBRAL COLUMN (Figs. 2-9 and 2-10)

The vertebral column consists of two distinctive vertebral types localized in either the trunk or the tail.

trunk vertebrae. Each typically consists of a biconcave **centrum.** The small canal running longitudinally through each centrum and the diamond-shaped spaces between two articulating centra are filled with the gelatinous notochord. The fused cartilaginous plates above the centrum form a **neural arch** from which projects a **neural spine.** Between adjacent spines are triangular **intercalary plates** of cartilage. The roof and sides of the vertebral or **neural canal** are formed by neural arches, neural spines, and intercalary plates, and the floor is formed by the tops of centra. The spinal cord lies within the neural canal. Dorsal roots of each spinal nerve emerge through foramina in the intercalary plates, and ventral roots emerge through foramina in the neural arches. From the ventrolateral border of each centrum project **transverse processes** to which the rib cartilages are attached.

caudal vertebrae. Each consists of a centrum, neural arches, and a neural canal. Attached to the ventral surface of each centrum is an additional pair of fused cartilaginous plates that form the **hemal arch.** The **hemal canal** formed by these arches contains the caudal artery and vein. Projecting ventrally from each hemal arch is a **hemal spine.**

B. Appendicular Skeleton

The appendicular skeleton in the dogfish consists of the median fin cartilages and the pectoral and pelvic girdles and their fins. The girdles in the dogfish do not articulate with the vertebral column.

1. MEDIAN FIN CARTILAGES

These consist of the skeletal supports for the two dorsal fins and a caudal fin.

dorsal fins (Fig. 2-11). Each fin has as its skeletal framework a **basal cartilage** to which are attached **radial cartilages** that bear **ceratotrichia** (fibrous dermal fin rays). A **fin spine** is located at the anterior end of the basal cartilage.

caudal fin (Fig. 2-12). Consists of the many caudal vertebrae whose hemal arches are elongated. This fin is also supported by ceratotrichia.

2. PECTORAL GIRDLE AND FINS (Fig. 2-13)

The anterior paired fins are supported by a U-shaped cartilage located just posterior to the splanchnocranium. The ventral part of the girdle consists of the **coracoid bar** from which a **scapular cartilage** extends dorsally on each side. The latter articulates with the skeleton of the pectoral fin at the **glenoid**

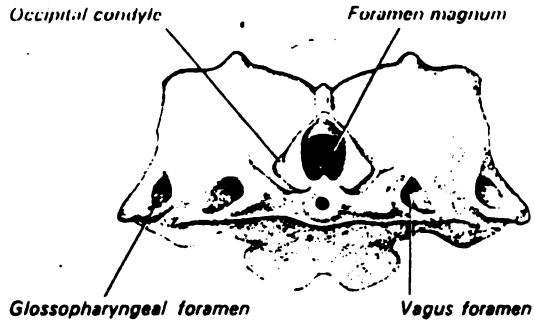


FIG. 2-5 *Chondrocranium (posterior view).*

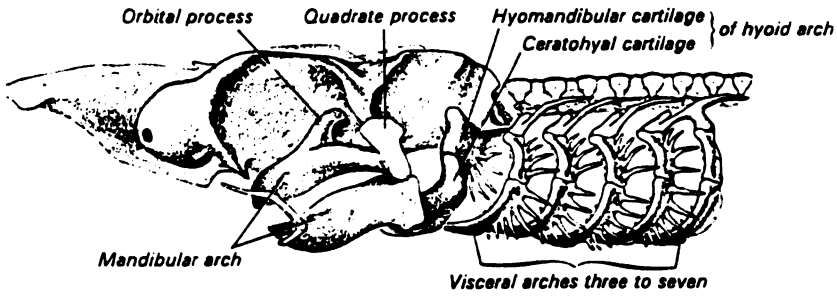


FIG. 2-6. *Splanchnocranium (lateral view).*

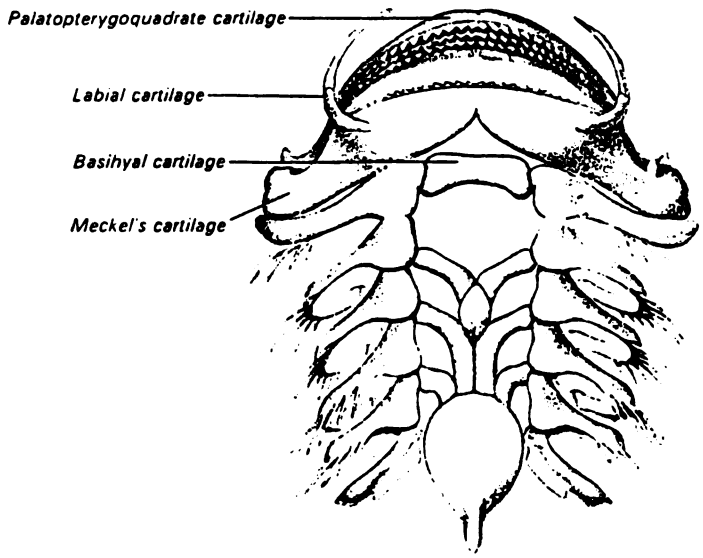


FIG. 2-7 *Splanchnocranium (ventral view).*

surface and has a medially projecting **suprascapular cartilage** attached to its free end.

The skeleton of the pectoral fin consists of three **basal cartilages**: the smallest and outermost cartilage is the **propterygium**; adjacent to it is a wide triangular cartilage, the **mesopterygium**; the innermost cartilage, the **metapterygium**, is long and narrow. Small **radial cartilages**, arranged in rows, articulate with the basals. Distal to the radials are **ceratotrichia** that provide additional support to the fin. The basal and radial cartilages are collectively known as **pterygiophores.**

3. PELVIC GIRDLE AND FINS (Figs. 2-14, 2-15)

This girdle consists of a transverse **ischiopubic bar** from the end of which a short **iliac process** extends dorsally. The pelvic fin has two basal cartilages. One, the long, curved **metapterygium**, articulates at the **acetabular surface** with the bar. The other, the small **propterygium**, lies anterior to the metapterygium. The metapterygium articulates with numerous radial cartilages, which, in turn, bear the ceratotrichia. Modified radials form the **clasper cartilages** in the male.

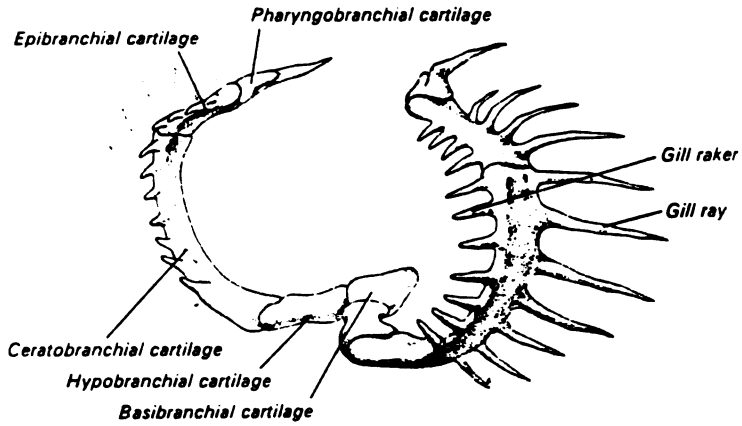


FIG. 2-8 *Third visceral arch*

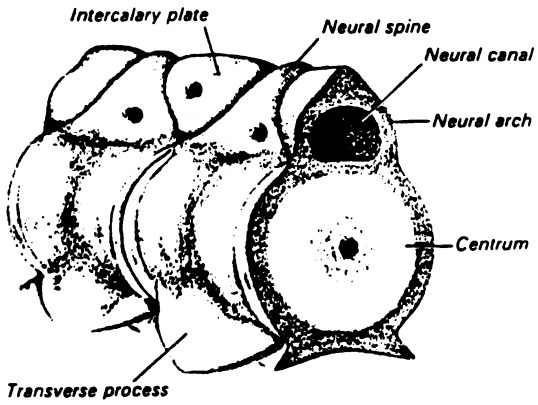


FIG. 2-9 *Trunk vertebrae.*

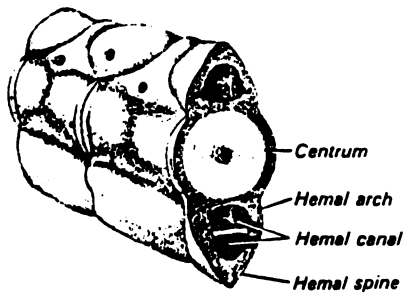


FIG. 2-10. *Caudal vertebrae.*

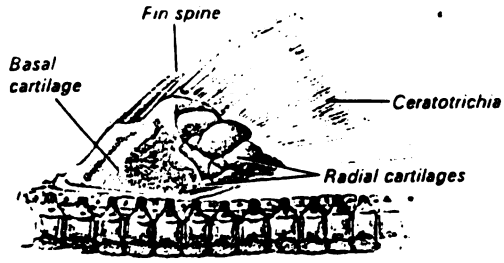


FIG. 2-11. *Dorsal fin (lateral view).*

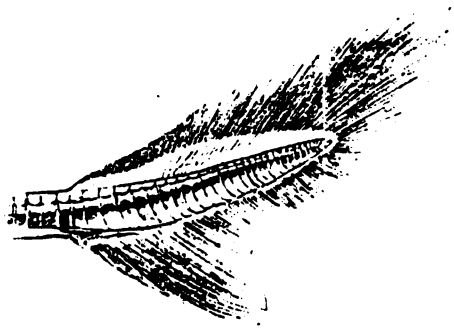


FIG. 2-12. *Caudal fin (lateral view).*

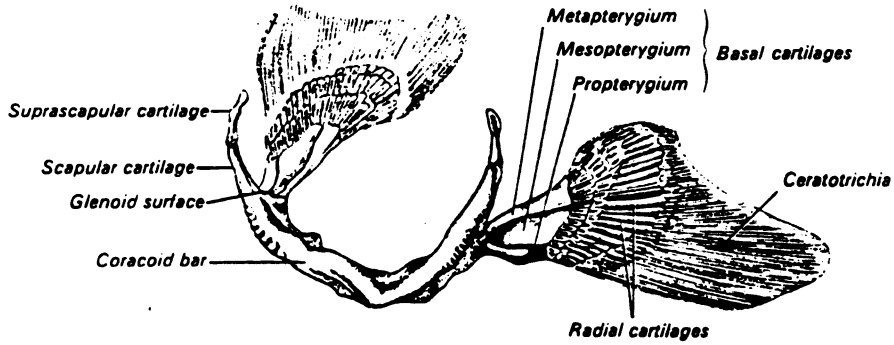


FIG. 2-13. *Pectoral girdle and fins.*

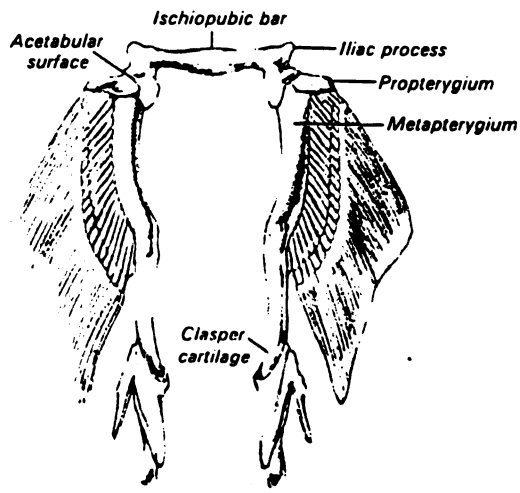


FIG. 2-14. *Pelvic girdle and fins, male.*

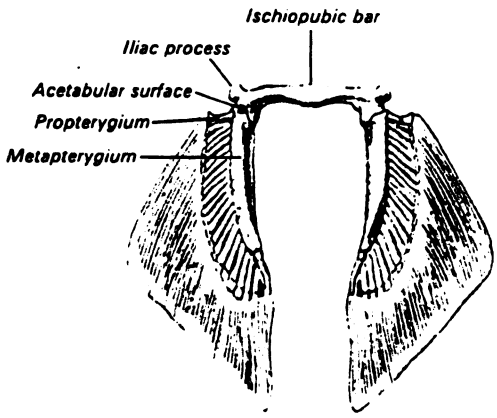


FIG. 2-15. *Pelvic girdle and fins, female.*

APPENDIX C

INFORMANT INTERVIEWS

TEACHER INTERVIEW (Formal or Informal)

Probe Questions

...The laboratory setting in the community college seems different than that of the large universities - Professors vs. T.A.

...Do you feel that makes a difference?

...As a professional do you help council or direct students in career areas?

...How about the social interaction in the lab - do students seem to interact well?

...What kind of concerns do they share with you?

...Do you feel the interaction between student and teacher is beneficial? How so?

...Do students seek your advise in areas other than academics? (e.g. personal, professional)

...Do you do active modeling of students in the lab setting?

...There seems to be unique opportunities for interaction between students and instructors in a lab setting. How do you use this time related to your goals?

...What are laboratories for?

...Learning to think and/or learning to follow directions.

...Preparing students for their professional environments.

...Do you relate to different groups differently? (e.g. nurses vs. x-ray tech., pre-med. vs. pre-dent.)

...Are instructors aware of needs in the field? What skills are needed to succeed?

...How could the laboratory be used to even more advantage in community college?

...Do you feel inservice might be a way of exploring potential use of improving laboratory interactions?

...What are some of your personal goals for the lab classes?

...How much direction do students need?

STUDENT INTERVIEW (Formal or Informal)

Probe Questions

...What laboratory classes have you taken in college?

...Were the teachers professors or teaching assistants?

...What type of role did the instructor play? (e.g. manager, guide, lecturer, monitor, combination)

...What type of interactions did you have with your lab instructor? (e.g. academic, social, personal, counselor, other)

...Were the interactions beneficial to you?

...Compare your college or community college labs with those taken elsewhere.

...Did you ask questions in lab?

...Did you work well with your lab partner?

...Did you have the same instructor for lecture and lab?

...Did instructors treat different students the same? (e.g. older or younger students, male and female, brighter students and those who needed more help)

INTERVIEW: JOHN MASTERS

March 6, 1981

Question: Basically what I want to talk to you about is some of the interactions that you have with some of the students that you have been telling me about, especially with some of the older women. How you feel about that and also how it got started.

Response: I think that I first started doing that because my first class I ever taught was with adult people; and I was a junior in college and the students were all in their thirties, fourties, and fifties.

Question: And where was this?

Response: I taught behavior modification at State Home and Training School.

Oh.

I started out there, and that was a good experience, but it was a little bit frustrating in that the people were not academically oriented. They were taking care of the mentally retarded people or "residents" as you called them there. We were trying to teach them behavior modification techniques that they could use in dealing with their problems and there was a lot of reluctants on their part to learn something new. They didn't like some young wipper-snapper coming in and telling them how to do their job so I had to learn how to break that barrier; the age barrier; and the subject content barrier, to get to these people. (I'm not sure that I was real successful.) I got a good feeling with working with older people.

Question: You use those same techniques then in your classes now?

Response: Well, yes; but modified; just more experience with dealing with people and learning their problems that they have to keep remembering that school is not always their primary focus. That they have families that are their primary focus; particularly women who are raised in a traditional setting, their primary focus is their family and their husband. School is kind of a secondary thing to them and they have always viewed it that way, and I think that they were raised that way.

Question: What other special problems do you see in that they have families?

Response: I think they have a self-image problem, that they don't think they are capable of becoming whatever it is they are trying to become. They may like to be nurses but they just don't know how they could possibly be smart enough or be intelligent enough or have the abilities to be a nurse. I think they're being pressured by society to get a job, have a career, also their kids are gone, they have nothing to do, the economic situation is saying: "Hey, you'd better get a job"; and a lot of them, their marriages are very unstable and they tend for being independent and having no means for support.

Question: You see that as part of this "Mission" to the College then, serving these kinds of people?

Response: Yes, I think so. I think that is important.

Question: You taught in a four-year institution at _____?

Response: Yes, at _____, as a graduate student.

Question: Do you see any difference in the students that you have here, as compared to the ones you had at _____?

Response: Agewise there certainly is a difference, but also when I was teaching at _____, most of my students were "pre-med" which is a totally different thing than my nursing students, and the nursing students that I did teach, (I taught several quarters of Anatomy and Physiology for the nursing students but they were working for a "Bachelor of Science Degree".) The students here have an "Associates Degree" which is a two-year program, rather than a four-year program, which is considerably more academic work.

Question: Is there a difference in the ages; are there more younger girls going into a four-year degree program vs. the older women going into a two-year program? Because of goals? (Do the older women tend to choose a two-year program?)

Response: I think that because of the economic situation they tend to choose the two-year program. They have got families to support, they have obligations, and they want to achieve their goal in a minimal amount of time. They want to get out into the workforce - because their primary goal is to make money. (They don't have as much time to work on it.) They aren't so career oriented that they don't think in terms of achieving and continuing to achieve in their career, they want to get in and do a job, leave the job there, go home to their responsibilities and home. They don't want to climb-up the ladder. They don't want to become "head nurse" and then "supervisor-this-and-that" and then "director of nursing". They aren't into that. Their self-esteem level at this point is "I want to be a nurse, if I can; I don't think I can, but I'm gonna try".

Question: Who initiates most of the (I know there is a lot of personal interaction between you and your older students), at the beginning of the year, I wasn't here to see it, but who initiates this? Do you create an atmosphere where they tend to come to you with this, or do you encourage them to talk to you? How do you handle that?

Response: I think it's a mutual thing that occurs. I tend to like teaching to the older people, so I tend to focus on them in class. When I'm lecturing, I'm focusing on them in class because usually the younger ones, in my experience, catch on a little bit quicker and I know that I can sample the group. If some of the older ones are a little bit insecure, don't know what's going on, then I can figure that I need to work more on that. So I tend to pay more attention to them and I think that gives them the feeling that I'm a little bit more interested in them, so they tend to open up a little bit more. A lot of these people are just dying for somebody to talk to. (They don't have anybody to talk to.)

Question: Do you encourage them to come in here and talk to you in your office? And what about calling at home?

Response: Yes, sometimes they do and usually it is not for a specific thing. Usually it's for kind of a hand-holding thing; (I'm just beside myself or I just don't know where to being and study for these bones, where should I start?). It's not specific things like (is our test next week at 8:30?, what is the difference between this and that?). Generally it's not specific things, it's more of an emotional thing.

Question: Tell me about how the two women that you have in your afternoon class; the one that was having health problems and overwhelmed by the other women asking her for too much help - how did that all start?

Response: Well, they were lab partners and lab partners generally get to know each other a little bit better and sometimes study together. Their studying for a lab kind of went over into studying for lecture. They compared notes, got together and studied together. It just kind of snowballed. Jan, who is a better student, found it was sapping time from her other obligations - her family and her studying. It was bringing her down, so she had to gracefully get out of (the situation) without hurting Phyllis's feelings. I think we accomplished that, between the three of us we kind of worked around that. They are still lab partners and are still being friendly and in a working relationship, it's just not such a time consuming thing for Jan.

Question: What did you see your role in helping to solve problems?

Response: My focus was to keep the one women's self-esteem up. Because I could see that if she was dumped by Jan, it would have just crushed her. When I walked into the lab and found her sitting on the floor half in tears at the foot of a skeleton, she didn't know where to begin, she was just lost. She couldn't study with Jan because she said "Hey, I'm gonna be busy today, I can't". So she was just kind-of beside herself, lost, forlorn. I could see that if she felt that way it was just gonna interfere with her learning. So I sat down on the floor with her and we talked about not being able to study with the other person. I explained that Jan had a health problem and had to have surgery (which made it look like this was the really big think and that it wasn't her). It was these other things, to try to build-up her self confidence a little bit.

Question: Did it make you feel good as a teacher - that's part of your role?

Response: I feel that's part of my role with these people because I can't teach them unless I can put them in a mental state so that they can learn. I could stand up there and talk to them till I'm blue in the face, and it would just go in one ear and out the other if they don't have a good positive image of themselves and a good attitude. Somehow I think I perceive that better in some of the older women and older students. They express their needs better. For instance, some of the younger women will come up to me and they'll just blush. They try and talk to me and they can't, they just blush. They can't talk to me, I kind of scare them, I think. I'm an authority figure, yet I'm not as old as they're use to in college. They are just out of high school, they think all faculty are old croney people.

Question: Your not an old crone? (laughter)

Response: No, not yet! (joking - and more laughter)

Question: Do you have students come back to see you after graduation?

Response: I have a unique experience also, in that since I'm in the nursing program and I see my former students in the hospital. For instance, the person who is head nurse on the floor I'm working on at "Ferguson's" is a former student of mine. So now, she is teaching me, and its just a really nice relationship. Many people over there are former students of mine; some of them make the transition real well and they'll call me "Bob" and "What can I do for you? What can I teach you today?" Some of them are still a little bit - "hello Mr. Long".

Question: There is a difference between first name and Mr. Long?

Response: Yes, it's a real significant thing. Maybe I exaggerate it, I'm not sure. I seem to think it's a barrier "Mr. Masters" "John or Jack".

Question: Do you socialize with your students at all; purely social? (You know, go out and have a glass of wine.)

Response: Not very much, I have in the past. I've gone out to the bar with the girls, we have a good time, but most of them want you in a particular role. A few people you can do that with, and I'm kind-of cramped for time so I really don't do a lot of socializing. The majority of them, even though they call me "Robert" and are very friendly, your here and there is something about being here and being in the defined situation. They can come and talk here where as if you go out and socialize with them then your intruding on this other life of theirs. I think it would be like trying to socialize with your therapist. I have a certain role and it's defined and I think they find some security in it, maybe I do.

Question: What about pre-professional modeling - they're gonna be nurses, do you actively work with them in class or in the laboratory to let them know how they are supposed to behave - what will be expected of them, that sort of thing?

Response: What else would I find valuable about being in the nursing program because prior to being in the nursing program I didn't know that stuff. So now that I've been in the hospital and I have received the heavy indoctrination. You know, being a nurse is more than just a job, it's belonging to a cult - it really is. It's an interesting concept too, I think. Nursing is very cult oriented. There are traditions: pinning ceremonies, capping ceremonies and not so much in the public schools but in the diploma schools where a lot of the nurses came out of a lot of ritual went on in the daily lives from the dress, when I talked to people who had been through these programs, the older women describing the clothes they had where they were made to look very simple. They wore hair nets, they wore these gown sort of things that had bibs on them, the candy stripe looking thing. They were grey, no life - drab. They were all onelength regardless of the real tall or the real short nurse. That was the length that they came in , and that's what you wore. So if you were five foot it hung down around your lower calves, and if you were six feet it was real high. That's why caps were such a significant thing because the older women weren't allowed to wear the cap until they got their "RN"; then they got their cap. Where as the younger nurses, they hate those caps. In fact Grand Valley doesn't even

have the caps. They're losing ritual I think because the public schools and it's not so much of a ritual anymore.

Question: Have they asked your advice on career? That sort of thing? I know most of them that are in nursing are in pre-professional.

Response: A lot of them do, for some reason three or four of them this semester have been into that. We sit down and we talk about it. In lab, when it's getting toward the end of the hour, they'll kind of drift up and I find that very rewarding, it's been very frustrating though because their experiences and my experiences are quite different. When I went to school I took eighteen to twenty hours a semester all lab courses and I took heavy course work all the time and got through. Many of these people are living at home and taking a few classes here and there and for some reason or another I think it's a lot easier to completely emerse yourself in it and get it all done. It just seems easier to me. Also thinking about divergent instead of convergent plans. Like a lot of people will converge on a single career, prepare themself for just a single career and exclude everything else, just narrow down on that thing. The way I do things is a divergent thing: build a base and continue to build a stronger and stronger base so that it prepares you for a number of different things. Different options: plan A, plan B, and plan C. To me that gives me a sense of security that I have a variety of different things that I can branch into. We talk about that, the different plans. Both of them, I think, are lagitimet but maybe it never occurs to a person that there are a couple of different ways to look at it and I think that the essay that I wrote: "The advantages of a Liberal Arts education" helped me to cement some of those ideas and bring them together.

Question: How would you feel about taking the teachers out of the lab setting and putting a teaching assistant in there?

Response: Well, I've always thought that was a great advantage of the small school. When I went to school at _____, I had the same lecture and lab instructor and I felt that was a great advantage over having a teaching assistant. Even though I was a teaching assistant for two years, I'd still have to say that I prefer it that way. I know that I wasn't able to give my students the same quality education that their other instructor could have.

Question: Your mind was on what?

Response: My mind was on my own studies, in fact the first meeting that we had they got us all together, we were up at _____, we were teaching Biology classes from 101

up through Anatomy and Physiology. All undergraduate classes and their first comment was: "Your first responsibility is your education. Then your responsibility is your research and all that stuff, and finally your responsibility is your teaching assignment."

They came right out and said that, and I thought that at the time that it was a little bit different, but as I got into the system I saw that he really meant it.

Question: Was this the philosophy of the institution?

Response: That is the philosophy, of that department anyway. As much as I experienced it, it seemed that way. It seemed that way in Chemistry and every place. I think that generally it's pretty true.

Question: What would you say the philosophy of this institution is?

Response: I would say that the philosophy of this institution is strictly an educational institution. When we don't have research, the legislature has not defined our roll in those terms. We are an educational facility and we are not concerned with publishing research - this and that. I think the worst education I had was in graduate school, the very worst.

The worst lecture, the worst laboratory experience. It was really a very bad experience because the instructors were not at all interested in teaching - even teaching their lecture! In fact, the man that I worked under, I took classes from and he was probably one of the worst teachers I had. Mainly because I knew where he had been just before class; (laughter) knew that he was a heavy drinker. You could see him leaning back against the black board - he wasn't resting, he was holding himself up. I knew what was going on, I had been in the lab working until four o'clock in the morning, went home and slept for two hours, came to a class knowing that he had too! Knowing that that's what he was functioning on.

I've had instructors that I couldn't understand a thing they were saying - because they spoke a different language.

Question: You prepare a lot of your own material and you do a lot for your own classes, so you see your own role more as a teacher.

Response: A teacher - yes that's our role here. It would be nice if we could get involved in research and things like that, that were directly related to teaching.

Research on teaching, I think that that's where the legislature should be going for some funding. I think that that is an area that really would be great for us and I think that's what state universities are supposed to be doing in their education, they are supposed to be doing it for us.

Question: There is research on teaching in the elementary and secondary level, but the College teaching is another thing.

Response: "Higher Ed" - isn't doing much, they're doing more than what we are doing and they are supposed to be. My impression is, that they are supposed to be finding these things out and then clueing us in on all the new stuff - I don't see that happening, I have never seen state universities coming here and holding seminar's and things (updating-type seminars).

Question: For the instructors, that would be very helpful?

Response: I think so! If indeed there is something to update.

Question: Do you relate to different groups differently? You've got x-ray people, you've got nursing people - because their careers are going to be different, their demands are going to be different in their program. Do you relate a little differently to each of your students depending on what they are going to do?

Response: I think I probable do, I'm not sure that that's a good thing to do. In the past, I've found that the nursing students are the better students and the x-ray students and the O.T. people are traditionally poor students. Admittedly, by their own programs this is true. The standards that they have are lower and they attract people with poor backgrounds.

When you have a lab full of x-ray students, very frequently what you have is: people leave early, they do very poorly on tests, they don't always grasp the information as well as some of the other people do. So I think that because of that, I form prejudices. I don't think they're bad prejudices (when I say prejudice, I mean - relate to them a little bit differently than I do others).

Question: Your seeing them as populations?

Response: Yes, I feel like "I'd better really explain this in real simple terms."

Question: It's not always a conscious thing?

Response: Yes, that's true. But you know that your dealing with a little bit different group. Now if I had a whole group of "Hospital X Students" I would figure: "Oh let's do this kind of, there might be a few snotty ones in here. For some reason it attracts the people who think that they are much better than the 'ADN Students' and they are gonna let you know." And if I had a whole class of them, I would know that there are some real "creackjack students" real smart students but, there are also a couple of slower ones in there. Your on guard a little bit more; somebodies gonna throw you a question that is designed to be a little bit snooty. You have got to handle that so that you don't loose space.

Question: They test you?

Response: Oh, yes! They test you a little bit more. Some of the other groups - your "head hauncho" - and they don't question you. "ADN Students" basically are that kind of student. They are sharp students but their not snooty.

Question: It's not only YOUR perception of THEM, but THEIR perception of YOU and YOUR ROLE!

Response: Agree

Question: You know all of the different people on the faculty, you know they use the laboratory differently. Do you think that there is a need for inservicing, and training people on how to use the laboratory most effectively as instructors? Do you see any need for that, or do you feel that there would be a...

Response: It seems to me that the lab is such a personal thing, a personal expression; lecture is the same thing. It would kind-of be like almost going in there and saying "well, now this is what we would like you to do and what your doing, we don't care for the way your doing it - we want to change what you are doing." It is awfully hard to do in a persons' domain - your classroom is your place.

Question: You see some resentment there - intrude on that?

Response: In education, they're really protective about their classroom. That's their domain, and you don't cross that line. I think that you have to really do it in a very subtle way and a very non-threatening way. It would really have to be presented really well! I would think that the best way to do that would be by demonstration. To have everybody go through a lab that you designed using your techniques

the way you think it should be done. They'll pick-up off that and take what THEY think is valuable out that and how THEY can adopt it into their own situation. To sit them there and say "This is how we think it should be done", I think would antagonize and infuriate them.

Question: What about sharing some techniques, if you got a group of people together to share some of the things that work for them rather than...

Response: Well, I don't know if we all have it that well defined.

Question: You don't know what your doing? (laughter)

Response: Yes. I think that it's a personal thing. You go in there and its a "gut-level" sometimes with these people and its not always even what you say it's sometimes when you don't say something. Like I'll sit there and listen to these people struggle. You know they'll be mispronouncing it - they'll say the wrong thing and then I'll check to make sure it's done right then I've got to catch them if they don't. Then I have to step in there and say "hey wait a minute, that was wrong!" But I'm gonna try and let their lab partner straighten it out first, before I have to.

Now maybe somebody else doesn't do that, maybe somebody else stands right over them and says "this, this, this, this, this, this!" For that person, that might be the best way that they teach.

Question: Do you handle different labs differently as far as depending on the content?

Response: Maybe in a subtle way, but not drastically. Usually I have a pretty modulous group of people (agreement). A few people from here a few people from there.

Question: Mixtures?

Response: Agree

APPENDIX D

STUDENT SURVEY

May 12, 1981

Dear Students,

As part of my doctoral dissertation research at Michigan State University, I am studying the interaction of pre-professional science students and their teachers in a laboratory setting. I would appreciate your comments on your J.C. lab experience this year.

Please do not include any names in your comments to maintain confidentiality. The findings, which will be used as part of a larger research project, will be available upon request.

Thank you for your time,

Kay T. Dodge

1. Curriculum or major field _____
2. Age Group
   - Under 20 ____
   - 21-35 _____
   - 36-50 _____
   - over 50 _____
3. Sex
   - Male _____
   - Female ____
4. How many other college labs have you had? _____
5. What do you see as the major role of the instructor in lab? _____

   _____

6. Which of the following types of interactions have you experienced with your lab instructor this year (either in lab or office). Check as many as you wish.

   _____ lecture / introduction
   _____ small group instruction
   _____ individual instruction
   _____ professional or career counseling
   _____ personal counseling
   _____ social (non-school discussion, coffee, etc,)
   _____ other : _____

   _____

7. Which of the interactions listed in question 6 occured most often?

---

8. Which of the interactions listed in 6 were most helpful or beneficial to you and why? (you may list more than one)

9. Compare the interaction with other students with the interaction with your instructor?

10. What is your general evaluation of the laboratory portion of the science class.

11. In your opinion, how could the laboratory instruction or interaction be improved?

May 12, 1981

Dear Students,

As part of my doctoral dissertation research at Michigan State University, I am studying the interaction of pre-professional science students and their teachers in a laboratory setting. I would appreciate your comments on your J.C. lab experience this year.

Please do not include any names in your comments to maintain confidentiality. The findings, which will be used as part of a larger research project, will be available upon request.

Thank you for your time,

Kay T. Dodge

Kay T. Dodge

Summary Human Anatomy + Physiology

1. Curriculum or major field Health Related

2. Age Group
   - Under 20 70 - 50%
   - 21-35 60 - 43%
   - 36-50 8 - 6%
   - over 50 1 - <1%
   - 139

3. Sex
   - Male 10 - 7%
   - Female 129 - 93%

4. How many other college labs have you had?
   - 0 14%
   - 1 28%
   - 2 27%
   - 3 18%
   - 4 3%
   - +4 10%

5. What do you see as the major role of the instructor in lab? _____

---

6. Which of the following types of interactions have you experienced with your lab instructor this year (either in lab or office). Check as many as you wish.

   - 121 lecture 87%
   - 84 small group instruction 60%
   - 84 individual instruction 60%
   - 2 professional or career counseling .5%
   - 1 personal counseling .25%
   - 16 social (non-school discussion, coffee, etc,) 12%
   - 5 other : instr. not present 4 4%
     lab manuals 1

7. Which of the interactions listed in question 6 occured most often?

Various / see file

8. Which of the interactions listed in 6 were most helpful or beneficial to you and why? (you may list more than one)

Lecture : 26%

Group : 40%

Ind. Instr. 30%

Personal Couns. < 1%

Careers Counc. 1%

Social : < 1%

Other : 1%

9. Compare the interaction with other students with the interaction with your instructor?

see originals on file

10. What is your general evaluation of the laboratory portion of the science class.

see originals on file

11. In your opinion, how could the laboratory instruction or interaction be improved?

see originals on file

APPENDIX E

TEACHER QUESTIONNAIRE

May 15, 1981

Dear Collegues,

For my doctoral dissertation at Michigan State University, I am doing an ethnographic study of the interactions of community college instructors and their students in a laboratory setting. I would appreciate your comments on the use and management of your labs. This survey will be used as part of a larger study employing the techniques of participant observation, interview, and survey. Upon completion, the findings will be available upon request.

To maintain confidentiality, please do not include your name on the survey. Please put the completed survey in my box in the main office, or in the inter-school mail

Thank you for your time and help in this project.

Raspectfully,

Kay T. Dodge

Kay T. Dodge

Life Science Division
213 Main J.C.

1. What science classes do you teach? _____
   _____
   _____

2. What are your general science goals for your laboratory classes? (check those appropriate and add others you include in your lab)
   _____ teaching independent thinking skills
   _____ teaching students to follow directions
   _____ teaching students to manipulate science equiptment
   _____ teaching students science concepts
   _____
   _____
   _____

3. What do you see as your major role in the laboratory?

4. What types of interaction between students and instructor occur within your lab setting? (check as many as you wish) (office applies also)
   _____ Academic-lecture
   _____ Small group instruction
   _____ Individual instruction
   _____ professional or career counseling
   _____ Personal counseling
   _____ Professional modeling
   _____ Social
   _____ Other _____ _____

5. How do you rank community college lab experiences as compared to those at four year institutions? Why?

6. What advantages or disadvantages do you see in having a full instructor in lab, rather than a teaching or graduate assistant?

7. What are the most effective types of interactions in your lab?

01

1. What science classes do you teach? Anatomy and Physiology
General Biology

2. What are your general science goals for your laboratory classes? (check those appropriate and add others you include in your lab)

_____ teaching independent thinking skills
_X_ teaching students to follow directions
_X_ teaching students to manipulate science equiptment
_X_ teaching students science concepts
_____
_____
_____

3. What do you see as your major role in the laboratory?
1. Introduce laboratory material outline procedure.
2. Provide assistance as student questions arise.

4. What types of interaction between students and instructor occur within your lab setting? (check as many as you wish) (office applies also)

_X_ Academic-lecture
_X_ Small group instruction
_X_ Individual instruction
_____ professional or career counseling
_____ Personal counseling
_____ Professional modeling
_X_ Social
_____ Other _____ _____

5. How do you rank community college lab experiences as compared to those at four year institutions? Why? I would rank them very high because of small numbers in lab. Also our lab instructors have better background due to being lecture instructors.

6. What advantages or disadvantages do you see in having a full instructor in lab, rather than a teaching or graduate assistant?
1. Better coordination between lecture material and lab.
2. Full instructor usually has a better background.

7. What are the most effective types of interactions in your lab?

Small group and one-to-one.

8. Do you feel the interaction between teacher and student in the laboratory could be improved? Please explain

Yes. Often we assume that if students do not request help, etc., that they are having an adequate experience. Possibly during the time we could move about more asking direct questions and spot checking scopes, etc.

9. How much does nature of the material being taught influence your role and management of the lab? *The nature of the material only moderately influences the lab due to lab exercises being written as a group effort. Schecule, order of topic is also a group effort.*

10. Which description applies to the majority of your lab classes:

_____ Teacher centered or directed investigation

_____ Student centered investigation

__X__ Student centered with some teacher interaction

_____ Student centered with a great deal of teacher interaction

11. Do you feel that a workshop exploring the ways to use laboratories more effectively would be helpful to either new or experienced lab instructors?

Yes.

12. Other comments on your attitude toward, or use of, the community college laboratory setting.

Some lab experiences are limited by what I'll term "repeatability". We are moving through large numbers of students, our time is limited to two hours. We have little opportunity for any open ended work, little chance for more technical demonstration or lab experiences.

1. What science classes do you teach? Embryology
   Comparative Anatomy
   Zoology

2. What are your general science goals for your laboratory classes?
   (check those appropriate and add others you include in your lab)

   X teaching independent thinking skills
   X teaching students to follow directions
   X teaching students to manipulate science equiptment
   X teaching students science concepts
   _____
   _____
   _____

3. What do you see as your major role in the laboratory?
   Guide the student through the materials to be studied.

4. What types of interaction between students and instructor occur within your lab setting? (check as many as you wish) (office applies also)

   X Academic-lecture
   X Small group instruction
   X Individual instruction
   X professional or career counseling
   _____ Personal counseling
   _____ Professional modeling
   X Social
   _____ Other _____ _____

5. How do you rank community college lab experiences as compared to those at four year institutions? Why?
   Good. Small classes, friendly atmosphere.

6. What advantages or disadvantages do you see in having a full instructor in lab, rather than a teaching or graduate assistant?
   The lab instructor knows exactly what the student should learn in lab and sees to it that they master the material.

7. What are the most effective types of interactions in your lab?
   Verbally guiding the students through the animal dissections or slide examination and then going from student to student to see that he is seeing what he is supposed to see.

8. Do you feel the interaction between teacher and student in the laboratory could be improved? Please explain *No. I find the approach I use to be very effective.*

9. How much does nature of the material being taught influence your role and management of the lab?
Much of the material is too difficult to expect the student to understand on his own. Lab manuals usually don't give enough help nor do students care to read alot of directions.

10. Which description applies to the majority of your lab classes:
_____ Teacher centered or directed investigation
_____ Student centered investigation
_____ Student centered with some teacher interaction
__X__ Student centered with a great deal of teacher interaction

11. Do you feel that a workshop exploring the ways to use laboratories more effectively would be helpful to either new or experienced lab instructors? *No.*

12. Other comments on your attitude toward, or use of, the community college laboratory setting. *Laboratories are most important in courses like Embryology and Comparative Anatomy. Students need hands-on experience to tie in what has been said in lectures.*

02

1. What science classes do you teach? Anatomy and Physiology 121-122

2. What are your general science goals for your laboratory classes? (check those appropriate and add others you include in your lab)

- X teaching independent thinking skills
- X teaching students to follow directions
- X teaching students to manipulate science equiptment
- X teaching students science concepts
- _____ Teaching students how to work with others in a lab.
- _____
- _____

3. What do you see as your major role in the laboratory?
To reinforce, with hands-on types of experiences, the lecture material and to go into more detail where lab is more appropriate such as identification of muscles, organs, etc.

4. What types of interaction between students and instructor occur within your lab setting? (check as many as you wish) (office applies also)

- _____ Academic-lecture
- X Small group instruction
- X Individual instruction
- _____ professional or career counseling
- X Personal counseling
- X Professional modeling
- _____ Social
- _____ Other Self-confidence building

5. How do you rank community college lab experiences as compared to those at four year institutions? Why? Where the same instructor teaches both lecture and lab there is much more continuity.

6. What advantages or disadvantages do you see in having a full instructor in lab, rather than a teaching or graduate assistant? Full instructors are most likely channelling most of their efforts into teaching where as graduate assistants have their own education taking top priority.

7. What are the most effective types of interactions in your lab?
One to one.

8. Do you feel the interaction between teacher and student in the laboratory could be improved? Please explain *Yes. Getting student to take more advantage of their lab experience like; asking more questions, doing all the required work in the time provided.*

9. How much does nature of the material being taught influence your role and management of the lab?
Much, some material requires explanation and close observation while other experiences should be more self-discovery.

10. Which description applies to the majority of your lab classes:

_____ Teacher centered or directed investigation

_____ Student centered investigation

__X__ Student centered with some teacher interaction

_____ Student centered with a great deal of teacher interaction

11. Do you feel that a workshop exploring the ways to use laboratories more effectively would be helpful to either new or experienced lab instructors? *Yes.*

12. Other comments on your attitude toward, or use of, the community college laboratory setting. *It is good that most lab room can only accomodate 24 students.*

APPENDIX F

COLLEGE DOCUMENTS AND CONTRACT

FACULTY

The College has eleven major instructional divisions - Business Studies,Fine Arts, Health Education, Language Arts, Life Sciences, Physical Education, Physical Sciences, Social Sciences, Counseling, Educational Development, and Technology. Full-time and part-time faculty share the instructional responsibilities within this structure.

Faculty are classified into the following categories:

1) regular full-time
2) temporary full-time (one or two semester appointments)
3) part-time adjunct day college faculty
4) Continuing Education
    a) part-time adjunct faculty: on-campus
    b) part-time adjunct faculty: off campus
    c) part-time adjunct faculty: Weekend College
    d) part-time adjunct faculty: Business & Industry
    e) part-time Community Education

In addition to instructors, faculty positions include librarians, counselors, instructor-coordinators, counselor-coordinators, instructor-directors, counselor-directors and such faculty who are given released time to perform duties as faculty-coordinators or faculty-directors.

Students transfer to to escape 4-year hassles

by. Ulester Douglas

Doug Brooks, a sophomore, attended Michigan State Univeristy for one year and a term. Last year he had to drop out because he was unable to pay his tuition.

Brooks was no longer eligible for a scholarship he received, and his grant was not enough to cover all his expenses. He transferred to this semester because, "It is less expensive."

Many students are faced with this problem each semester, but there are reasons other than financial, that cause students to drop out from four-year institutions and enroll at

According to Diana Pace, a counselor at Grand Valley State Colleges, "Pressures put on students by the changes in the job market," also account for students coming back to .

LuAnn Logendyke, a sophomore, is a typical example of this situation.

Logendyke attended Central Michigan University for two and a half years. She was working toward a major in psychology and business and had hoped to work for a while before pursuing her post-graduate studies.

But she said that she realized that "it would be difficult to find a job in these areas with only a bachelor's degree," and decided to change her major.

Logendyke transferred to the following semester and enrolled in the nursing program. "There are more job opportunities in nursing," she said.

Mike Keller of Students' Relations, Aquinas College, explained that students also drop out of four-year institutions because of academic deficiencies.

There are students who graduate from high school and even junior college and are still not well equipped for the bigger schools.

"If I were taught more English at high school I would not have had any problems at Western," said Barbara Vaughn, a Creston High graduate.

Vaughn switched to "in order to get a new start."

location and reputation of providing a quality education, are also some noted factors that have attracted four-year schools dropouts.

Source: College newspaper, 2-17-82.

Teaching conditions from current contract.

ARTICLE VI

GENERAL WORKING CONDITIONS

A. CALENDARS (see memo of understanding dated 12/4/80)

B. WORK LOADS

The normal work loads* for faculty members for the 1980-83 contract are as follows:

*"Normal work load" is defined as the aggregate of the number of hours assigned a faculty member within a given academic work year within the prescribed limits stated in B. 1-3. The assignment of a given number of hours in one (1) semester shall not be construed to be a necessary determinant for assignment of hours in a succeeding semester. "Overload" shall be defined as the aggregate of the number of hours assigned a faculty member beyond his/her "normal work load". Determination of overload shall be made at the beginning of the second semester. (see memo of understanding dated 12/4/80)

Compensation to any faculty member for actual hours employed in the fall semester shall be distributed throughout the normal pay days in that semester at the faculty member's request. If no such request is made, compensation for fall

day overload will be paid no later than the third pay day of the spring semester.

1. Librarians and counselors--35 hours or its equivalent in the academic calendar year. (See Appendix A-1, A-2, A-3, and A-4.)

2. Instructors in the LPN Program--50 (20-20-10) contact hours or its equivalent in the 44 week program.

3. All faculty members other than 1 and 2 above - 30 contact hours or its equivalent.

4. Cooperative Education shall be equated at five (5) students per contact hour.

C. CONDITIONS

The general working conditions shall be maintained as in effect at the time of the signing of this Agreement except where improvements are provided by the Board. (Alleged violation(s) of this section shall be pursued under the Type A grievance procedure only).

However, no faculty member shall be reassigned from one division and/or department to another without a discussion of the proposed reassignment with the faculty members. During such discussion, the faculty members have the option of having the presence of the President of the Association or a designee.

D. SENIORITY LIST

A master seniority list indicating length of satisfactory, continuous full-time service at College shall be prepared by the appropriate administrators and issued to the Faculty Association no later than 30 days after the beginning of the school year.

E. STUDENTS AND RECORDS

1. Faculty members shall not allow unauthorized persons in their classes for more than one (1) class session. Unauthorized persons are those who have no evidence of having paid their tuition.

2. Records of individual student absence and academic performance shall be maintained by each faculty member. Such records will be retained by the faculty member in accordance with the statute of limitations (seven (7) years). Upon termination of services, said records shall be left with the registrar for record keeping purposes. To facilitate such record keeping, faculty members will be supplied with appropriate grading and record materials, record book, class list, and grade cards. Faculty will have at least one week's notice prior to submission of appropriate records.

3. No class which is appropriately scheduled shall be dismissed without prior approval of the appropriate administrator (Dean of Arts and Sciences, Dean of Occupational Education, Dean of Continuing Education) or designee.

4. Faculty members shall follow accepted course outlines except in those instances where authorized to do otherwise by the appropriate administrator, and divisional chair.

F. OFFICE HOURS

1. Teaching faculty (full-time) shall be on campus a minimum of five (5) office hours per week (for student consultation) in addition to their normal teaching load. Said hours shall be scheduled where appropriate in both a.m. and p.m. modules. The faculty member shall also be available additional time each week on campus for preparation, attendance at meetings as scheduled by the Dean or his/her designee or additional activities related to his/her teaching function.

2. So as to best serve the students, office hours will be scheduled in units no less than 30 minutes in length, posted, and adhered to by the faculty member. Such schedule shall be submitted to the Instructional Dean upon his/her request.

SOME FACTS ABOUT THE COLLEGE

NUMBERS SERVED - HEADCOUNT

Traditional College Students (Fall Semester 1980-81)		8,905
Men:		
Full-time	2,252	
Part-time	2,084	
Women:		
Full-time	1,924	
Part-time	2,645	
Apprenticeship		893
Community Service (School Year 1980-81)		21,622
Those taking classes which qualify for state funding	14,065	
Those taking classes which do not qualify for state funding	7,557	
Participants at Workshops, Seminars, and Reviews		5,000+
Total Number of Metropolitan Residents Served by the College 1980-81		37,292

SOME FACTS ABOUT THE COLLEGE (CONTINUED)

NUMBERS SERVED - CREDIT HOUR EQUATED

For state-aide purposes, Michigan equates thirty-one credit hours as the equivalent of a full-time student. On this basis, J.C. serves approximately 6,400 Fiscal Year Equated Students.

FULL-TIME FACULTY AND ADMINISTRATION	245
PART-TIME FACULTY	158

CLASSES OFFERED

Approximately 1300 Sections

On Campus

Seven days a week from 8:00 a.m. to 10:00 p.m., excepting Saturday evening and Sunday morning.

Off Campus

Locations at Ottawa Hills and Grandville High Schools, business and industry locations, Occupational Training Center serving 500 students at Leonard and Ball N.E. location.

SOME FACTS ABOUT THE COLLEGE
(CONTINUED)

TUITION RATES

$24.00 per credit hour for School District residents

$40.00 per credit hour for non-resident students

$60.00 per credit hour for out-of-state students

(Typically, a full-time student takes 30 credit hours per academic year; $720 for a resident, $1,250 for a non-resident. Books and fees average $150 per year.)

SOME FACTS ABOUT THE COLLEGE
(CONTINUED)

MAJOR FACILITIES

Main Building - 1923

- Apprenticeship Training
- Fine Arts and Foreign Language Division
- Home Economics Department
- Life Science Division
- Physical Science and Mathematics Division
- Technology Division
- Social Science Division
- Administrative Offices

Music Center - 1923 (2 million dollar remodeling completed August 1980)

- Music Department
  - Practice Rooms
  - Performance Rooms
  - Rehearsal/Lecture Rooms
- Performing Facility for Community use

West Building - Acquired 1966 (currently in process of sale/lease to Kendall School of Design)

- Language Arts Division

North Building - 1971

- Business Division
- Dental, Nursing, and Radiology Division
- Student Commons and Activity Office
- Public Service Division
- Small Auditorium
- Social Science Division

Learning Resource Center - 1971

- Library
- Listening Laboratories
- Photography Program
- Television Studio
- Computer Laboratory

Ford Building - 1976

- Physical Education Division

SOME FACTS ABOUT THE COLLEGE
(CONTINUED)

STUDENT/COMMUNITY CENTER

225 Space Parking Ramp Addition - Completed November 1980

60,000 Sq. Foot Student/Community Center - Completed August, 1981

3 Floors - Each floor built in three equal "pods" East-West circulation on North side of building (Bostwick) vs. middle of building. 20 foot enclosed mall - calder red steel and glass.

Top Floor

- Counseling
- Educational Development Center
- Dean's Office
- Lounge
- Building Manager
- Foods Director

Middle Floor

- Cafeteria
- Dining Room
- 175-seat Multi-Purpose Room
- Small Group Meeting Rooms
- Public Restaurant
- The Heritage

Lower Floor

- Student Activities Office
- Newspaper
- Student Congress Meeting Room
- Health Services
- Recreation Room
- Bookstore
- Security

SOME FACTS ABOUT THE COLLEGE
(CONTINUED)

FINANCIAL INFORMATION

The College operates on an annual budget of $16,250.00. Sources of revenue are as follows:

State Aid	$6,600,000.
Tuition	6,100,000.
Local Taxation	2,534,000.
Other	600,000.

SOME FACTS ABOUT THE COLLEGE
(CONTINUED)

COLLEGE FOUNDATION

The Junior College Foundation, established in 1964 as part of the 50th anniversary celebration of the College, has three purposes:

1. To provide increased student financial assistance.
2. To encourage improvement in the academic programs.
3. To broaden faculty education and training.

A five-year community campaign, begun in 1979, has the following goals:

1. To secure $150,000 in donations to the Foundation by the end of 1979.
2. To secure $200,000 worth of capital outlay gifts by the end of 1980.
3. To secure $1,000,000 worth of Direct-Investment-Return gifts by the end of 1983.

McCabe-Marlowe House - Conference Center

1. Please refer to the brochure in this packet which offers an overview of this exciting renovation project of a 125 year old Heritage Hill home formerly owned by two of College Science faculty, Miss McCabe and Miss Marlowe

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