TEACHERS' PERCEPTIONS AND USE OF CLASSROOM SPACE

by

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Under the direction of Dr. C. Kenneth Tanner

ABSTRACT

This dissertation was conducted to examine the perceptions held by secondary teachers about their use of classroom space. Six participants--Georgia teachers with National Board certification--were interviewed and asked to describe their teaching experiences related to: orientation issues (the individual's perception of space); operation issues (intentions and attempts to shape and use the environment); and evaluation issues (judgments made about the environment). The findings of this study indicated three major themes concerning teachers' perceptions of classroom space: (1) the adequacy of the amount and arrangement of space for teachers' needs, (2) the physical condition of the classroom in relation to teacher performance and morale, and (3) the affects of the classroom's physical condition on student behavior. The amount or arrangement of space was inadequate for the teachers' needs, particularly in the areas of student mobility and storage. However, teachers found numerous ways to modify and shape their setting to make it support their instructional program. Newer facilities and smaller class sizes contributed to teachers' sense of well-being and effectiveness while poor maintenance and overcrowding were associated with feelings of frustration. Teachers believed that the physical environment sent positive or negative messages. Students in trailers and older, poorly maintained buildings seemed to be more destructive and less appreciative of their facility than students in newer schools. Based on teachers' perceptions in this study, seven classroom design recommendations were identified. 1.) Construct adequate storage to house materials for instructional programs, particularly in laboratory sciences. 2.) Plan for flexible arrangements of people, furnishings, and equipment by limiting built-ins and immobile fixtures. 3.) Locate all technology resources together and away from windows. 4.) Provide classroom space in secondary schools that will support instructional programs and accommodate student mobility. 5.) Construct additional space for computer workstations located in classrooms. 6.) Build separate workspaces for teachers to use for planning and conferencing with parents, students, and colleagues. 7.) Create professional classroom environments that include computers with Internet access and telephones with outside lines.

INDEX WORDS: Classroom design, Classroom environment, Classroom space, Design requirements, Educational environment, Educational facilities, Educational facilities design, Educational facilities improvement, Educational facilities planning, Facilities, Facility requirements, Flexible facilities, School construction, School space, Student needs, Space utilization

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A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF EDUCATION

ATHENS, GEORGIA

2002

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This dissertation is dedicated to my husband, Walter Snow,

my children, Cassie and Jonathan Cain, David and Brian Snow,

and my parents, Katherine and Oiva Kangas,

for always being there to listen, encourage, comfort and love.

I could not have done it without them.

ACKNOWLEDGMENTS

The completion of this research was made possible by the contributions, encouragement and support of friends, family and mentors. When my pace began to slow, their words of encouragement inspired and energized me anew.

First and foremost, I would like to thank my doctoral committee. Throughout my program, their wisdom and leadership enriched my learning experience both personally and professionally. Dr. Ken Tanner, Dr. Thomas Holmes, Dr. Kathleen deMarrais, Dr. Karen Loup-Hunt, and Dr. William Wraga provided essential expertise and perspective as well as support for this project. Ken, thank you for sharing your enthusiasm for facilities research. I will be forever indebted.

I would also like to thank the outstanding teachers who participated in this study. Their willingness to share their classrooms and their rich teaching experiences made this study possible. It was a privilege to work with these talented professionals.

Finally, although I dedicated this dissertation to my family, I cannot acknowledge them enough for their thoughtfulness and support during the entire time I have been in graduate school. At one point, all six of us (Walt, Sue, Cassie, Dave, Jon, and Brian) were in college at the same time, a shared experience we are happy to have behind us. Walt always quipped, “that which does not kill us makes us stronger,” and so we are indeed stronger in many ways as a result of this endeavor.

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CHAPTER 1

INTRODUCTION

It's 9:15 a.m. At the sound of the bell, Ann mobilizes for action, knowing she has just four minutes to make it to the next class. A three-year veteran new to this system, she is a "floater" moving each period to any room vacated by a teacher on planning. But this is second period and every classroom in the overcrowded old three-story building is at capacity. Grabbing her overhead projector and oversized canvas tote bag of supplies, she heads down three flights of stairs to the only available space, a basement storage room under the gymnasium. Entering the sixteen by forty-foot windowless cavern, she flips on the overhead hanging bulbs, aims the overhead projector at the cement-block wall and turns to face thirty-three students seated at makeshift tables and folding chairs. For the next fifty minutes they will strive to do pre-algebra as the Nikes thunder in the gymnasium overhead.

At the same time across town, Mary looks up from her reading lesson to see the Assistant Principal standing at the door of her windowless classroom trailer. The wind and rain have become noticeably louder against the metal building and with just a glance the AP signals to Mary that her class must move to safer quarters. Turning to the twenty-eight students, she directs them to quickly gather their materials. Well-versed in this routine, they assemble the books, pencils, paper and equipment they will need, knowing they won't soon be back. The mobile classroom is evacuated as the students dash through the pelting rain toward the nearby cafeteria door. Once inside, they join the other trailer refugees, clustering in a corner of the cafeteria where Mary tries to focus their attention again on page eight in their story.

These vignettes are used to illustrate the relationships between a school's physical environment and the teachers who work in them. Just how important is the classroom setting? What is the role of the physical environment in the teaching-learning process? And how do teachers manage the space in which they have been assigned to teach? The purpose of this study is to explore the relationships between classrooms' physical environments and the teachers who work in them. Specifically, this study will examine multiple dimensions of the use of classroom space from the point of view of individual teachers in secondary schools.

Most individuals can recall a time when they learned in spite of the setting. Teachers, too, have observed that they could teach anywhere, even under a tree. However, the real issue is whether the student learned and the teacher taught as much or as well as they would have in a better environment. The relationship between school facilities and student achievement is a complex issue with an extensive body of literature. Although research does not show that student performance rises when facilities go from decent to divine, it does show that achievement lags in shabby buildings (Stricherz, 2000).

Clearly, a high-quality learning environment is essential to educating our children. Yet, in spite of the many hours spent in schools, our knowledge of their effects on us and of our ability to affect them is really quite small. Often, we focus on understanding the activities of school while giving little attention to understanding the role that the physical environment plays. School environments have a largely untapped potential as active contributors to the learning process (Taylor, Aldrich, & Vlastos, 1988).

Environmental psychologists have demonstrated that we influence and are influenced by the physical environment that surrounds us. The performance of a given built environment depends not only on its physical characteristics, but also on the interaction of those characteristics with the needs and requirements of its users. Veitch and Arkkelin (1995) concluded:

> The efficiency with which humans function is determined in large part by the limitations and proscriptions of the designed environment. Good design, everyone agrees, is that which causes minimal human discomfort and maximum human functioning. (p.316)

If, indeed, activities such as teaching and learning cannot proceed without affecting and being affected by the places in which they occur, then educators would do

well to look closely at their classrooms to understand how they can use the environment as a tool in improving instruction and achievement (Gehrke, 1982).

Stokols (1976) presented a useful conceptual framework for analyzing human interaction with the environment. The model suggests three basic modes of transaction: orientation, operation, and evaluation. Orientation refers to the individual's perception of space, the way they orient toward the environment. Operation processes emphasize the ways in which people act upon and are affected by their surroundings, focusing on an individual's attempts to shape and use the environment according to their needs. In the final mode, evaluation, people assess the effectiveness of their past behavior and the opportunities afforded by the environment for future goal-attainment. This model is helpful in analyzing how teachers relate to educational space. More specifically, it provides a framework for examining the relatively uncharted relationship between the classrooms' physical environment and the teachers who work in them.

While teachers and students acknowledge the need for differentiated learning space, research to guide the customization of classrooms is scarce (Duke, 1998). Space is needed for technology, projects, and group work based on the unique needs of different content areas and age levels. Yet, in many schools all teachers are compelled to work in the same type of space. Taking into account new thinking about how students learn, research is needed to help determine how to design classrooms to accommodate a variety of activities (Duke, 1998).

Concomitantly with this call for the study of the use of the classrooms' physical environment is the realization of the importance of the viewpoint of the individual teacher. Feiman-Nemser & Floden (1986) state that there has been a striking shift "from

trying to study the world of teaching as a public, social phenomenon to trying to understand how teachers define their own work situations" (p. 505). There are "too few studies which explore the subjective world of teachers in terms of their conceptions of what is salient" (Lortie, 1973, p. 490).

The individual teacher's viewpoint is important for a number of reasons. First, as the ones who direct the learning activities of the students, teachers can speak for themselves about the meaning of their work. Next, a teacher's narrative provides a window through which we can learn more about their intentions and goals and to understand more fully why they do what they do. In addition, because teachers are often the final authority in how curriculum and instruction policies are implemented, knowledge about their perspective can "inform predictions about how teachers are likely to respond and guide efforts to shape those responses" (Feiman-Nemser & Floden, 1986, p. 505). Finally, the understandings and knowledge of teachers can be a source of information for the improvement of education. Sarason (1971) argues "if we have learned anything about the change process, it is the bedrock importance of gaining understanding and support of those who 'own' the problem because directly or indirectly they will be affected by what happens" (p.5). Teachers' perceptions are the raw materials in the measurement of environment, in contrast with the use of direct observation techniques which report the environment from the perspective of the researcher, not the inhabitants (Dorman, 1996).

Statement of the Problem

To meet the challenge of higher standards and higher expectations, students are likely to need as many of the elements of a good educational experience as possible.

Elements of a quality education include not only good teachers and up-to-date instructional materials but also a complex array of direct and indirect influences on learning. Although the subject of extensive research, much of the literature on the classroom has focused on social and psychological elements, rather than on the use of the physical environment. It is apparent that this presents an incomplete portrait of the classroom environment (Fraser, 1986; Gehrke, 1982).

Additionally, the research in this area has been concerned with students more than with teachers. Gehrke (1982) states that the relationships between the physical environment of the classroom and the teachers who work in them are relatively unexplored. School environments have a largely untapped potential as active contributors to the learning process (Taylor, Aldrich, & Vlastos, 1988). How teachers perceive classroom space, what they do with the space they have, and how it contributes to effective teaching and learning needs to be further examined.

Purpose

The purpose of this study is to understand the relationships between classrooms' physical environments and the teachers who work in them. More specifically, this study will examine multiple dimensions of the use of classroom space from the point of view of individual teachers at the secondary school level. The study reflects the various dimensions of the classroom environment previously discussed through the examination of teachers' experiences with: orientation issues (the individual's perception of space); operation issues (intentions and attempts to shape and use the environment); and evaluation issues (judgments made about the environment).

Setting

This study was conducted in six secondary schools in both rural and urban districts in Georgia. The principal informants were veteran teachers who received National Board Certification from the National Board for Professional Teaching Standards (NBPTS), an organization formed in 1988 to offer teachers the equivalent of advanced board certification in medicine. These teachers were interviewed to understand how they use classroom space during instruction, to determine how they enhance the physical environment and to determine how they use classroom space as a resource for learning. Since implementation is essential, teachers' use of the physical environment was observed for documentation.

Studies of exemplary teachers are valuable sources for models of effective classroom practices. Berliner (1986) strongly advocated the investigation of expert teachers to provide extremely useful case material from which we can learn. Investigations of teachers regarded as exemplary have led to detailed descriptions of teaching and learning and the development of models for what teachers do and why they do what they do. These models provide insight into the conditions associated with teacher change (Tobin & Fraser, in Waxman and Walberg, 1991). Changes aimed at altering the conditions under which teachers labor must be based on realistic descriptions of their work lives (Corcoran, Walker, & White, 1988).

Research Question

The main question explored through this study was: What are the perceptions and experiences of secondary school teachers related to their use of classroom space? These perceptions and experiences were examined in particular with regard to the three modes

of: (a) orientation, (b) operation, and (c) evaluation. The following major questions were developed to better understand the teachers' perspectives:

1. What is the teacher's perception of their classroom space?
2. What are the teacher's intentions and attempts to shape and use the environment?
3. What judgments do teachers make about their environment?

Significance of the Study

Although the research on schools' physical environment is extensive, much of the literature on the classroom has focused on social and psychological elements, rather than on the use of the physical environment. Use of physical space is important in a total learning environment and varies depending on context. Stokols and Altman (1987) describe three reasons to be concerned with the physical environment of the classroom: time and energy conservation, program "authority" and school sameness.

"The human capacity to 'make do' with minimal milieu provisions often means that optimum milieu arrangements are not developed" (Stokols & Altman, 1987). Students can discuss mathematics while seated in a room under a gymnasium but should they? Teachers can handle storage problems by walking back and forth to utility rooms down the hall but is that the best use of their time and energy? Although teachers may function adequately in minimally adequate conditions, these conditions may need to be examined or changed to reduce time and energy demands.

> Environmental factors that do not conform to some modal value on each of the perceptual dimensions are expensive to live with; we pay for tuning them out by using more energy or by being less effective in our work. (Veitch & Arkkelin, 1995, p. 309)

The qualities and use of instructional space can reflect the value placed on particular educational programs. Stokols and Altman (1987) describe the contribution of certain milieu qualities to the educational program:

> The placement of chairs in an inward-facing circle, instead of in row-and-column positions, 'states' that discussion is to involve attention to one another's persons as well as to their verbal statements. Provision of a reading niche instead of books at student's desks 'states' that reading is a valued activity and that it might be attractive or pleasurable. Optimum provisions of place and things can suggest program behaviors and program benefits. (p.703)

Organization of space sends signals to students about how teachers view learning. Yet, teachers do not know much at all about using the environment for curriculum and instruction (Gehrke, 1982).

The day-to-day sameness of milieu conditions in classrooms is well known. The possibility exists that change, for its own sake, can be a stimulating experience. For example, new seating arrangements, introduction of individualized learning stations, and changed learning centers can freshen experience and energize behavior. The capacity of novelty to alert and to arouse curiosity in children is well-established (Stokols & Altman, 1987). It is important to consider how teachers use milieu provisions to plan and implement instruction.

This study is significant in three ways. First, the study examined the use of classroom space from the perspective of the individual teacher with respect to each of the following dimensions: orientation (the individual's perception of space); operation (intentions and attempts to shape and use the environment); and evaluation (judgments made about the environment). Second, this study focused upon the viewpoints of the teachers directly involved in planning and implementing the use of classroom space. Their viewpoint is often neglected but is critical to understanding how plans and

intentions affect the process and consequences of classroom teaching. Third, this study examined the way in which secondary school teachers actually use classroom space, providing a better understanding of how the design of the physical environment can be improved to accommodate students and instructional programs. "The study of the school environment is clearly important because it is likely to contribute to understanding and improvement of the school's functioning and to satisfaction and productivity within the school" (Templeton & Jensen, 1993).

Theoretical Perspective

The justification of our choice and particular use of methodology and methods is something that reaches into the assumptions about reality that we bring to the work we do. To ask about these assumptions is to ask about our theoretical perspective (Crotty, 1998). According to Goetz and LeCompte (1984), theoretical perspectives, or conceptual frameworks, are those loosely interrelated sets of assumptions, concepts, and propositions that constitute a view of the world that "may structure strongly the questions a researcher asks and the means chosen to answer them" (p.37). It guides researchers in framing their project, determining what kinds of investigations are appropriate, and shaping their analysis. According to Bogdan and Biklen (1998),

> Theory helps us to work through the contradictions we learn about. And contradictions take us deeper into the important parts of our data and expand theory. (p. 181)

Theoretical perspective is a way of looking at the world and making sense of it, understanding how we know what we know (Crotty, 1998). The theoretical perspective for this study is based on Symbolic Interactionism. This theory, first enunciated by Charles Horten Cooley, John Dewey and George Herbert Mead (Becker, et al., 1961), is

often used synonymously with qualitative research. The theory assumes that human behavior is to be understood as a process in which the person shapes and controls his conduct by taking into account the expectations of others with whom he interacts. At its heart is the notion that we are able to put ourselves in the place of others (Crotty, 1998). In this study it means the researcher must take the emic approach, conveying how things look to the teachers inside the classroom.

Basic to the approach is the assumption that human experience is mediated by interpretation (Blumer,1986). Blumer (in Crotty, 1998) defined three basic symbolic interactionist assumptions:

- That human beings act toward things on the basis of the meanings that these things have for them;
- That the meaning of such things is derived from, and arises out of, the social interaction that one has with one's fellows;
- That these meanings are handled in, and modified through, an interpretive process used by the person in dealing with the things he encounters (p. 72).

Symbolic interactionists are concerned primarily with the mutually influencing behavior of interacting individuals. It is assumed that people will respond to one another and the environment around them on the basis of the meanings that these things have for them. An individual's actions are based not on predetermined responses to predefined objects, but rather as interpreters, definers, signalers, and symbol and signal readers. Their behavior can best be understood by having the researcher enter into the defining process through such methods as observation (Bogdan & Biklen, 1998).

The methods used by interactionists have been principally qualitative. According to Stryker (1964, cited in Mercer & Corey, 1980), interactionists tend to use life histories, study the world through the eyes of the participant, focus on common experiences,

interview individuals, and use observations as research strategies. Observations and interviews mutually interact with each other during the course of the research process.

Just observing an event or phenomenon, however, even through the eyes of a participant, is not enough. Butt and Raymond (1987) assert that there is a need to go further in understanding the relationship among events through engaging in dialogue with the teacher. This process would allow the researcher to pursue meanings, motives, beliefs, and intentions, i.e. the teachers' thoughts and actions.

Communication and language are fundamentally important in understanding the symbolic interactionist stance. People in a given situation often develop common definitions through regular interaction and shared experiences. While some may take shared definitions to indicate truth, meaning is always subject to negotiation. Problems that arise may cause them to forge new definitions, to discard old ways, or, in short, to change. How participants develop such definitions is the subject matter for investigation (Bogdan & Biklen, 1998).

Another important aspect of symbolic interaction theory is the construction of "self," the definition people create of themselves through their interactions with others. The self is a social construction, the result of persons perceiving and defining themselves through the process of interaction. "We owe to society our very being as conscious and self-conscious entities, for that being arises from a process of symbolic interaction" (Crotty, 1998, p. 74). According to Bogdan & Biklen (1998), people attempt to see themselves as others see them by interpreting gestures and actions directed toward them and by placing themselves in the role of the other person. Putting oneself in the place of the other and seeing things from the perspective of others is a central notion of symbolic

interactionism. "Only through dialogue can people become aware of the perceptions, feelings, and attitudes of others and interpret their meanings and intent" (Crotty, 1998, p.75).

Interpretation is essential. Symbolic interactionists do not attempt to resolve the discrepancies between the views of various users of a concept by establishing a standard definition. Rather, they seek to study the concept as it is understood in the context of all those who use it. "It is multiple realities rather than a single reality that concern the qualitative researcher" (Bogdan & Biklen, 1998, p. 27).

Symbolic interaction is appropriate in this research since I studied the use of classroom space from the perspective of the teachers, using interviews and observations to examine their thoughts, actions, experiences, and behaviors. Through dialogue with the teachers, their words will be used to convey how things look to those inside the classroom. Meanings will be derived from oral responses of the participants during open-ended, in-depth, unstructured interviews. The content of the interviews will serve as the unit of analysis.

Definitions

Several terms are used throughout the study. In this section these terms are identified and defined for the reader.

Learning environment – an environment designed for the primary purpose of learning.

National Board for Professional Teaching Standards- an organization formed in 1988 with the theory that teachers should be able to earn advanced certification in any of the subject matter areas or levels, for example, early childhood or high school mathematics,

just as a medical doctor earns an initial license to practice medicine and then passes a test for board certification.

Secondary – middle and high school, grades six through twelve.

Space – the square footage within a confined classroom area.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this review is to survey the body of literature that informed the basic questions of the study. This review is divided into two sections. The first section examines literature on theoretical concepts in environmental/ecological psychology, social psychology, operant learning and perception as they relate to the classroom. The second section reviews literature on the classroom setting, including descriptions, effects, and appropriateness of the environment, and environmental competence of teachers.

Theoretical Concepts

Environmental, Ecological, and Social Psychology

In order to understand teachers' behaviors and experiences, a researcher must look closely at the particular settings in which teachers operate. Environmental and ecological psychology provides a framework from which to examine the relationships between environment and behavior. Williams et al. (1985) stated, "Four elements functioning together-an organization, its members, its work and its physical environment-form an ecology, an ever-changing web of relationships that aims to accomplish whatever the organization exists for-to educate people, to make furniture, or to process insurance claims" (p. 5).

This "ecology" has been the focus of a relatively new branch of psychology called environmental or ecological psychology, the study of the interdependent relationships between the goal-directed actions of persons and the behavior settings in which these

actions occur (Wicker, 1979). Rather than looking at human behavior in isolation, its "focus of investigation is the interrelationship between the physical environment and human behavior and experience" (Holahan, 1978, p. 9).

Psychologists Barker and Wright developed most of the terminology and methodology used in ecological psychology including several terms that are central to any discussion in this area. The first is behavior setting, which is a term preferable to "environment" or "facility" because it emphasizes the inseparability of a setting with the behaviors that occur in it. Wicker (1979) defines a behavior setting as "a bounded, self-regulated and ordered system composed of replaceable human and nonhuman components that interact in a synchronized fashion to carry out an ordered sequence of events called the setting program" (p. 12).

The second important term is synomorphy, which can roughly be defined as the fit between behaviors and objects in an environment. Coordinated behaviors and objects have synomorphic relationships with one another (Wicker, 1979). Gump (1987) describes synomorphy as it relates to the school setting:

> The settings exhibit a physical aspect- site, enclosures, facilities, manipulanda- and they possess a program or action structure. In early elementary school, a standard small setting is the reading circle that has a location usually away from the center of things in the classroom. The circle's chairs face inward around a table or small open space and form a spatial boundary for the activity. Books, charts, and other tools of the educational process are at hand. . . The physical arrangement of the reading circle and its program manifest an interlocking relationship. . . They exhibit what Barker (1968) has labeled synomorphy or "similarity of shape." Finally, the reading circle with its beginning and ending times manifests a temporal boundary. Other settings, all of which show a physical milieu, and a program in synomorphic relationship are contained within spatial and temporal boundaries. These settings or environmental segments cluster together to create the ecological environment for a school's staff and students. The quality of school life is heavily determined by the nature of these school settings. Description of the school environment, at the ecological level, then, comes down to the description of school settings. (p. 692)

Although architects may study a space while it is not occupied, ecological psychologists would consider it impossible to study the use of a space without seeing how people behave within it (Gayeski, 1995). Ecological psychologists believe that the behavior of people and their immediate environments are interdependent, rather than independent. They seek to understand the sequences of interactions that link the perceptions, decisions, and actions of people with non-psychological events that occur in settings (Wicker, 1979). Ecological psychologists emphasize the need to consider a holistic model of behavior-settings including the ambient environment (light, sound, temperature) and layout, as well as physical, mental, and interactional activities (Holahan, 1982).

Operant Learning and Perception

Although ecological psychology has some specific methods and theories of its own, it borrows heavily from other work done in learning, social psychology, and perception. One of the major questions these theories can help to answer is why people behave in certain ways when they are in certain environments.

One explanation for why people behave in ways congruent with their immediate environment is that they have learned to do so by trial and error. According to operant-learning theory, the events that follow a given action determine whether the action will be repeated. Learning occurs when behavior is followed by a reinforcer or a punishment (Wicker, 1979; Winter, 1996). Educational psychologists also have found that we learn by observing behavior of others. In a Montessori classroom where it's easy to watch classmates engaged in various projects, children learn by observing their peers even

before they are given a lesson (Gayeski, 1995). Using these theories, we can understand that certain things in an environment can reward or punish certain kinds of behavior.

Studies in perception are also useful in helping us to understand how people react to various environments. In his research on environment and behavior, Stokols (1976) developed a useful conceptual framework for analyzing how teachers related to educational space. He identified three modes of human interaction with the physical environment: orientation, operation, and evaluation. Orientation, an emphasis on the ways in which people orient toward the environment, is reflected in research on environmental perception, cognitive mapping, the assessment of personal dispositions toward the environment and the measurement of social climate. An emphasis on operation processes, or the ways in which people act upon and are affected by their surroundings, is reflected in research on human spatial behavior and the behavioral effects of environmental stressors such as noise and high density. Evaluation processes involve the ways in which people assess the effectiveness of their past behavior and the opportunities afforded by the environment for future goal-attainment (Stokols, 1976).

Wicker (1979) maintains that people are active in perceiving the environment. Environmental perception has several essential features, including: affective reaction (does this setting suit my needs?), orienting reaction (how do I fit in?), categories of analysis (what notions from my previous experience may be useful here?), and analysis of environmental contingencies (how is this feature of the setting related to that feature?). Over time, as the person tests out features of the setting, he or she gains a sense of order and predictability about the setting and some sense of mastery over it (Wicker, 1979).

Much research has been done on the effects of various manipulations of layout, color, lighting, and noise on individual performance and preferences. Arousal theory asserts that various situations can cause emotional excitement, pleasant or not. Noise, temperature, and color can raise one's level of arousal. While research has found that a moderate level of arousal might adversely affect performance on a complex task, it can actually help performance on simple ones (Gayeski, 1995).

Jung postulated that fundamental psychological characteristics account for how people perceive the world and how they evaluate the information they receive. Individuals have two different preferred styles of perceiving the world: sensing (using the five senses, facts, and details) or intuition (using primarily ideas and associations from the unconscious incorporated with data from the senses). He said that people also vary in their preferred styles of making judgments: thinking (logical, impersonal) or feeling (personal and subjective values) (Gayeski, 1995).

According to Steele (1973) studies of sensory deprivation have indicated that over time a dull, monotonous environment tends to promote a person's withdrawal into himself, a blocking of experimentation, and a sense of lack of control over his environment. Size and arrangement of space also affects behavior. The more a worker's movements are restricted to a small area, the more his growth depends on a diversity of stimulation in his immediate surroundings.

> A place promotes growth not only through the amount of stimulation, but also through the patterns of stimuli, particularly if the patterns are unexpected or novel. Unexpected arrangements help to break old habits of seeing or behaving (p. 86)

Wittich and Schuller (1973) view perception as the foundation of learning. A learner perceives through his senses – therefore, to facilitate learning, one must provide

specific sensory experiences. In the classroom arise many sensory experiences that the designer of learning environments can control, and by doing so, he can improve the quantity and quality of learning. Common stimuli found in the classroom environment are energy forms: light, heat, sound, and vibration. Other environmental stimuli that exist are time of day, furniture, seating arrangements, work spaces, colors, peers, and even teachers (Rath & Ittleson, 1981).

In addition to theories about learning and perception, personality theories have also been applied to environmental design. In the 1980s, the Facility Management Institute, a group sponsored by the Herman Miller furniture company, adopted Jung's model as modified by Briggs-Meyers to conduct research regarding optimal work settings. They maintained that a lack of fit between one's personality style and one's behavior-setting leads to what psychologist Leon Festinger called cognitive dissonance. The following are combinations of preferred styles for perceiving and judging along with descriptions of work settings that the researchers at the Facility Management Institute maintained were optimal for each personality type:

- Thinking/intuition – "visionaries" who work best in an environment with a lot of reference material and no interruption.
- Feelings/intuition – "catalysts" whose personal approach to information needs the presence of personal items such as photographs.
- Thinking/sensing – "stabilizers" who need an environment geared to action and the need to display information with little personalization in a typically bureaucratic style.
- Feeling/sensing – "cooperators" who work best through meeting with others; they need work spaces designed for meetings (Gayeski, 1995).

Applying these theories to the current study helps the researcher explain what relationships exist between teachers' experiences and behaviors and their classroom's physical environment. What are teachers' perceptions of their classroom's physical

environment? How do teachers attempt to shape and use the environment? This study attempted to answer these questions.

Classroom Setting

Description of the Environment

Steele (1973) describes an environment as the total surrounding context for the person or subject of interest, including the physical, social and economic forces. Within that space are a number of settings, the immediate physical surroundings at a particular moment in time. Environmental research has shown that in most cases the setting acts more as a moderator – a facilitator or inhibitor – of responses which, in turn, combine in complex ways to result in different performance levels (Steele, 1973).

Thinking of instruction as an environment gives emphasis to the place or space where learning occurs. According to Wilson (1996), a learning environment, at a minimum, contains:

-the learner;

-a setting or space wherein the learner acts, using tools and devices, collecting and interpreting information, interacting perhaps with others, etc.

This metaphor holds considerable potential because instructional designers like to think that effective instruction requires a degree of student initiative and choice. An environment wherein students are given room to explore and determine goals and learning activities seems to be an attractive concept (Wilson, 1996).

Students who are given generous access to information resources- books, print and video materials, etc. – and tools- word-processing programs, e-mail, search tools, etc.- are likely to learn something if they are also given proper support and guidance.

Under this conception, learning is fostered and supported, but not controlled or dictated in any strict fashion. For this reason, we tend to hear less about instructional environments and more about learning environments-instruction connoting more control and directiveness, being replaced by the more flexible idea of learning. A learning environment, then, is a place where learning is fostered and supported (Wilson, 1996).

Effects of the School or Classroom Setting

According to Veitch & Arkkelin (1995), the efficiency with which humans function is determined in large part by the limitations and proscriptions of the designed environment. Good design is that which causes minimal human discomfort and maximum human functioning. Too often, these researchers contend, designers of institutional environments merely turn out near carbon copies of what already exists, making the implicit assumption that because that's the way it's always been done, it must be the correct way (Veitch & Arkkelin, 1995).

The arrangement and contents of a space or a room can affect the behavior of people; it can make it easier to act in certain kinds of ways and harder to act in others. According to Kritchevsky and Prescott (1977) particular settings invite children to involve themselves in particular activities. The extent of children's constructive participation in the activity will depend in large part on how well certain concrete, measurable aspects of the surrounding physical space meet their "hunger, attitudes and interests" (p. 5).

Space communicates with people – in a very real sense it tells us how to act and how not to act. What it tells us to do is related to what is in the space and how these things are arranged or organized. "Just as adults behave in one way at a table set for a

formal dinner and in a very different way a the same table set for a poker game, children tend to behave in ways suggested by spatial contents and arrangement" (Kritchevsky & Prescott, 1977, p. 9).

The impact of physical settings on organizational life is much more complex than simply as an agent contributing to or reducing morale. Based on his observations and on Maslow's theory of basic human needs, Steele (1973) identified six dimensions that represent the various functions of physical settings: security and shelter; social contact; symbolic identification; task instrumentality; pleasure; and growth.

For Rath and Ittleson (1981) in their research on applying human factors design to learning resource centers, the classroom is not just a shelter for teachers and learners. Rather, it should be considered as a subsystem in the process of producing effective, efficient, and predictable learning. The environment, like hardware, is inert unless designed for, and arranged in, the context of the process. The size, shape, design, furniture, floor covering, acoustics, and environmental considerations (such as temperature, humidity, and lighting) of a learning area predetermine the kinds of activities that can take place.

In a 1993 study on teachers' perceptions of their school environments, 75 state Teachers of the Year responded to the School-Level-Environment Questionnaire (SLEQ) developed by Fisher and Fraser (1990). Findings showed that these teachers desired less work pressure, more freedom to experiment with the curriculum, and more opportunities to interact and share professional knowledge with each other. When asked about facilities and equipment, teachers responded that there were not enough resources available to effectively teach. Data analysis of the SLEQ revealed that elementary teachers rated their

actual school environments slightly more positive than secondary teachers (Templeton & Jensen, 1993).

Appropriateness of the Setting

Lang (1996) states, "The physical environment should not be constructed to manipulate or influence a particular style of teaching or learning, but rather be responsive to and adaptive by individual teacher and student needs" (p. 1). Through his research on educational facilities and teaching practices he concluded that there are six qualities to be considered in creating an optimum learning environment. These components are size, shape and scale; acoustical quality and noise control; illumination and views; temperature, humidity and ventilation; communication, electrical power and technology; and material finishes, textures and color. A successful learning space, according to Lang, requires that both the educator and the designer understand the affects of each component with respect to learning as well as inter-relationship of the criteria.

According to Taylor, Aldrich, and Vlastos (1988), the passive egg-crate closed classroom format is often more like a prison than a place of discovery and creativity. After studying the effects of learning environments on the behavior and learning of children, these researchers are convinced that school environments have a largely untapped potential as active contributors to the learning process. Careful thought, time, enthusiasm, and efficiency of planning can make a school ready to create the kind of learning environment so crucial to student growth.

> Every object, color, texture and spatial configuration, as well as their selection and placement, has educational significance. The designer of such spaces must, therefore, ask him or herself: "What educational implication does this or that design decision have for the occupant (learner or teacher)?" In order to do that, the designer must work closely with the educator to articulate what those goals for

> children are, and the educator must articulate more than square footage per child as the conceptual base for education (Taylor, Aldrich, and Vlastos, 1988, p. 31).

The built environment can become an active, three-dimensional textbook or teaching tool, rather than a passive space housing a disarray of things. Taylor, Aldrich, and Vlastos (1988) suggest that achieving well-ordered learning rests on four premises:

1. People are considered an integral part of, not apart from, the environment.
2. The architectural environment, as a work of art in and of itself, can affect behavior.
3. The environment can be designed, engineered, and provisioned to serve as an additional learning tool.
4. The learning environment can be evaluated as a learning tool. (p. 32).

Our view of learning space should reflect a realization that the space is one of dynamic complexity. According to Michael Fullan (in Hunkins, 1994), such complexity is the real territory of change. "We need spaces that will facilitate the creation of meaning, places where knowledge can be constructed, experiments conducted, investigation carried out, and results of inquiry shared and shaped. We need spaces where the curriculum can serve as the raw material for the knowledge-work process" (Hunkins, 1994).

Effects of Building Condition

Good facilities are an important precondition for student learning, provided that other conditions are present to support a strong academic program. A growing body of research has linked student achievement and behavior to the conditions of the physical building. In the District of Columbia, students' standardized test scores were lower in schools with poor building conditions, after controlling for socioeconomic status. Students in facilities in poor condition had achievement that was 6% below schools in fair condition and 11% below schools in excellent condition (Edwards, 1991).

In a study of small, rural Virginia high schools, Cash (1993) found a relationship between building condition and student achievement. Student scores, adjusted for socioeconomic status, were up to 5 percentile points lower in buildings with lower quality ratings. Poorer achievement was associated with specific building condition factors such as substandard science facilities, air conditioning, locker conditions, classroom furniture, more graffiti, and noisy external environments. Similarly, Hines (1996) found that student achievement in large, urban, Virginia high schools was as much as 11 percentile points lower in substandard buildings as compared to above-standard buildings.

A before-and-after case study was conducted on the effects of school renovation on Syracuse City School students. Student scores were analyzed in reading and math for an 11-12 year period surrounding several elementary school renovation projects. Findings revealed a correlation between newer facilities and student performance levels. A statistically significant relationship was found between upgraded facility conditions and higher math scores, particularly in the sixth grade. Results also indicate decreased student performance during the renovation project (Moore & Warner, 1998).

The General Accounting Office (GAO, 1996) examined the extent to which America's schools have the physical capacity to support learning into the 21st century. In a survey of approximately 10,000 schools, the GAO found that 40 percent of the schools reported that their facilities could not meet the functional requirements of laboratory science or large-group instruction. Over half reported unsatisfactory flexibility of instructional space necessary to implement effective teaching strategies.

The Institute for Educational Leadership (Corcoran, et al., 1988) conducted a study of conditions in five urban school districts. The purpose was two-fold: to provide a

rich description of conditions facing urban teachers and to gain insight into how variations in conditions affect teachers. The project collected descriptive data on 31 elementary, middle, and secondary schools. More than 400 interviews from teachers, administrators, central office personnel, board members and union officials, were analyzed. Observations, interviews and analyses confirm that in most of these 31 schools "Teachers appeared to accept as normal, and therefore adequate, conditions that were at best bleak and dreary and would not be tolerated in other professions" (p. 12). Physical conditions were sub-standard due to lack of repairs and preventive maintenance, with only 3 of the 31 schools considered by teachers to be in "good" condition. In 16 of 31 schools, space was reported to be a problem. Common space problems described were the number of students compared to the size of the room, the lack or quality of office space or teacher lounges, meeting space and common areas, and the lack of storage space. Teachers report that the teacher-student ratio is judged by the district-wide average, not by the size of the room. In other words, space is not matched to needs (Corcoran, et al., 1988).

Using criteria developed by a national task force of facility planners, architects, and school administrators, observations were conducted in three American and three Japanese schools. A profile of a school having characteristics conducive to student learning was created. The Interface Profile presents six major areas of interface between facility and learning. According to the study, student learning is enhanced when the facility: is an integral part of the community; is adaptable to the users' needs; permits teachers to function as professionals; fosters communication; creates an appropriate

behavioral setting and; accommodates a variety of learning styles. (Hawkins & Overbaugh 1988).

The quality of the physical environment affects the performance of teachers as well as students. A study of working conditions in 31 urban schools concluded "physical conditions have direct positive and negative effects on teacher morale, sense of personal safety, feelings of effectiveness in the classroom, and on the general learning environment." In dilapidated buildings teachers felt despair and frustration while teachers in renovated buildings voiced "a renewed sense of hope, of commitment, a belief that the district cared about what went on in that building," (Corcoran et al., 1988).

In an analysis of teachers' perceptions of their school environment, Gehrke et al. (1982) found that middle school teachers used the environment to control student behavior but not as a curriculum variable. Although some teachers were alert to colors, lighting, space, crowding, or furnishings, few used their walls to teach or reinforce learning. None saw that the school could look far more like a home or office building than it did and still function well. Classroom location had some impact on teachers' social activities and friendship patterns. Gehrke concluded that teachers need guidance in the effects and uses of school space.

Lowe (1990) determined which aspects of the physical environment affected teachers the most. In interviews with State Teachers of the Year, factors such as quality equipment and furnishings, climate control, and acoustics were identified as the most important environmental features. Teachers emphasized that the ability to control classroom temperature is critical to student and teacher performance.

Effects of School Size and Capacity

In addition to concerns over physical aspects of the learning environment, school size and capacity are issues that are receiving increased attention. In New York City, a study of overcrowded schools found that students scored significantly lower on both math and reading exams than did similar students in underutilized buildings. Teachers and students in the overcrowded schools agreed that overcrowded conditions had a negative effect on classroom activities and instruction. (Rivera-Batiz and Marti, 1995).

In a study of urban schools, Corcoran et al. (1988) found that overcrowding and heavy workloads created stressful working conditions that led to higher teacher absenteeism. Overcrowding makes it difficult for students to concentrate on lessons and receive personal attention. For teachers, an overcrowded classroom means an increase in the workload and a decrease in time to implement innovative teaching methods.

Schools are also addressing the multiple concerns of school size, population density, and physical scale of school buildings. A recent investigation of school size and student achievement in high schools found a curvilinear relationship between the two (Lee and Smith, 1997). Student achievement in reading and math was related to school size, with the ideal high school ranging from 600 to 900 students. Students learned less in smaller schools and considerably less in larger schools. Poor and minority students were particularly affected. The greatest negative effects of size were experienced in high schools with enrollments more than 2,100 students. This is particularly disturbing for Georgia, where schools are larger than in many states. Only about 17 percent of secondary students in Georgia attend schools with enrollments less than 900 (NCEF, 2000).

The classic study Big School, Small School (Barker and Gump, 1964) found that small schools (100-150) offer greater extracurricular opportunities than large schools (over 2,000). Factors such as student satisfaction, participation in school activities and organizations, and number of classes taken were all found to be superior in small schools as compared to large schools. Large high schools may also foster feelings of anonymity among students. Close relationships with teachers were found to be the strongest school-based correlate of healthy adolescent behavior (Resnick et al., 1997).

New research sponsored by the Rural School and Community Trust shows that Georgia's smaller schools reduce the damaging effects of poverty on student achievement and help reduce the achievement gap between students from poorer communities and those from wealthier communities. Researchers analyzed 1,626 schools in Georgia using the Iowa Test of Basic Skills for grades 3, 5, and 8, the Georgia High School Graduation Test in grade 11, and the percentage of students receiving free or reduced price lunch. In Georgia, as school size increases, the achievement scores in schools serving children from poorer communities fall on 27 of 29 test scores (NCEF, 2000).

In addition to the research on school size, studies have shown that class size is related to student achievement (Achilles, Finn, & Bain, 1997-98). In grades K through 3, class sizes of about 15 students appear to benefit all students, particularly those who need extra help. Small classes can be provided in the confines of a large school, using the school-within-a-school model. The perception of a small class can also be accomplished with additional square footage. Twenty students crowded into a 700 square foot room may discourage movement and groupwork, whereas twenty students in a room twice that

size might allow a variety of instructional activities to occur simultaneously (Achilles, Finn, and Bain, 1997-98).

If a school facility is uncrowded and in good condition, does that mean it is adequate for the functions that need to be undertaken? Functional adequacy concerns the appropriateness of the physical space for teaching and learning (Duke, 1998). It involves not only the square footage but also how the square footage is configured and organized in relation to other areas. In her study of school environment, Gehrke et al. (1982) found that teachers were most likely to mention the convenience of having a classroom located near the library, a book storage area, or other resource materials. Although some teachers indicated they organized classrooms to support instructional activities, all seemed to readily accept that the school "should look like a school." Their years as students taught them indirectly what schools should be like and how one should use them. By coming to understand how individuals perceive, value, and feel about their learning environments, educators and planners can determine the extent to which a variety of facilities may be required to optimize learning (Gehrke et al., 1982).

Environmental Competence

Learning and the environment are inextricably related. Two aspects of that relationship include learning in an environment and learning about the environment. Too little attention has been given historically to the environment as an object of learning rather than merely the context for learning (Pederson, 1999).

Steele (1973) defines environmental competence as a person's ability to be aware of the surrounding environment and its impact on him and his ability to use or change his

settings to help him achieve his goals without inappropriately destroying the setting or reducing his sense of effectiveness or that of the people around him.

> The thrust here is toward a process which: (a) makes people more aware of the settings around them; (b) inspires them to ask themselves what they are trying to do there; (c) stimulates them to assess the appropriateness of their settings for what they want to experience or accomplish; and (d) leads them to make appropriate changes (in either the setting or their own location, or by leaving it for a better one) to provide a better fit between themselves and the setting. (p. 8)

Most people in our culture tend to be blind to the impact of the physical environment on their day-to-day lives, especially their work lives. Steele (1973) points out that organizational policies pay less attention to the impact of physical settings on behavior than to the impact of the "task" environment – the nature of the work world in which members strive toward their chosen organizational goals. Organizations are a good deal less competent in dealing with spatial decision-making than they are in dealing with product- or service-related decisions. Like individuals, organizations tend to be deficient in basic environmental competence.

As time passes a person is less likely to recognize and deal with the deficiencies in his physical settings. He lacks motivation to think about how an altered setting might produce better experiences for him; in fact, that concept would be meaningless to him (Steele, 1973).

> Even when we are aware of our experiences, we tend to have difficulty relating them to spatial causes; we are blind to the impact of settings. We lack the ability to look at our physical surroundings and their influences on us, and the necessary training is provided by neither our educational institutions nor work organizations. If someone does not know how to change something, he is unlikely to consider changing it. Tables, partitions, chairs, etc., that might be placed in various locations rarely get moved, due to the user's lack of knowledge about the possibilities. If the person feels unknowledgeable, he usually divorces himself from the change process and leaves it to the "experts" who are often even less knowledgeable about his needs. (p. 118)

People often are not clear about what they want or what they are trying to do, thus making it difficult for them to define an "appropriate" setting. Although people may have some notion of what a space should be like, they may be unable to articulate their ideas. The "form follows function rule does not help much if one cannot define the function" (Steele, 1973, p. 118).

Attributing certain aspects of teachers' practice to the constraints in which they work is a very difficult and speculative task. Teachers may not themselves be aware, and therefore cannot give their accounts, of constraints that affect their classroom behavior. Alternatively, they may have been aware at one time of why a particular strategy developed but this may now have come to be an accepted, taken-for-granted aspect of their practice. In addition, teachers' behavior is often the result of several motives and both distant and more proximal constraints that make accounting for their behavior all the more complex (Calderhead, 1984).

In a three-year study on programs for children in day-care centers, Kritchevsky and Prescott (1977) found that space was, in many instances, severely limiting the amount of choice that could be given to children and teachers. Moreover, teachers and directors obviously were unaware of this influence. They also found a relationship between a clear understanding of the influence of physical space and clarity of goals, concluding that an understanding of the ways in which space can shape program goals almost inevitably leads to clarification of these goals (Kritchevsky & Prescott, 1977).

Gehrke et al. (1982) found a similar lack of awareness when she interviewed eleven middle school teachers about their orientation toward and operation in their schools. The interview data indicated that teachers vary in their level of awareness or

sensitivity to the school environment, in their awareness of its effect on them, and in their perception of control over it. Sensitivity to the environment, its effects, and controllability followed a normal distribution pattern with some teachers alert to colors, lighting, space and furnishings and others less so. They also vary in the amount of conscious use they report making of the environment. While they were not always clear about why certain environmental manipulations "work," they were aware that they do work. All seemed to accept that the school should look like a school. "That it might look far more like a home, an office building, or a lounge than it did and still function well, did not seem to be a part of their thinking" (Gehrke et al., 1982, p. 9).

Changeability

In his work on environmental change, Steele (1973) describes changeability as "the extent to which a physical setting can be easily and quickly altered" (p. 87). Movable furniture and changeable wall locations help to provide a manipulable setting where people can take action to change a place and get feedback as to whether their choices were effective for what they were trying to do. A change in the physical space will have an important impact on the quantity and quality of what is being produced, on the kinds of experiences people are having. To assume that the setting's impact is marginal dismisses the problem and makes it difficult to envision what a place would have been like had it been changed (Steele, 1973).

A change in the physical setting, such as painting a wall, is often viewed as irreversible because the notion of settings as ever-changing, evolving, and experimental is unfamiliar (Steele, 1973).

> In most organizations management is unaware of the potential connections between settings and the functioning of the organization. Since they see the

> provision of physical settings as simply another basic chore which is peripheral to the "real" tasks of the system, they lump physical facilities with other services, such as accounting and maintenance. The emphasis is thus put on doing what is most "efficient", i.e. least costly, rather than on what will be most useful for the workers' environment. (p. 138)

The day-to-day repetition of milieu conditions in schools is well known. The possibility exists that milieu change, for its own sake, can be a stimulating experience. For example, new seating arrangements, introduction of privacy booths, and changed learning centers can freshen experience, can energize behavior. The capacity of novelty to alert and to arouse curiosity in children is well-established (Gump, 1987).

Room arrangement and usage can send messages about what is valued. For example, placing chairs in an inward-facing circle, instead of in row-and-column positions, sends a message that discussion is to involve attention to one another's persons as well as to their verbal statements. Provision of a reading niche instead of books at student's desks suggests that reading is a valued activity and that is might be attractive or pleasurable. "Optimum provisions of place and things can suggest program behaviors and program benefits" (Gump, 1987, p.703).

In Gehrke's (1982) study of teachers' perceptions of their school environment, student management arose as the dominant focus of the interviews; curriculum and instruction were nearly ignored. Adjustments to the classroom setting were uppermost in the teachers' minds, while adjustment in the school beyond their own rooms was considered someone else's domain.

> If we try to find evidence that teachers are consciously planning for and using the environment in their efforts to teach a given curriculum, we are somewhat stymied. Most do not indicate that they use the environment, or even see its potential as a curriculum variable (p. 9).

A few of the 11 teachers in Gehrke's study thought about and used wall space in their classrooms for instructional purposes. Unlike primary teachers who seem to use every inch of wall space to teach or reinforce learnings, these middle school teachers provided few alternatives to themselves and the texts as conveyers of content. Students' work related to a particular unit might be placed on the boards, but not as teaching tools. Posters and pictures might be put up, but seldom to convey facts, concepts, or skills. One teacher claimed that he "encouraged inquiry by putting provocative quotations and posters around the room" (p. 10).

Gehrke et al. (1982) reported that some teachers did organize furniture in their rooms to support instructional activities. Teachers mentioned moving students into circles for discussion, clusters for small group work, and straight rows for lecture. The typical arrangement however, was the inevitable straight row, which was meant to assure that "when I'm giving directions, everybody is looking the same way and I have . . their concentration" (p. 10-11). This exemplifies the overriding concern for minimization of disruption rather than maximization of instruction.

The human capacity to make do with minimal milieu provisions often means that optimum milieu arrangements are not developed (Gump, 1987).

> There are clearly healthy and unhealthy buildings in the medical sense, in the psychological sense and in the sociological sense. Our ability to adapt is probably why bad elements of architecture are so widely tolerated. After a while they cease to be noticed by those who are continuously exposed to them. This does not mean, however, that adaptation is without cost to humans. It requires energy to move to a new level of adaptation and it requires energy to stay there. Environmental factors that do not conform to some modal value on each of the perceptual dimensions are expensive to live with; we pay for tuning them out by using more energy or by being less effective in our work or play. (Veitch & Arkkelin, p. 4)

Summary

The literature shows that the quality of school life is heavily determined by the nature of school settings, particularly the interdependent relationships between the goal-directed actions of persons and the behavior settings in which these actions occur. Teachers' perceptions of the environment, school size and capacity, spatial arrangement, and building conditions all contribute to how people react in various environments.

Yet, most users are unaware of the potential connections between settings and the functioning of the organization; few teachers consciously plan for and use the environment. As Veitch and Arkkelin (1995) stated, "The fact that environments wreak relatively little havoc is a tribute to human adaptability. . . users and clients have not fully exploited the potential of present designs, and behavioral scientists have only recently begun to examine the interdependency of humans and their environments" (p. 314). This study seeks a further understanding of the relationship between the physical environment of the classroom and the teachers who work in them. With a clearer understanding of the uses to which the present environments are being put, accommodations in existing space-user relations could be made to provide for a better organism-environment fit.

CHAPTER 3

METHODOLOGY

The purpose of this study was to explore the relationships between classrooms' physical environments and the teachers who work in them. More specifically, this study examined multiple dimensions of the use of classroom space from the point of view of individual teachers in secondary schools. The study reflected the various dimensions of the classroom environment through the examination of teachers' experiences in relation to orientation issues (the individual's perception of space), operation issues (attempts to shape and use the environment), and evaluation issues (judgments made about the environment).

The main question explored through this study was: What are the perceptions and experiences of secondary teachers related to their use of classroom space? These perceptions and experiences were examined in particular with regard to the three modes of: (a) orientation, (b) operation, and (c) evaluation.

Tenets of Qualitative Research

A qualitative design was chosen for this study because it allowed for 1) the collection of data that is rich in description of people, places, and conversations; 2) the investigation of topics in context; and 3) an understanding of behavior from the subject's own frame of reference. Bogdan and Biklen (1998) describe the goal of qualitative research.

> The qualitative researchers' goal is to better understand human behavior and experience. They seek to grasp the processes by which people construct meaning

> and to describe what those meanings are. They use empirical observation because it is with concrete incidents of human behavior that investigators can think more clearly and deeply about the human condition. (p. 38)

Guba (1978) describes qualitative methodology in education as naturalistic because the researcher frequents places where the events being studied naturally occur. Naturalist inquiry is characterized by observation, discovery and selection under natural conditions rather than intervention and manipulation of variables in a controlled setting. The data are gathered from people engaging in natural behaviors such as talking, listening, and working. "A qualitative study of people in situ is a process of discovery" (Lofland, 1971, p. 4). It is, necessarily, a process of learning what is happening.

The objective in this study was to understand the relationships between classrooms' physical environment and the teachers who work in them. As such, a qualitative research design that focused on thorough descriptions provided by participants and interpreted by the researcher, was an appropriate methodology.

Role of the Researcher

Spindler (1982) stated that qualitative methods of inquiry and observation must not disturb everyday interaction and communication in the setting being investigated. Since participant observation is identified as central to most approaches in qualitative research (Wolcott, 1999), the general guideline, as suggested by Lofland et al. (1984), is to be inconspicuous and inoffensive in the setting. Wolcott (1999) addressed the inherent paradox of the role of participant observer.

> As a general guideline, it seems preferable to stay on the cautious side, becoming only as involved as necessary to obtain whatever information is sought. Operating with that level of restraint allows a researcher to help everyone else to remain conscious of the research *role* as the work continues, rather than risk having someone later complain about having been misled by a pretense at involvement. (p. 48)

Throughout the research process, I assumed the role of a passive participant and interviewer. "The ethnographer engaged in passive participation is present at the scene of the action but does not participate or interact with other people to any great extent" (Spradley, 1980, p. 59). However the researcher's training, predispositions, and doctrines, i.e. their subjectivity, will undoubtedly affect what is perceived as central and what is considered accessory. "All researchers are affected by observers' bias" (Bogdan & Biklen, 1998, p. 34); therefore, they should attempt to seek out their own subjective states and the ensuing effects on data. The goal, according to Bogdan and Biklen (1998) is "to become more reflective and conscious of how who you are may shape and enrich what you do" (p. 34).

The methods researchers use aid in the process of transcending biases. Researchers spend considerable time collecting and reviewing piles of data that provide a "much more detailed rendering of events than even the most creatively prejudiced mind might have imagined prior to the study" (Bogdan & Biklen, 1998, p. 34). Crotty (1998) suggests that to the best of one's ability the researcher's own knowledge and presuppositions should be "bracketed" (p. 83) so as not to taint the data with previous understandings. The experience of the phenomena should be allowed to speak to us first-hand.

Several steps were taken to avoid tainting the data. First, I assumed the role of passive participant, remaining as inconspicuous as possible during all classroom observations. Second, I responded to my interview guide by participating in a bracketing interview conducted by a colleague. Third, I addressed my own subjectivities in a formal statement.

Researcher's Subjectivities

I brought to this study 21 years of experience as a teacher and administrator, my professional education and knowledge, findings from previous research, and my own curiosity and interest in teacher education and the process of teaching. Specific to this research, I brought experiences from a variety of classroom settings that were both spacious and cramped, modern and antiquated, windowed and windowless, instructionally supportive and poorly planned. As an administrator, I am familiar with the curriculum and instructional needs of the secondary school. I have worked with architects and builders on new construction and renovation projects where, in spite of my best efforts, curriculum objectives and teachers' concerns were disregarded in the design process, resulting in facilities that failed to support instructional needs.

I see as included in the teacher's role the responsibility of managing the learning environment. Not only should teachers be responsible for the learning and development of their students, they should be responsible for creating a supportive environment where learning and development can take place.

Use of physical space in the classroom is an important component in the classroom environment. The organization of space through the arrangement of desks, centers, or work areas indicates to students how a teacher views learning. When used well, physical space and physical resources can enhance learning and contribute effectively to classroom instruction.

Selection of Participants

This study was designed to investigate classrooms' physical environments as seen through the eyes of successful teachers. Secondary classroom teachers were the central concern in this study; specifically, six Georgia teachers who teach in grades 6 through 12.

Secondary teachers were selected for two reasons: (1) the challenge that secondary teachers face in adapting their classroom environment to the instructional needs of multiple classes that flow through their room each day, and (2) the researcher's familiarity with secondary curriculum and instruction. Purposeful sampling was used to select participants who were veteran teachers with experience in a variety of classroom settings.

Because this study required participants to reflect on their experiences in using classroom space for instruction, it was preferable to interview teachers who have participated successfully in a reflective process. Therefore, the researcher chose to study teachers who have received certification from the National Board of Professional Teaching Standards. There were two reasons to use this group: (1) they were easily accessible and, (2) as Board-certified educators, they have already shown their ability to reflect on their classroom environment and instructional practices.

The six participants in this study included:

- One male and five females
- One urban teacher, three suburban teachers, and two rural teachers
- Two teachers with middle school experience only, one teacher with high school experience only, and three teachers with both middle and high school experience

Dee (pseudonym) had been teaching for twenty years in the same county at the time of the interview. The first two years of her career were at the elementary level until a position became available in the sixth grade at a near-by middle school. For 17 years Dee taught language arts and social studies at the county's oldest school where she lived through numerous lengthy renovations. The past year she taught at a new school on a two-person team. After only a few months in the new facility the principal told her she and her teammate would be relocated the following year due to overcrowding.

Karen (pseudonym) was a 30-year veteran who spent her entire career at the middle school level in three southern states. She came into teaching "by accident" when an administrator at the school behind her house asked if she would teach a small group of special needs children. At the time, Karen was a stay-at-home mother, so the students walked from the school through the back yard to Karen's kitchen where they took their mathematics lessons at her kitchen table. After the death of her husband Karen earned her teaching credentials and relocated to Tennessee where she taught in an open classroom school, an experience that positively impacted her teaching philosophy. Karen was the only participant in this study who had "served time" in a trailer classroom.

Dave (pseudonym) came into teaching through the back door. After completing a B.S. in Biology at UNC in Chapel Hill he went to work selling hospital equipment and then computer equipment. After seven years in the business world he admitted he was very unhappy. Feeling that he "just wanted to teach" he got a provisional certificate and started teaching science at an urban high school. Three years later, he moved to a middle school where he has continued to teach science for 12 years.

Anne (pseudonym) was in her 10th year of teaching when she was interviewed for this study. She taught mathematics at a rural high school for two years before moving to the middle school. As a certified math teacher she was shocked when the middle school principal asked her to teach one class of geography. For seven years she worked at an old dilapidated middle school, a "rough environment," before moving to a new building.

Jane (pseudonym), a 30-year veteran, spent her entire career teaching in rural high schools in south Georgia. As a science teacher, she specialized in biology and physical science, emphasizing active student involvement through laboratory experimentation. Over the years, Jane was recognized for outstanding teaching on numerous occasions, receiving several STAR teacher awards, a Tandy Scholar award, and three county Teacher of the Year awards.

Lynn (pseudonym) has been in education for 28 years, six at a middle school and the remaining 22 at the one high school. During all that time she taught social studies courses, including U. S. History and Economics. Because she taught all levels of students from Study Skills classes to Advanced Placement, she learned to actively involve her students and to be creative with her lessons. Outside of school, Lynn participated in historic re-enactments, an activity that gave her ideas for her classroom. For her history classes she has portrayed over forty different figures from various time periods.

Data Collection

In this study, interviewing was the dominant strategy for data collection in conjunction with participant observation. Data in the form of formal and informal interviews were collected to determine the perceptions and experiences of secondary

teachers related to their use of classroom space. Interviews created opportunities within which the secondary teachers expressed their experiences and perceptions. Observational data allowed for understanding a phenomenon in a way and to a degree that was not entirely possible using only insights and information obtained through interviews.

Interviewing

An interview can be defined as "a purposeful conversation, usually between two people but sometimes involving more, that is directed by one in order to get information from the other" (Bogdan & Biklen, 1998, p. 93). According to symbolic interactionist theories (Blumer, 1986) the use of descriptive accounts from the actors is a preferred method of data collection. It is appropriate for this study because the purpose of the research and the purpose of interviewing are related and compatible. The purpose of this study is to understand the relationships between classrooms' physical environments and the teachers who work in them. The purpose of an interview is:

> . . to allow us to enter the other person's perspective. We also interview to learn about things we cannot directly observe. We cannot observe everything. We cannot observe feelings, thoughts, and intentions. We cannot observe behaviors that took place at some previous point in time. We cannot observe situations that preclude the presence of an observer. We cannot observe how people have organized the world and the meanings they attach to what goes on in the world. We have to ask people questions about those things. (Patton, 1987, p. 109)

The interview process is used to gather descriptive data in the subjects' own words so that the researcher can "add an inner perspective to outward behavior" (Patton, 1987, p. 109). It is the goal of this study to gain perspective into the teachers' behaviors concerning the use of classroom space.

By selecting interviewing as an appropriate data collection strategy, the researcher's task is then "to provide a framework within which people can respond

comfortably, accurately and honestly to open-ended questions" (Patton, 1987, p.109). In qualitative research this interview framework can vary along a continuum from structured to unstructured (Bogdan & Biklen, 1998; Patton, 1987).

Patton (1987) offers an extensive review of the development of the interview framework. Three types of interviews are identified: (1) the informal conversational interview, (2) the general interview guide approach, and (3) the standardized open-ended interview. These three approaches differ in the degree to which the interview questions are determined and standardized prior to the interview.

In an informal conversational interview, questions arise spontaneously in the natural flow of the interaction. Since questions are not predetermined, participants play a stronger role in defining the content and direction of the interview, resulting in interview questions that change over time. This approach requires a great deal of time for data collection and it results in highly individualistic data that are more difficult to analyze.

The interview guide approach utilizes a list of prepared questions or issues to be explored during the interview. Although the order or wording of the questions may vary from interview to interview, the guide is prepared to make sure that essentially the same questions or issues are discussed with each participant. By providing a focus for the interaction, the guide helps the researcher best use the allotted interview time. It also allows for a more systematic and comprehensive approach across the various interview sites. While it does allow for other questions and issues to emerge, an interview guide may be hampered by the omission of important topics.

In a standardized open-ended interview each participant responds to the same carefully worded questions in the same order. Interview questions, including follow-up

questions, are written in advance exactly as they are to be asked. Standardized open-ended interviews minimize the effects of the interviewer and allow for maximum use of time. In addition, data analysis is easier. However, this approach limits flexibility in pursuing different questions with different participants or in exploring different topics that emerge during the interaction.

The particular type of interview approach chosen for a study should be based on the research goal (Bogdan & Biklen, 1998). For this study, an interview guide was used to address the research questions. The use of an interview guide allowed for the collection of comparable data across subjects (Patton, 1987), and, therefore, was an appropriate approach to use.

The key to collecting good data from interviewing is asking good questions (Merriam, 1998). Five dimensions related to questioning need to be considered when designing and conducting interviews for the purpose of data collection: "what questions to ask, how to sequence questions, how much detail to solicit, how long to make the interview, and how to word the actual questions" (Patton, 1987, p. 115). Each of these dimensions will be briefly examined.

Patton (1987) has identified six types of questions: experience/behavior, opinion/belief, feeling, knowledge, sensory, and background/demographic. The researcher can use these categories to organize the type of information desired and to formulate actual interview questions. Patton (1987) also offers guidelines for the sequencing of questions. Interviews should begin with non-controversial questions that require descriptive answers. Following the description of the experience or activity,

questions requiring interpretations, opinions, and feelings can be asked. This sequence establishes a context and helps increase the accuracy of the response.

The time frame of the question should also be considered when sequencing questions. Typically, questions about the present are easier to respond to than questions about the future. Therefore, a question related to present activities and experiences should be asked first to establish a baseline for comparison, followed by questions about the past and then the future. In addition to the time frame of the question, the researcher must control the amount of time allotted for the interview. Interviewers maintain control by knowing the purpose of the interview, asking the right questions, and giving appropriate verbal and nonverbal feedback (Patton, 1987).

"The way in which questions are worded is a crucial consideration in extracting the type of information desired" (Merriam, 1998, p. 76). In qualitative research good questions should be open-ended, neutral, sensitive, and clear (Patton, 1987). Truly open-ended questions permit participants to choose their own words and take whatever direction they want.

Probes, an interview technique used to go deeper into the responses (Merriam, 1998), add to the richness of the data and give cues to the interviewee about the desired level of response. Probes can be used to elaborate, clarify, or provide additional details in a conversational style.

To help insure the collection of good data in this study, the guidelines offered by Patton and Merriam regarding the type, sequence, and wording of questions were followed in the development of the questions and probes to be used in interviews.

Formal and informal interviews were conducted during the data collection phase of this study and were the primary data source for this research. Using an interview guide, data were collected through single formal interviews with each of the six teachers and through a number of informal interviews. In the formal interviews the researcher interviewed each of the middle school teachers individually. The interview guide was as follows:

1. Think about the learning environment where you currently teach and tell me about it.
2. Think about the instruction that occurs in that space and tell me about it.
3. Tell me about the effect of the space on your instructional decisions.
4. Tell me about the most important features of your classroom.
5. Tell me about the changes you have made in your classroom.
6. Tell me how you feel about this classroom (and others where you have taught).
7. Think about another learning environment where you taught and tell me about it.
8. Tell me about the things you did in that space that you no longer do in your current space.
9. What are the helps and hindrances you experience in this classroom (and in others where you have taught)?
10. If you were designing a classroom what would you want?

Informal interviews took place at various times, including after classroom observations and as a follow-up to the formal interview. There were several purposes for the informal interviews: (1) to collect personal and professional background information from the teachers, (2) to gather additional background information related to the study, and (3) to collect information to help refine the focus of this study. All formal interviews were tape recorded to insure an accurate account. As soon as possible following the interviews, the tapes were reviewed and transcribed by the researcher.

Additionally, field notes were made both during and immediately following the formal interviews to supplement the data collected during the interaction. These notes

contained an account of the verbal and nonverbal information from the interviews including body language, gestures, the physical environment, impressions, and insights from the researcher. Notes were also made following the informal interviews.

Observation

Observation was the secondary data collection technique in this study. Observational data was used because it allows for understanding a phenomenon in a way and to a degree that is not entirely possible using only insights and information obtained through interviews.

Personal contact with and observations of a phenomenon in its context has advantages as a data collection technique. Observations allow for greater understanding of the context in which the events occur, provide direct experience with the program, make available information that may otherwise be unavailable or taken for granted by participants, present a more comprehensive view of the phenomenon, and allow the evaluator to form impressions and feelings critical to data interpretation (Patton, 1987).

In this study the researcher observed the teachers in their classrooms to gain a better understanding of the context in which they work, to have direct experience in the classroom environment being studied, to gain access to information that might otherwise be inaccessible, and to seek a more comprehensive view of the individual teachers and the context in which they work. Six formal observations were conducted, one in each participant's classroom. The length of the formal observations ranged from sixty to ninety minutes. Informal interviews were conducted when the researcher was on campus to conduct observations. All observations were overt, with the full knowledge and

agreement, both oral and written, of the teacher and school administration. Further, the researcher acted only as an observer and did not participate in any classroom activities.

During and following the classroom observations, detailed field notes were written to record what happened. In qualitative research these notes express "the written account of what the researcher hears, sees, experiences, and thinks in the course of collecting and reflecting on the data in a qualitative study" (Bogdan & Biklen, 1998, pp. 107-108). Field notes usually include verbal descriptions of the setting, people, and activities; direct quotations or the substance of what was said; and researcher's comments on feelings, reactions, hunches, or initial interpretations (Merriam, 1998). These notes are the raw data from which the study's findings emerged.

Data Analysis

In qualitative research, the goal is to better understand human behavior and experience. Researchers seek to grasp the processes by which people construct meaning and to describe what those meanings are. The culminating activity in that process is not data collection but the analysis, interpretation, and presentation of findings (Patton, 1990). It is through the process of data analysis that the researcher makes sense out of the data (Merriam, 1998).

> Data analysis is the process of systematically searching and arranging the interview transcripts, field notes, and other materials that you accumulate to increase your own understanding of them and to enable you to present what you have discovered to others. Analysis involves working with data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others. (Bogdan & Biklen, 1998, p.157)

Typically, there is not a precise point where data collection ends and analysis begins. One of the hallmarks of qualitative design is that the tasks of data collection and

analysis are simultaneous (Merriam, 1998; Patton, 1987). With the first interviews and observations, analytic insights and hunches direct the next round of data collection, leading to refinement of the questions in an ongoing, interactive process. The overlapping of data collection and analysis, when implemented carefully, improves the quality of data collected and the quality of the analysis (Patton, 1987).

Bogdan & Biklen (1998) suggest several techniques to aid the process of data analysis in the field: make decisions that narrow the focus of the study; use previously collected data to plan future data collection sessions; write memos about what you are learning; read literature; and explore metaphors, analogies, and concepts. Researchers are advised to speculate, to write and to review the data during the data collection process (Bogdan & Biklen, 1998). These techniques were employed during the analysis of data in this study.

When the data collection has ended, a period of intense analysis begins. In this process, the data are consolidated, reduced, and to some extent, interpreted (Merriam, 1998). The researcher brings order to the data, organizing it into patterns, categories, and basic descriptive units (Patton, 1987).

Developing coding categories is a crucial part of the process of analysis. Coding involves condensing the bulk of the data sets into analyzable units by creating categories with and from the data (Coffey & Atkinson, 1996). Particular research questions and theoretical approaches may suggest certain coding schemes (Bogdan & Biklen, 1998). No matter what coding and sorting techniques are used, the goal is to make the data manageable and to retrieve the most meaningful bits of the data. "The important analytic

work lies in establishing and thinking about such linkages, not in the mundane processes of coding" (Coffey & Atkinson, 1996, p. 27).

Categories or themes develop by looking for regularities in the data. One unit of information is compared with the next to determine which units of information go with each other (Merriam, 1998). The number of categories depends on the data and the focus of the research. When complete, the categories should have a minimum of unassignable data items, be relatively free of ambiguity, and make sense in the light of the data (Merriam, 1998).

In qualitative research the data is usually analyzed inductively (Bogdan & Biklen, 1998). In this approach the researcher attempts to make sense of the situation without imposing pre-existing expectations on the phenomenon or setting under study. Theory, emerging from the bottom up, is grounded in the data rather than imposed a priori through hypotheses or deductive constructions (Bogdan & Biklen, 1998; Glaser & Strauss, 1999; Patton, 1990).

Storytelling and narrative accounts are used by qualitative researchers as mechanisms for collecting and interpreting data. "The storied qualities of qualitative textual data . . . enable the analyst to consider both how social actors order and tell their experiences and why they remember and retell what they do" (Coffey & Atkinson, 1996, p. 57). By relating "how it all happened," social actors organize their life experiences, making sense of them. These experiences provide information about the individual's perspectives in relation to the wider social grouping or cultural setting to which they belong. The analysis of narratives is a way of examining not only the key actors and events but also the cultural conventions and social norms (Coffey & Atkinson, 1996).

Inductive Analysis was the strategy employed to analyze these qualitative interviews. In this approach, a standard coding and categorization method was used. The narratives were first pulled apart through the coding process. Then, coded data was grouped into categories. Finally, the categories were analyzed to identify specific themes and reassembled in a format that shows the themes common to all the stories. In this way the integrity of each individual story is maintained while the common threads are revealed.

Prior to beginning formal analysis, all data were organized to facilitate the process of locating units of data. All transcribed interviews were copied onto backup disks, photocopied, organized in labeled folders and read in their entirety multiple times by the researcher.

Segments that stood out or seemed critical were highlighted and notations were made in the margins of each transcript. These segments, or units of data met two criteria identified by Lincoln and Guba (1985). First, they revealed information relevant to the study and stimulated abstract thinking about the phenomenon being studied. Additionally, these units were the smallest stand-alone pieces of information about something and could be interpreted without additional information.

Segments that were identified as potentially relevant or important to the study were coded to indicate the participant and the line number of the transcript. This permitted the researcher to easily locate each segment in the context of its original transcript when necessary. The coded segments were then cut and pasted into computer documents. The researcher used codes extracted from the first transcript to see if they were present with the next set of data. Lists of comments and terms from one transcript

were compared with other transcripts and then compiled into a master list of recurring patterns. Categories emerged from repeated analysis of the patterns in the data.

Reliability, Validity, and Generalizability

The traditional quantitative approach to research, which rests upon the positivist perspective that seeks a universal "truth," has always been concerned with issues of reliability, validity, and generalizability. Quantitative research, then, must demonstrate that an investigation has measured what it intended to measure, that the same results would be achieved if the study were repeated, and that the results may be applied to other groups.

In contrast, the emphasis in qualitative research is the existence of multiple realities. Therefore, it does not seek to reveal a universal "truth." Wolcott (1994) noted that qualitative research has "a quality that points more to identifying critical elements and wringing plausible interpretations from them, something one can pursue without becoming obsessed with finding the right or ultimate answer, the correct version, the Truth" (pp. 366-367).

Due to the philosophical differences of these research approaches, different methods of establishing trustworthiness in research findings are necessary. According to Firestone (1987):

> The quantitative study must convince the reader that procedures have been followed faithfully because very little concrete description of what anyone does is provided. The qualitative study provides the reader with a depiction in enough detail to show that the author's conclusion 'makes sense.' (p. 19)

Merriam (1998) points out the need to adhere to standards of trustworthiness throughout the research process: "Studies must be rigorously conducted; they need to

present insights and conclusions that ring true to readers, educators, and other researchers" (p. 199).

In this qualitative research, I was interested in accurately and honestly presenting the thoughts and opinions of the teachers in this study. Several strategies were incorporated to demonstrate validity, reliability, and generalizability of the findings.

Reliability

Since reliability rests on the assumption that there is a single reality and that examining it repeatedly will produce the same results (Merriam, 1998), the concept of reliability is at odds with the philosophical underpinnings of qualitative research. Qualitative researchers, who believe in the existence of multiple realities, would not expect repeated study to necessarily result in the same findings. Lincoln and Guba (1985) suggest that rather than getting the same results, researchers should think about the "dependability" or "consistency" of the results obtained from the data and whether the results make sense.

Merriam (1998) suggested several techniques to ensure the dependability of results. I incorporated several of these strategies in this study.

The investigator's position. In order to provide evidence that the interpretation of data is reasonable, the researcher must explain the assumptions and theoretical perspectives that support the study. Descriptions of the participants, including the researcher's relationship to them and the criteria used for selection, should be explained. The theoretical perspective bused in this study and a description of the participants were addressed in previous sections of this paper.

Triangulation. The consistency or dependability of findings may also be affected if multiple sources of data are used. In this investigation, data were collected through interviews, observations, and the review of audiotapes from meetings with the teacher participants.

Audit Trail. An audit trail is created when a researcher provides details concerning data collection, category derivation, and decision-making. This allows independent judges to authenticate the findings by following the trail of the researcher (Guba & Lincoln, 1981). For this study, an audit trail was accomplished through the maintenance of interview transcripts, correspondence, detailed notes, and drawings made by the researcher.

Pilot study. In 2000, a pilot study was conducted with two suburban middle school teachers. This study was conducted to obtain feedback on the interview guide and to assess my skill as an interviewer. Pilot study procedures were identical to the subsequent research study with the exception that I asked the pilot study participants to evaluate the interview guide's effectiveness in addressing the research question and to provide feedback to me on my interviewing skills.

Validity

Merriam (1998) suggested that qualitative research has the ability to yield particularly valid results due to the acknowledgement of multiple realities:

> Because human beings are the primary instrument of data collection and analysis in qualitative research, interpretations of reality are accessed directly through their observations and interviews. We are thus "closer" to reality than if a data collection instrument had been interjected between the participants and us. Most agree that when reality is viewed in this manner, internal validity is a definite strength of qualitative research. (p.203)

Several of Merriam's strategies were incorporated into this study to ensure validity, including those listed below.

Triangulation. As stated previously, this study achieved triangulation through the use of multiple sources of data, including audiotapes, formal and informal interviews, and individual classroom observations. Communications with participants also provided the researcher with opportunities to review findings with them and see whether reasonable conclusions had been reached.

Member checks. Member checks occur when data and tentative interpretations are taken back to the people from whom they were derived. Participants in this study were provided copies of the data after the interviews occurred and were later given copies of preliminary findings to see if the results were plausible.

Peer examination. This strategy can bolster validity by allowing the researcher to address issues concerning the study with individuals other than participants. In this study, three colleagues, all doctoral students at the University of Georgia, were asked to comment on the findings as they emerged.

Researcher's biases. The assumptions, philosophies, theoretical orientations, and biases of the researcher were acknowledged and addressed so they would not interfere with an accurate and honest portrayal of the participants' perceptions of the phenomenon being studied. At the start of the study, I developed a written statement that acknowledged the biases that guided me. During the course of the work, the written statement was reviewed for potential changes that may have occurred during the investigation.

Generalizability

Research is often examined for its ability to generalize to a larger population or to a specific group of individuals. Findings are determined to be relevant if they are applicable to others.

In this study, the researcher sought to understand the perceptions of a group of six teachers. The extent to which these findings can be applied to other populations is dependent on the people in those populations (Merriam, 1998). Although the perceptions of the six participants may be indicative of similar groups of secondary teachers, the results of this study cannot be generalized to other teachers by this researcher. To enhance the possibility of user generalization, several strategies were included in the study to address this issue. The inclusion of participants from multiple diverse sites around the state was used to enhance the transferability of the findings. In addition, predetermined questions and specific procedures for coding and analysis were used.

Limitations

As with all research, the methodology selected for use limits the study. Qualitative research has a number of conventions that could pose problems. Typically, the same individual collects the data and presents an analysis of it. Limitations deriving from researcher characteristics or personal predilections are, at times, unavoidable and may restrict access to data. The special relationships that researchers develop during fieldwork are critical to the depth and breadth of information they acquire.

In defining the scope of the problem I investigated, I chose to study only secondary teachers who had achieved certification from the National Board of Professional Teaching Standards. Subjects taught by these teachers included science,

social studies, and mathematics. English and other elective courses were not included, a possible limitation in the study. Whether the views expressed by these teachers or the findings emanating from this inquiry apply to non-Board-certified secondary teachers or to other groups of teachers cannot be established without further research.

Although I have tried to be clear as to my own personal perspectives and how they influenced both the conduct of the research and the analysis of the data, researcher bias remains a limitation. Consumers of this study must judge the applicability of one case to another.

Summary

In this research I addressed the question: What are the perceptions and experiences of secondary teachers related to their use of classroom space? To pursue this question, the research was framed within the perspective of symbolic interaction, which suggests that meanings are handled in, and modified through, an interpretive process used by individuals in dealing with the things they encounter. Using interviews and observations as the qualitative data collection method, the study created opportunities within which the National Board-certified secondary teachers expressed their experiences and perceptions.

Using inductive analysis, the teachers' interviews were pulled apart and analyzed through repeated phases of coding and comparison. To promote reliability and validity of my analysis, I used a pilot study, triangulation, peer examination, and member checks.

CHAPTER 4

SUMMARY OF FINDINGS

The purpose of this study was to understand the relationships between classrooms' physical environments and the teachers who work in them. More specifically, this study addressed the question: What are the perceptions and experiences of secondary teachers related to their use of classroom space?

First, this summary examines teachers' responses concerning the classroom's physical environment, particularly the amount and arrangement of classroom space, wall space, storage, light, and physical condition in rooms utilized by each participant. In the second part, teachers' comments regarding the effects of the classroom environment on planning and instruction, on students, and on teachers are reviewed. Part three examines teachers' recommendations related to design and utilization of classroom space.

Part 1: Perceptions of the Classroom's Physical Environment

Amount of Space

When teachers talked about their classrooms, they used terms such as "scrunched," "crammed," and "horrible" to describe the amount of space. Only one teacher felt the size of the room was adequate, although the configuration of the room was problematic for her. For the others, "small" was the term most commonly used to describe instructional space in their current or previous classroom.

Karen, the only teacher with experience in a modular classroom, described her current classroom as "the smallest room I've ever worked in except for a trailer." (Appendix D) Teaching in a classroom trailer was difficult for her.

> It was the first time I'd ever been in a trailer as a classroom. My desk was on one end. It was very narrow, very long and narrow. I had twenty-eight students in the class, I remember, and the desks were completely scrunched. And that was just horrible for me.

To get a little more space, Karen allowed the students to sit and work on the steps leading up to the trailer. Leaving the door open also made the room look bigger.

In addition to teaching in a trailer, Karen also taught in an open space classroom, an experience she said she "loved" in spite of the derogatory things she had heard about that environment. For Karen, the open space classroom "was great because we had more room to group and you could have more students working on an activity." The larger space provided more opportunities for learning centers and more places to put students.

Small classrooms were the norm throughout Dee's teaching career. In her previous school, an overcrowded, outdated building, existing classrooms had been subdivided during a lengthy renovation process. Dee stated,

> I think they did the best that they could without adding more space. Instead of adding more square footage to the wings that were already there they just gutted them and then reconfigured them as best they could. So you ended up with really small rooms and really big rooms they tried to create for science labs.

In the new middle school where Dee taught, the room was still small due to the built-in bookcases that lined the length of one long wall. Although the shelves were "very nice for displaying things" they took up valuable floor and wall space (Appendix B). As a result, she had minimal wall space for hanging student work and "there is very little you can do to rearrange the room." Because she found her new classroom "a little

bit confining," she sent students out into the hall in order to accomplish the group work she liked to do in class.

Anne used a different strategy for dealing with inadequate classroom space. She removed her desk. In a classroom of thirty-two large students she decided that she could do without the desk to make more room for the students.

> I thought, the focus here is students. Let me take that out. A lot of teachers ended up doing that. They took the teacher desk out just to try to create a bigger looking environment.

Anne looked for ways to seat students so they would have enough space to do what they needed to do and not "feel like they were on top of one another." She changed the student furniture, swapping traditional desks for tables because "it did open up a lot more space." For Anne, the extremely overcrowded situation was so difficult that "some days it would get next to you."

Classroom space became a problem when class size increased for Dave and Jane. When he had 26 students in his science room, "it was so crammed full" that Dave had to bring in tall wooden stools for students to sit at the lab counters. In Jane's science room, having 28 students made it "hard to position everybody so they could see the board or see the TV" and it "gave them very little room to move around for lab." The addition of twelve new classroom computers and computer tables also took away valuable floor space needed for movement around Jane's lab (Appendix C).

> Being crowded limits mobility, that's the main thing. And with teenagers they don't usually want to crowd together and be close to each other. They don't want someone else bumping into them or touching them. That is a problem with high school students. They want their space. So we need to provide them with adequate space.

To get around the space problem, Jane considered the use of space in her instructional plans. She set up lab activities that could be done either at the lab counters or at student desks. She also installed hooks for lab aprons in three separate locations around the room to avoid crowding.

Lynn also considered classroom space when planning for instruction. Her long, narrow social studies classroom formerly housed the school's language lab. Although the overhead drop-down equipment was removed during renovation, the raised dais in the front of the room remained. She creatively used the area for student presentations and for her 40 different costumed reenactments of historical figures. Lynn told students she would put a throne on the raised dais when she portrayed Queen Elizabeth.

For Lynn, the size of the room did "make it difficult to get from the front of the classroom to the back and make sure that I interact with everybody." However, the room size did not limit her instructional plans.

> I've had as many as 36 students in this room and when it's wall to wall students it's difficult to break into groups. But I did it. I knew it was important to be able to teach the way I wanted to teach. Interestingly enough, every one of the students passed their Georgia High School Graduation Test in social studies. It taught me a lot because initially I thought, with 35 or 36 kids in this classroom I can't do the things that I normally do.

Lynn's room was also unique in that the door to the central electrical system for the entire building was at the front of the room. Although the door was "usually locked," there was some concern on her part that "we might be targeted if anyone wanted to take control of this floor because they would have control of the electricity." No incidents involving that area have occurred since Lynn moved into the room, but it was obvious that she was not comfortable with the arrangement.

Wall Space

In addition to their comments about the amount of space available for moving about the classroom, teachers also discussed the amount and use of wall space in their rooms. For some, the walls are an important feature, one they use to their advantage in instruction.

In spite of the cupboards, windows, and whiteboards that occupy most of the wall space in Dave's classroom, he managed to display science-related charts and posters in any available location. It was part of his overall instructional philosophy to display objects that get students excited about the subject they're studying. Dave felt strongly that it was "important for teachers not only to decorate their room but also to have it change out a little bit." For Dave, going into a classroom that remained the same every day sent a message.

> We sometimes have our faculty meetings in different rooms in the building and to go into a room where it looks like it's been stripped, just the bare walls, there's no personality in there. It feels like an institutional type room. Then to go into a room where they've really tried to decorate, bulletin boards and stuff, I just feel like OK I'm ready to learn now. You go down to Georgia State and take a class in those awful looking classrooms and then you go into a classroom where the teacher has really tried to do something with it and you just feel something. That they care and that they're really into their subject. And you're just turned on more.

Anne also liked to look at things on walls rather than drab, empty space. In her previous school she "just put everything up on the walls that I owned" to make her outdated room more cheerful and inviting. Like Dave, she noticed the difference between her classroom and others in the building. At the end of the school year after she had taken everything down from her walls, teachers meeting in her room were struck by the change. "They had honestly not realized that there were things in here that made the

classroom look cheerier. A couple of them said, well, maybe I need to get a few posters or something."

Everything Anne put on her walls was "a learning experience" for the students and "it showed them that I cared about my work space." In her classroom at a new middle school, she continued to "have lots of stuff on the walls." A large bulletin board displayed student-made string art, interactive math problems, and a display of famous mathematicians. Three motivational posters and two math-related posters also hung on the walls around the room. Anne made a point to comment on what was up and she used these displays during instructional discussions.

Lynn used her bulletin board "not just to teach but to motivate- in fact, I use my whole room for that." Fifty-two motivational and humorous posters were on display on the day of this observation. Her extensive use of posters was prompted by a comment she heard.

> I had a teacher in college one time that said, "On your best day some student is going to turn you off. You should always have something on the wall that is going to be uplifting. Let them read, let them look at it, let them think."

Dee admitted that, "basically the charts and things that I have pretty much stay up all year." She occasionally put up information or a poster on a unit they were studying in social studies, but she did not see herself as an "artsy" teacher, like those who do interactive types of things with their bulletin boards. "I've just never done much of that." Built-in bookcases on one entire wall made space somewhat limited. "Because I don't have a lot of wall space I guess I don't worry about covering it very much since everything else is pretty busy."

Jane had a room with three large bulletin boards, a feature she did not like. "I don't have time to do bulletin boards so keeping something fresh and new on them was a challenge. I don't do a bulletin board with a theme and so forth. That's just not my teaching style." She had one bulletin board in her current room where notices and pictures of students were posted. On the other walls she hung motivational posters that remained up most of the year.

Like Jane, Karen had a single bulletin board with non-instructional displays, including commercial, seasonal cutouts and newspaper clippings of school events and announcements. Seven motivational posters and several assignment charts hung on the walls. Karen used part of her cream-colored cement block wall as a screen for the overhead projector. When asked to describe how she used wall space, Karen was hesitant and then admitted she didn't know. "I guess for measuring things when we talk about perimeter and area, perpendicular and parallel lines in the ceiling and on the walls with the concrete blocks. I can't think of another way."

Storage

Three teachers identified storage as a major problem in their present classroom. Due to the amount of equipment needed for their instructional programs, the two science teachers, Dave and Jane, were the most vocal about their need for more storage space.

"Every year I try to think of something that will make it easier in here," Dave said, whether it's taking down the boxes stored on top of the wall cabinets or figuring out a different way to store things. "The biggest problem is my storage, I just don't have enough." Because his students did not have lockers, they stored their materials in his room. To accommodate them, Dave converted the space under the lab counters into

shelves for holding students' supply tubs. Opening the under-counter cupboard doors revealed shelves packed with students' belongings that "are not allowed in the halls because of the fire code." It took up a lot of space that could have been used for storing science equipment. The displaced equipment had to be moved elsewhere.

> We don't have a storage area like the high schools have, storage rooms where they can keep their science supplies. So I had them build that case back there and I keep microscopes there and more chemistry supplies in that other cabinet. We're just crammed in here.

Dave created a storage area in the front corner of his room by constructing floor-to-ceiling wooden shelves concealed behind a wall he built. This new area gave him much-needed storage but it created an unusual configuration in the room by taking a chunk from the corner of the room. Although adding this new space provided some relief, it did not completely solve Dave's problems.

> I would say that storage inhibits me in some ways. But I've worked around it. I have a big basement at home so I have stuff there. When I want to do the activity I have to bring it here. It's not a big deal but it would be easier if I had that here. I have the advantage of having a big basement. If I were in a small apartment I wouldn't be able to do that.

Like Dave, Jane had a need for additional storage for her science equipment. Her high school classroom had cabinets for glassware, triple beam balances, mass sets and calculators. In addition, she had an attached storage room for larger equipment. The room was "so cluttered and crowded" because "there are a lot of things that take a great deal of space in order to have an adequate number for all of my lab groups." Watching the way Jane's students moved easily around the room picking up supplies and completing tasks, it was obvious that they were frequently engaged in laboratory activities. Because her instructional philosophy was to have students actively involved, it followed that she needed space to house a large quantity of supplies. "Science teachers

just need lots of storage space. If they do labs as they should there is just a lot of lab equipment that's required and it takes a lot of space."

Like Jane, Dee's instructional philosophy included the active involvement of students. Posters and large projects were a regular part of social studies activities in Dee's classroom. However, "with 29 in a class you're just much less likely to assign really big things that you've got to put some place." Students needed room to work on them. Space limitations in her classroom did not stop Dee from including research projects in her plans but she struggled to find places to store the works-in-progress. She tried hanging posters on strings stretched across the room and using the tops of her built-in cabinets for storage but that was discouraged by the principal who "wants it attractive" in the classroom. Her solution was "to streamline things more." She planned exactly what days each group was going to work and then "I get those graded and they're gone."

Dee also had difficulty finding room to store other instructional materials like bulletin board supplies and materials for social studies units. Although "there is a storage room out here that I could probably store some things" she is "afraid it might disappear" there. Instead, she had "a lot of stuff in my trunk and my car and a lot of stuff in my garage at home."

Although Lynn did not comment during the interviews about storage problems, she was observed to have difficulty with storage due mainly to organization not lack of space. Lynn had two small rooms attached to the back of her classroom that were intended as office space. Her social studies department put a microwave oven in one room and used the area as a lunchroom. Lynn described the other room as "my junk area."

Two teachers interviewed did not discuss or exhibit problems with storage in their classrooms. Both teachers, Karen and Anne, taught mathematics. Each teacher had one large enclosed cabinet and multiple bookshelves where teacher and student supplies were easily accessed. These rooms showed the least amount of clutter during observations.

Lighting

Of the five teachers who had windows in their classrooms, four chose to cover the windows at least part of the time. A variety of reasons were given for putting some sort of covering on the windows and for the type of covering used.

For Anne, windows were an important feature in a classroom. She recalled a time when she did not have a window.

> I tell my students that I went to a middle school that didn't have windows in it. One of my vivid memories is when they came on the intercom and said, students you are being sent home. It was like 12 o'clock. Why? It was sleeting outside and we had no idea what the weather was.

Anne felt strongly that windows helped her feel like she was a part of the outside environment. In her present classroom, "if it gets gloomy or if a thunderstorm is coming we can see it coming" through the single floor-to-ceiling window at the back of the room. She installed a curtain at the top of the window for aesthetic reasons. The small piece of colorful fabric provided "a little bit of home environment, a special touch."

Dave enjoyed the view to the outside through the bank of windows above his lab counters across the back wall of his room. The windows were high but they offered a view of the treetops at the rear of the school. They also provided an abundance of natural light, something that Dave often used to his advantage.

> I usually have them opened up. In fact, a lot of times we can work in here without any overhead lights. If it's a nice, sunny day we can open those all up and work with that kind of lighting. A lot of activities like the chemistry and where we're

> doing something with flames, it's more dramatic without the fluorescent lights on, so that's really good.

For some activities Dave elected to block the light by using curtains that his sisters custom-made for his room or by putting up black paper for total darkness. At the time of this interview and observation, Dave, with the help of a visiting artist, had transformed the science lab into a dark room where Dave and the students were developing pictures they had taken with oatmeal-box cameras. Students carefully moved from station to station in the darkened room with only a few necessary low-watt spotlights to guide their actions. Following this project, Dave planned "two or three days of activities where they shine things into bottles and see the refraction" before taking the black paper off the windows.

Two five-foot side-by-side windows were located at the back corner of Jane's science classroom. To the left of the windows were two computers. Four more were to the right of the windows. When students used these computers, sunlight was a continual problem, at some times worse than others. Changing the location of the computers was not an option since all available wall space was in use by either lab counters or computer tables. Jane chose to hang sheer white curtains because the "sunlight comes in and shines on the computer screens and the glare is so bad that you couldn't read the screens." The curtains were not enough to block the glare, however, and Jane covered the windows with white paper. The paper and the curtains remained over the windows year-round, effectively blocking the glare and the view.

The window was not the only lighting problem in Jane's room. Two long lab counters were so poorly lit that when students "are standing here trying to do a lab their bodies cast a shadow because the light is all behind them and it's dark and they can't

see." These areas were practically useless for normal science lab activities. Less than half the available counter space was lit well enough for students to use. "The only lab counters where the lighting is good are the one up front, the demonstration counter, and the one right back there that has one light right over it." Students pulled their desks together where the lighting was better in the room to complete their lab activities. The unused lab counters on one side of the room were piled with teacher materials and books, an area Jane referred to as her "office."

Dee believed that "an outside view helps a lot." However, she chose to put up curtains in her previous classroom to block a view that was "distracting." Workmen doing renovations and students doing outside activities in the open grassy areas between the wings of the building created a visual disturbance. "It was hard to keep students on task." The view out the single floor-to-ceiling window in her brand-new classroom was peaceful and curtain-less.

For Lynn, the view from the huge, paneled window in a previous classroom was a distraction for her students, too. There were no blinds or curtains. "I guess they thought the tinted windows would suffice for that and didn't really consider the fact that sometimes you needed a way to block out that outside world."

In her present classroom Lynn had one floor-to-ceiling window in a back corner. "I don't miss windows," she stated, adding, "I don't think my students do either." Because the window opened and she had "horrors of kids falling out," she kept a table in front of the window. The handle used to open the window was stored in her desk drawer. The window caused her some concern for other safety-related reasons.

> The other part of my room that actually causes me concern is this window. We're on the second floor and we're kind of off to the side. When there's a fire drill or

> some kind of drill where we've got to leave out of this room, trying to move into that flow of traffic going down those outdoor stairs there is kind of dangerous and very slow. So, my students and I have decided that if we had to we would go out the window. I have requested one of those ladders that you can buy for your home if you have a two-story building. And our principal laughed when I requested that and he said, "You're kidding, right?" and I said, "No, I'm serious, I think it's really a safety concern." But since he has not provided us with a ladder, we have all these really strong, long extension cords that I asked for. I know they wanted to know why did I buy so many extension cords. But my students said we could improvise very quickly if we needed to, to be able to get out the window.

Other lighting options were mentioned in the interviews. Lamps were a lighting choice used regularly in both Dave and Karen's classrooms. Both teachers frequently used lamps in place of florescent lighting. Dave chose lamps when he wanted to reduce glare in the room during certain activities. In Karen's classroom, lamps were used to "set the room where there is not a lot of harsh light." Lamps in all four corners of her room were used daily in conjunction with illumination from half the overhead fluorescent fixtures. Dee mentioned that she "tried different kinds of lighting," including lamps, because she heard that "some kids respond to that." After trying it, she "didn't really see that big a difference in the way they performed" and it made Dee "sleepy" so she quit using them.

In Jane's classroom, a motion detector was in use as part of an energy conservation program at the school. Jane explained that "the lights go off if we're not moving around." Twice during the interview we had to stand up and wave our arms to re-light the room. As a result, Jane had positioned the teacher desk near the motion detector so that while she graded papers she could remain seated and wave to trigger the lights.

Condition

Teachers experienced a variety of extreme conditions in the different classrooms where they taught. From new and nice to moldy with mice, they expressed appreciation and concern regarding the condition of their current and previous classrooms.

Anne spent several years teaching in old middle and high schools that were in poor condition before she moved to a brand-new facility. Her previous school had been partially renovated but it was "just a rough environment." To Anne, "things were just never really quite clean" in that antiquated building where "things were broken and you always seemed to be scrounging for desks." Classrooms, including hers, were drab-looking and outdated. "A lot of teachers would put things up on the walls and try to make it a little bit more pleasant environment, but somehow it just never seemed like home."

In contrast, Anne's classroom in a brand-new middle school was "my home, my work environment, my office." She admired the "nice, subtle, natural color" of the built-in wooden cabinets that lined one wall of her new room. "It breaks it up and it looks like 'Oh, there's supposed to be learning here, things on the shelves for us to look at.'" At her former school, Anne had to go out and buy a bookshelf if she wanted it.

When Dee taught in an older school recently, she thought the "principals were a little more inclined to let you do things to the room." She recalled a teacher who painted a mural on the classroom wall and another who put up a wallpaper border to "try to fix up the room because they were so old." She also remembered coming in one summer and painting her desk bright blue to get rid of the drab gunmetal gray color.

Her concern about the condition of that old building went far beyond just paint. Teachers, including Dee, were bothered by the overall physical condition of their classrooms and the building in general. The teachers had ants, mice, bugs and even birds in their rooms. In addition, there were flooding problems. Dee described the situation.

> The carpet would get moldy in the places where it would flood. We had teachers that had allergies and it was just a constant problem. Several teachers left the school to go to new schools simply because they just felt like they were sick all the time because of the environment. It was, I think, maybe even as much for the teachers as it was for the kids, kind of a down thing.

Dee described her first experience in the school as "very much like being in an old prison" due, in part, to inadequate lighting, exposed pipes, and holes in the ceiling. After teaching in that environment, she laughingly suggested that they "should have just blown it up and started all over" rather than "pouring millions" into renovating it, as they did.

Dave's current classroom served numerous purposes during the life of the school, experiencing modifications with each new role. At one time the room had been a cafeteria kitchen. Although no longer used, the doors for the busy cafeteria traffic pattern still remain on two walls. A Mexican tile floor with drains also remained as a reminder of the room's former use. The floor was a positive feature for Dave, whose curriculum included numerous water-intensive laboratory experiments.

When a new cafeteria was added, the room became a chemistry room and then a physical education facility for aerobics. After the building was reorganized as a magnet school, the room was temporarily unused until Dave moved in with his science program. Other than the lab counters along two walls, the room "was all open and there was no

shelving." Like Anne, Dave had to find his own bookshelves for the extensive amount of science equipment and supplies needed for his program.

Lynn experienced unusual conditions when she first moved into her current classroom. The air conditioner for the entire wing was located directly over her room. The flat roof leaked and became such a problem that her class "existed in this room for an entire semester with six 50-gallon plastic trash cans under the corner of the room on the left." Students and teacher were subjected to a constant ping-ping-ping with the water hitting the barrels. "It was almost Chinese water torture," according to Lynn. After repeated requests, "Board of Education members and the Superintendent finally came to see what my kids and I were enduring" and had the air conditioning system replaced and the roof repaired. Lynn said, "I promised God I would never complain of distractions in this room again. It was really a trying time for me."

Part 2: Effects of the Classroom Environment

Effects of the Environment on Planning and Instruction

As teachers talked about classroom space, storage, lighting, and condition, they described the effects these had on instruction, on students and on the teachers themselves. Lack of space affected the way teachers planned and organized instruction. Two of the teachers talked about the difficulties they experienced when they had to share classrooms. Three teachers described how their plans for group work were affected by the lack of space. Five had something to say about the affect of classroom conditions on students and teachers, including one who described the attitude toward a new school as a "psychological thing."

When Anne taught at an overcrowded school where the entire seventh grade was housed in modular units, she often shared her room with classes displaced from the trailers. Occasionally these classes would plan to use her room to watch a video since the trailers were not wired for television. More often it was unplanned due to some emergency or weather condition that forced the trailer classes indoors. In either case, Anne's room would be used during her planning periods. While the visiting teacher conducted her lesson, Anne had the choice of staying in the room to do her work or going to the library to work. Leaving the room concerned her because she worried about her "things disappearing and not knowing where to begin to search for where they were," an event that, fortunately, never occurred. Staying in the room concerned her because she "didn't want the teacher to feel like they were being watched by me." Still, the feeling of protecting her space was powerful.

> I can remember a couple of times the students would walk in with gum and that was my personal space where gum was not allowed. OK, let's spit the gum out. I felt mixed emotions about that. It was not my students but it was my classroom and I did not want to step on that teacher's toes that I was disciplining their child. But at the same time I didn't want to go to the teacher and say you know I really don't prefer gum in here could you have your students. . I didn't want to seem snooty in that sense so that was a hard line to toe on how to handle that.

Dave had a similar situation as a high school science teacher. During the regular six-period day he taught four classes in his lab room, leaving two periods where other people used his room. Commenting on his feelings about the room, he recalled that he "didn't have ownership as much." The last year he was there he was assigned to teach science in a room that had no laboratory facilities, just a demonstration table at the front and regular desks in the rest of the space. Although the other teacher that had the lab room offered to swap rooms when Dave needed to do a lab, it was really hard to do.

> It's hard to set up in one room and be in another room. Then his kids would all come in there and if we left anything out he was really . . the teacher was really easy-going, very understanding, but some teachers are . . you leave a mess and they go ballistic. I just remember it wasn't ideal. In fact, when I got the opportunity to come over here I was ready to go because I couldn't stand not having a lab classroom any more. Here I'm the only one that uses this room. That kind of affects you in a way.

In Dave's present location, he regularly used a group process he called "station work." He set up various stations at lab counters around the room and students rotated through the stations completing different tasks. There were several years, when he had 26 students, it was "so crammed full" that he had to bring in stools and have four students at each station, a situation he disliked because "two do the work and two just sit there." After struggling with the cramped space he decided to replace student desks with lab tables where additional station work could be done. "What I did was have 12 set-ups, six on the counters around the sides of the room and six at the new tables in the center of the room." The groups got down to a manageable size of two or three and the additional stations provided more room to spread out.

Dee's instructional practices were also impacted by the amount of space in her small, outdated classroom.

> You're less likely to do projects. You're less likely to do group work because you don't know where to put everybody. So you just find yourself making excuses. OK, I'm just not going to do that right now and you end up not doing it at all, which is a shame.

For Dee, the loss of group work activities affected her opinion of herself as a teacher because she was not challenging her students or giving them interesting things to work on. "It made me feel like I'm not doing my job as a teacher."

Although Karen found her space cramped, she persevered with group work activities. "Even in a trailer we were able to do that," she said, "not the stations but still

have the groups and the kids on the floor using manipulatives." Karen tried to think of the easiest way to group students without spending so much time moving desks around. "I try to picture the classroom when I'm planning and say how much space are we going to need for someone to draw and cut out, what can I do and how long can I do this without the students bumping into each other." She said that what affected her most about the space was the number of groups and the number of activities she could have.

Anne commented on the difference in her instructional plans between her previous and current schools. In her small, outdated classroom she felt "inhibited in that I wasn't able to really meet the learning styles of all the students." She didn't seem to be able to fit in the variety of active work, group work and seat work that she felt comfortable doing in her new classroom. "It would have been too chaotic of a day to try to work in that little space to get all that done." In the new classroom she could do a little bit of both student-focused and teacher-focused work during any class period because she had "a lot more places for them." During the interview, Anne reflected on the differences in her teaching at the old and new schools.

> I do think I've changed some of my teaching instruction because of my environment. I do a lot more hands on now than I did before and I didn't realize I wasn't doing as much. But I guess I really felt I was limited and now I don't feel that way.

Lynn, however, did not see anything in the classroom that would keep her from teaching the way she believed she should. "I don't really see things as a hindrance. I see things as something to get around and still do what I'm going to do. When I think of a hindrance I think of something that's going to stop me from doing what I'm going to do and there is nothing in this room that does that."

Effects of the Environment on Students

Having just recently moved from an old facility to a brand new building, Dee had a strong opinion concerning the affect of the environment on students. It was very clear to her that the building affected the attitudes of students towards school.

> When kids are in an old building that's gloomy they tend to write stuff on the walls and the few good pieces of furniture. I don't know why that is but it seems like in the older schools there was just a lot more vandalism. And it's a shame. I can remember during all those renovations we'd talk to kids about how nice the school is and how it used to be. The kids could see the changes but it was like in their minds it was still an old school and because it was an old school then they had the right to put their names on stuff and write profanity and things. And that was sad. That was sad to see them tearing up the bathrooms. I really see a difference between there and here. And I don't think the kids are any better here than they were at the other school. It's almost like if it's a new school it really does have a positive affect on their attitude towards school and on their pride in their school.

Dee also attributed the change in attitude to the light colors, the amount of light in the building, and the newness of it. To her, "there seems to be a psychological difference."

Anne also taught in an old school where the entire seventh grade was housed in modular units. In her opinion the students that were out in the trailers just didn't care about their building. They didn't appreciate being in a classroom, even a brand-new trailer. "They seemed to be more destructive with their school."

Bathrooms were a particular problem, especially the trailer bathrooms. Although Anne never went in it she heard stories that it was just a disaster. "The kids saw that they weren't allowed to go inside to use the bathroom so they thought well, we'll just destroy this one." Anne believed that the students didn't mean to do it. "I really think they felt like they were second-hand, had a second-hand school."

Many of those students moved with Anne to the new school when it opened. She saw that they know they are fortunate to be inside in a nice classroom. "They behave; they pick up the trash; they know that they have a much better place to go to school."

Effects of the Environment on Teachers

Anne was perfectly clear about the effects of her old classroom environment compared with her new one. The desks don't wobble, they're clean, they don't have gum all over them. "I have a desk, a teacher desk," she said, "and a nice chair to sit in." Even the white board was a step up from her old-style chalkboard. More importantly, she felt like a professional.

> I feel like I have a nice clean working environment like other professionals that I know have. And I feel like I can do my job in a more effective way. I don't have to worry about a leak in a ceiling and not having enough desks or there being a smell in the room. With middle schoolers, those things distract them. And to get them back on task can be an adventure so those things are taken out and I feel like I can have a full 55 minutes of class about whatever we are learning that day.

Anne was aware that her circumstances could have been worse in her old school. "I was so blessed that I did not have to go out in a trailer," she admitted. However, the overcrowded conditions, poor maintenance, noise level, and room-sharing arrangements were a daily grind. "Some days it would get next to you."

Lynn had a similar experience in an old school where she taught history. The classroom had exposed metal beams, cracked windows, old carpet, and "Venetian blinds that sometimes fell on the students." A previous occupant had painted roses on part of the chalkboard, an effort that may have beautified the environment but rendered the chalkboard useless for instruction. The desks were in such poor condition that the tops would often come off when students used them, so she used tape to hold them together. There was a sidewalk just outside the classroom with a fence that ran beside. "Students

constantly said they felt they were imprisoned." The overall situation was difficult for Lynn. "It was like, this is your room, you be happy with it, and no, we don't have any money to spend to make it better." That year she "wound up in the hospital with an ulcer because of some of my concerns about that classroom."

Her present teaching situation was considerably better, in spite of her concerns over safety issues related to the attached central electrical room and the second-story window. "The environment I teach in now is the best of all possible scenarios compared to the other classrooms that I've taught." Even so, when a fence was put up at the school, "students protested that they were being treated as if they were prisoners."

Lynn had a strong opinion about maintaining a positive attitude toward the environment. "As teachers I don't think we need to bemoan the fact that things aren't exactly the way we want them to be. But we can make our little part better and we can teach students to do that. We don't need to throw up our hands and say we can't do that because of all these different reasons. We're too adept at doing that already, making excuses for not being successful."

Like Anne and Lynn, Dee believed that the environment affected teachers' attitude and sense of professionalism. A new facility evoked a more positive feeling about the school. "It affects attitude more than anything else." For her it's not that you can't do the same things in the old building as you can in the new. "You can still do the same things. What difference does it make whether you have an old desk or a new desk? It's just aesthetic." Dee went on to describe the effect of the old school not only on teachers but also on the parents.

> When you have conferences, parents come in who are professional people. You sit down at your desk and there is a smell in your room of mold. You're sitting at

> an old 1940s desk that has had several coats of contact paper and lord knows what other stuff stuck on it. You have a hodgepodge of furniture and the paint is peeling. You just feel like "I'm just not a real professional here. I'm having to work with whatever I can find.

In her opinion the classroom environment affected everybody involved. The oppressive look that an old school can have made parents "look down on the teacher as being less of a professional." It extended even further, Dee says, to the school as a whole. The school was looked at as "not as good a school," something Dee felt was unfair.

In a new building there were very high expectations from the school and from the teachers, something those at Dee's new school felt from the beginning. "This is a new school so it must be really good and we have to be really good to live up to the facility. I know that sounds really bizarre but it's true."

The administrators were also affected by the sense of expectation that came with a new or renovated facility. When remodeling was completed at Dee's old school "one of the first things they did in the front office was go in and get rid of the old war-surplus furniture that was being used as the secretary's desk and get new furniture that looked classy." Lamps and plants were brought in "to make it look like a dentist's office or a physician's office." Dee observed that "you could almost see a more respectful tone come over" the parents who entered the office. "I don't know," Dee added, "it's just a psychological thing."

The principal at the new facility was also very conscious of this. "She wanted everything to look new, to match, to be coordinated like an office building or a hospital or any other public place" in hopes that it "would bring out a more positive response from

the kids and the parents." Dee believed that public spaces, such as offices and shopping malls, were so nice that people expected that from schools, too.

Dave offered an interesting perspective on the effects of new facilities on teachers.

> I've seen a lot of teachers and you give them a great facility, state of the art equipment and everything else and they're still going to give worksheets. They go back in their classroom and they do the same exact thing that they did every year. I think it's the classic thing you can take a horse to water but you can't make them drink. I don't think there is anything you can do about that. I'd hate to say it's 99 out of 100 that would do that but I think it's 60 out of 100. I think part of it is laziness and part of it is I get as much money for doing that as I do for pulling my hair out doing activities.

During the interviews, two teachers mentioned the word "seniority" when they talked about classrooms where they were assigned to teach. In these two instances seniority worked in favor for one teacher and against the other. Two other teachers also talked about seniority-related issues. For them, their experience taught them who to ask when they wanted improvements in their classrooms.

In his early years teaching science, Dave was reassigned from a laboratory room to a regular classroom to teach. Dave got a "little tiny room" while another teacher moved into the large lab. "I don't know why they did that. Maybe it was seniority, like you've been here the least and they wanted to make sure his Advanced Placement classes got all the experiences." Because he was new, Dave said he really didn't care. If a similar situation occurred now, he admitted he "would be upset."

Seniority saved Dee from a teaching environment she preferred to avoid- a trailer. She admitted that she didn't know how she avoided it. "It was just seniority, I guess," she said, knocking on the wooden desktop as she spoke. Sixth grade had always been her assignment and "they've tried to keep the sixth grade in the building." One year

several sixth grade classes were moved to trailers but "miraculously, I missed it," she said, adding, "that would be something to say when I retired, that I had never taught in a trailer."

Lynn and Jane have both learned over the years who to ask for improvements in their classrooms. Jane approached her principal to let him know that if he was ordering new desks "please remember my room because I've been teaching for 25 years and I've never had new desks." Jane's old wooden desks were replaced that year. Lynn also felt she had the "power to ask" for improvements. In her case, she made sure that administrators knew what was going on in her classroom by asking them to come observe the special things she did with her students. Lynn believed that if administrators knew what is going on in her classroom they were more like to put new materials in her classroom as a good investment toward student learning. According to her, the strategy paid off. Just recently three new "super computers" and a new television were added to her room.

Part 3: Teacher Recommendations

During the interviews all the teachers talked about what they would change in their present classroom or what they would recommend to those designing new classroom space. Suggestions included provisions for larger rooms, office space, and technology.

Four teachers described their need for space that supports their overall instructional program. Karen, who believed "you can't get engaged actively in learning if you're in straight rows all the time," advocated "bigger rooms" that accommodate round tables. To support her plans for grouping and movement, she wanted to get rid of individual desks and "go back to open-space."

Science teachers Dave and Jane described their need for additional space to do laboratory work. In Dave's ideal classroom he would have separate areas for lectures and labs.

> It would be wonderful if this was my lab room and I had a classroom right there that was my lecture room. On days where we weren't using the lab we could go right over there and have our discussions. If I could wish for anything, that would be one thing.

Dave also wished he had a large science storage room with shelving for easy access to supplies. It was frustrating "having to cram things into drawers." As he opened drawers at the lab counters to show the numerous items stored there, he commented that sometimes he'll go through the drawers and find things he hasn't used in years because he forgot the item was there. "Everything kind of gets in the way and you feel like it's in a big state of clutter," Dave said, adding, "It would help me professionally to have some of the clutter removed and have a place for everything."

Like Karen, Jane's instructional plans required "plenty of room for mobility of students." She suggested removing classroom computers that "are in the way" to make more space in her science room. Jane's recommendations extended beyond her classroom when she expressed concern over poorly designed hallways that contributed to crowding problems during class changes. The area outside her classroom, for example, was a regular traffic jam. "If you ever watch students coming to class and leaving there is such a narrow space there between my room and the other room, we have a bottleneck and that is poor design."

Anne also saw design problems in her school, in spite of the fact that the building was only in its first year of occupancy. Problems related to growth and overcrowding affected her sense of space within her room and the school.

> We've got to do something about overcrowding and trailers are not the answer for these kids. I don't think we should settle for that. I know they don't let us build schools to what we think the population's going to be. We've got to build to what they are right now. I don't think the people that are making that decision know what they're saying. I mean, we're already overcrowded here. We're adding six trailers next year. So, let us build some growth room. It makes me angry because I know that they could have done something in terms of making this school a little bit larger to not have that problem.

Because Anne previously worked in a severely overcrowded building where every available space was used as a classroom, she was concerned that the teacher workrooms and meeting areas in her new school would soon be taken away. Rooms that teachers and counselors used for grade-level meetings, parent conferences, and student counseling "should be a priority." In Anne's view, "someone that doesn't really work within the schools sees it as wasted space." She believed that the building principal valued that space but would not be able to keep it vacant for much longer.

Four of the teachers interviewed expressed a desire for office space, citing their need for an area where they could work, lock up documents, and store personal items away from student traffic. One teacher told of a previous teaching experience where all the teachers shared a large office. Another teacher was observed to have an office area that she used only for storage.

Karen and Dave recommended a separate teacher office for each classroom where they could "stash papers" and "be messy." Having office space would allow Dave to make better use of his demonstration table, an area at the front of his classroom where he piled student papers and "all that administrative stuff that you get."

In the school where Anne did her student teaching, there was a large common office area where every teacher had their desk. The room had paper cutters and a copy machine, making "a nice work area" that Anne "liked a lot." Based on the positive

experience she had in that office, she recommended a similar arrangement in the design of new school facilities. Jane agreed that all teachers should have office space.

> A teacher definitely needs office space regardless of what they teach, elementary, pre-K, right up through twelfth grade, any subject. It doesn't have to be big and elaborate but you need somewhere that you can lock up your personal things so that students don't have access to them. We must be very careful with some documents to protect the privacy of our students and I don't even have a filing cabinet that locks. It does bother me that I don't have a place that I can put personal things that is my space that students don't have access to. I think it's a matter of professionalism, too, that we want our little space.

All the teachers mentioned the use of technology in their classrooms and most included technology in their recommendations for improving classroom space. A wall-mounted television was observed in each classroom except Dave's, a space-saving feature he would prefer over the cart model he used. Two teachers had new large-screen televisions that they used for student-made and teacher-made PowerPoint presentations and flex-cam demonstrations.

Four of the six classrooms, all in older buildings, had telephones connected to outside lines. Two teachers in new classrooms had telephones connected only to the school intercom system. Dee was especially vocal about the lack of access to an outside phone.

> That's one of the unprofessional things about our profession- we don't have access to phones. It's been better at this school than anywhere I've been but if I receive a phone call I have to run up to this planning room. Having access to a phone I think is really an unprofessional thing. I think a lot of parents and people outside the school do not understand why you can't answer the phone when they call or why you don't call them back immediately because in every other profession they do. It's horrible. I think some of that is control. Because of long distance phone calls and charges and things, they try to keep a lid on who's calling who and they have to limit kids' access, too. It's a controlling thing. If it may not be the principal, it's people in the central office who think that teachers should not have phones in their rooms, which is a shame. But, I've never had that in my lifetime so I'll be surprised if I get a phone in my room.

Two years ago a phone with outside access was installed in Jane's classroom, a feature she considered a "great help." She shared a before and after experience.

> I used to do the yearbook and I would frequently have to call the yearbook company or call businesses that had purchased ads and so forth. I was always down in the office waiting on a phone. We only had a few phones that teachers had access to, so it was a real problem. It has been great having the phone in the room. Just yesterday I was calling a parent. I had called three times and couldn't reach the parent. Finally, on the fourth try, I reached her. If I had to travel down to the office each of those three times to make that call I would have given up. I would have said this is too much, I do not have time to do this, I'm not going to call this parent. But because the phone was readily accessible to me I got through to the parent. That has been a big help.

Classroom computers met with mixed reviews from the teachers. Although they appreciated the benefits the computers brought to the classroom, including internet access, the loss of space caused some concern.

If Dee had been asked to give input into the design of her classroom technology features, she would have suggested putting it all in one place. Instead, her television was mounted in the front left corner of her room while the computer access was wired to the back right corner. A fixed computer table was mounted to the wall to accommodate two or three student workstations. Dee commented on the design.

> It would not have taken a lot of thought to think you might want to use your computer in conjunction with your TV. Why don't we have all the technology in one place where the wiring can be worked together. And if you had a phone why don't you put the phone with the computer and the TV so all of that wiring can be interconnected. To me, that did not need a whole lot of design sense to think that one through. I'm not sure that was in the original design where they put this. I think maybe somebody in the central office just said go ahead install them and the workmen put them where they thought they should go without having taught. So, if they had the phones and everything they should really think about putting them together where they will be used together.

The twelve computers that lined the walls in Jane's science class were used extensively for research, reports and data analysis. In spite of this heavy usage, she

recommended that the computers be removed from individual science classrooms to make more space available for movement during lab activities.

> I've actually recommended that if we build a new high school, which we are due to build in the next few years, that the science department pool their computers- we have six in every classroom and I have 12 because I got a grant to purchase the others- but if we pooled our computers and put them into a computer classroom then we could have all of our students doing the same thing on computers at the same time. I think that would be beneficial. We would have that classroom space free to do labs. When you have a class of 28 in a room this small then the computers are in the way.

Other recommendations included small changes in the classroom that would make instruction more efficient. Because Dee "has a problem with kids not being able to see from a long way away," she would like her white board mounted on the long wall at the side of her room rather than on the shorter front wall where it is presently located. The white board was also mounted too low on the wall, creating additional visibility problems for students who could not see over the heads of other students when the overhead projector was in use. To solve that, Dee said she shined the overhead high onto a painted cement-block wall.

Visibility was also a problem in Lynn's classroom. When students could not see slides or videos on the front screen in Lynn's long room, she decided to project the images onto the back of a wall map located at the side of the room. She requested a new pull-down screen located about one-fourth of the way from the front of the room.

Both Dee and Lynn would like movable bookshelves. Although Dee had a wall of built-in bookcases in her new classroom, she would prefer bookcases that could be moved because it would give her more flexibility. Lynn wanted bookshelves that "could be closed up so I could hide my junk." In addition, she requested filing cabinets on rollers so they could be moved easily when the room was cleaned in the summer.

Lynn recommended more electrical outlets in classrooms. As a social studies teacher, she needed more plug-ins for the computers and computer globes used by her students. "We have spent over $400 each on those globes and to be able to rationalize and justify that cost they need to be used a little more than they are," Lynn said.

If Jane were designing a science classroom she would "be sure that there is some kind of track lighting or something that would light the counter areas where they're doing their labs." Since she was nearing retirement, Jane told some of the younger science teachers at her school that when the new high school is built they should "be sure to make notes on what you want and be sure to tell someone that's in a position to do something about what we need for science labs, because if we don't tell them they will not know."

Summary

Inductive analysis of the interview data led to the construction of three primary themes in teachers' perceptions of classroom space: (a) the adequacy of the amount and arrangement of space for teachers' needs, (b) the physical condition of the classroom in relation to teacher performance and morale, and (c) the affects of the classroom's physical condition on student behavior. In addition, analysis of data showed teachers in this study exhibited a high level of environmental perception.

CHAPTER 5

SUMMARY, RECOMMENDATIONS, AND IMPLICATIONS

Summary

This research addressed the question: What are the perceptions and experiences of secondary teachers related to their use of classroom space? To pursue this question, the research was framed within the perspective of symbolic interaction, which suggests that meanings are handled in, and modified through, an interpretive process used by individuals in dealing with the things they encounter. Using interviews and observations as the qualitative data collection method, the study created opportunities within which the secondary teachers expressed their experiences and perceptions.

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The findings of this study can provide both the educational and architectural communities with interesting and useful information about elements to be considered in future school-based facilities planning. Additionally, these results can aid educators in pre-service and in-service programs as they design and implement experiential training for secondary teachers.

Adequacy of the Amount or Arrangement of Space for Teachers' Needs

The first analysis reported in this study revealed the amount or arrangement of space was inadequate for the teachers' needs, particularly in the areas of student mobility and storage. When teachers talked about their classrooms, they used terms such as "scrunched," "crammed," and "horrible" to describe the amount of space. Only one teacher felt the size of the room was adequate, although the configuration of the room was problematic for her. For the others, "small" was the term most commonly used to describe instructional space in their current or previous classroom.

Previous research found the need for more space for teachers (GAO, 1995; Corcoran et al., 1988). For the teachers in this study, new methods of student evaluation, including projects and journals, required space for displaying and storing the work. Likewise, changes in instructional programs or techniques required space for large-group and small-group instruction. Teachers also noted that additional classroom computers called for special or dedicated space and thoughtful placement to ensure efficient use of the technology. According to the GAO report, school facilities that supported education reform activities and communications technologies did not resemble schools built in the 1950s.

Teachers in this study identified other common space problems including the number of students compared to the size of the room, the lack or quality of office space or teacher lounges, meeting space, and the lack of storage space. Similarly, a previous study of conditions in 31 elementary, middle and high schools (Corcoran et al., 1988), found that lack of space, even in newer buildings, prevented some teachers from having sufficient storage and activity space for their students. Few teachers had adequate

workspace to prepare for classes or meet with students individually. Teachers in the Corcoran study reported room size was not considered when calculating the student-teacher ratio. In other words, space was not matched to needs.

Room size was particularly problematic when class size increased. Room sizes in this study ranged from 616 to 988 square feet with 24 desks in the smallest and 32 in the larger rooms. Although no teacher mentioned the specific dimensions of their room or the square footage allotted per child, they clearly articulated the effects of the size, describing the "scrunched," "crammed," and "horrible" amount of space. This study paralleled previous research on class size that found 20 students crowded into a 700 square foot room discouraged movement and group work (Achilles & Bain, 1998). Three teachers who had rooms with approximately 700 square feet or less had class sizes between 24 and 30 students.

Although Dave's room had the largest square footage overall, the amount of usable space was considerably less due to the storage area that had been created in one corner and the science lab counters that jutted out into the room. As a result, Dave experienced great difficulty conducting laboratory group work with 26 students in the room. Karen also struggled with group activities that required student mobility in her 22 by 28 foot classroom. In spite of the difficulties posed by the amount and arrangement of classroom space, every teacher in this study continued to conduct small-group activities because that was part of their instructional philosophy.

In addition to their comments about the amount of space available for moving about the classroom, the teachers also discussed the amount and use of wall space in their

rooms. For some, the walls were an important feature, one they used to their advantage in instruction.

As in earlier research where storage was identified as a problem (GAO, 1995; Corcoran et al., 1988), three teachers in this study identified storage as a major problem in their present classroom. Due to the amount of equipment needed for their instructional programs, the two science teachers, Dave and Jane, were the most vocal about their need for more storage space. Lack of space limited the number and type of laboratory activities these teachers were able to conduct. Their views support a 1995 report from the General Accounting Office that found forty percent of the surveyed schools reported their facilities could not meet the functional requirements of laboratory science or large-group instruction.

Previous research has pointed out the interlocking, or synomorphic, relationship between the physical and programmatic aspects of a classroom setting (Gump, 1987). Physical qualities of the classroom setting must be understood in terms of the programs they are intended to support. Given the inadequate amount or arrangement of classroom space they had to work with, teachers in this study found numerous ways to modify and shape their setting to make it support their instructional program. Anne removed her desk; Jane adjusted the number and type of student lab activities; Dee sent students out into the hallway to work; Karen kept the trailer door open and allowed students to sit outside on the steps; Dave moved wooden stools into his room to seat overflow students at lab counters; Lynn clustered the student desks into groups of four to create more space for movement; Dave and Dee stored teaching supplies and equipment in their cars and in their basements or garages at home.

Teachers managed to function in minimally adequate milieu conditions but not without affecting their health, morale, time or energy. Gump (1987) pointed out that the human capacity to make do with minimal provisions often means that optimal milieu arrangements are not developed.

Physical Condition of the Classroom in Relation to Teacher Performance and Morale

Teachers in this study believed the physical condition of the classroom affected their performance and morale. Newer facilities and smaller class sizes contributed to teachers' sense of well-being and effectiveness while poor maintenance and overcrowding were associated with feelings of frustration.

One teacher described a teaching environment that was "prison-like" while another veteran educator talked about feeling "imprisoned" in her classroom. Previous research described the deplorable state of architecture and the physical setting of most American schools (Taylor et al, 1988) where "it is more like a prison than a place of discovery, wonder, and creativity."

This study also supported research findings that reported dilapidated buildings contributed to teachers' feelings of despair. In 14 of 31 schools (5 of 10 at the high school level) teachers felt working conditions had negative effects on their morale (Corcoran et al, 1988). Bugs, mice and mold in the old building where Dee previously taught contributed to her decision to move. Other teachers in that building also chose to go elsewhere because the environment "made them sick all the time." Lynn wound up in the hospital with an ulcer because of her concerns about the poor physical conditions in her classroom.

Teachers in Corcoran's study (1988) "appeared to accept as normal, and therefore adequate, conditions that were at best bleak and dreary." Similar sentiments were expressed in this study. Lynn, for example, stated that she felt she had to accept what she was given in her old building. "This is your room, be happy with it," was the message she received. Broken desks and poor environmental conditions contributed to her hospitalization for an ulcer. "In that room I did not feel it was a healthy environment."

Gump (1987) described buildings that are unhealthy in the medical, psychological, and social sense. Bad elements of architecture are widely tolerated, according to Gump, due to our ability to adapt. Corcoran (1988) found that teachers appeared to tolerate poor physical conditions if other working conditions were adequate or better. Participants in the current study were outspoken but accepting of the dull, monotonous environment where they taught. They tried to fix up "antiquated, outdated" classrooms by putting things up on the walls to "make it a more pleasant environment" but "it just never seemed like home."

Findings from the current study showed teachers' concern not only for physical conditions but also for safety. Water leaking from the roof into Lynn's classroom, for example, caused a situation that she described as "Chinese water torture" for the students and her. Additionally, a five-foot tall window at the back of her second-floor classroom and a door to the school's central electrical system at the front of her classroom caused Lynn undue concern for the safety of her students. Physical conditions have direct positive and negative effects on teacher morale and sense of personal safety (Corcoran, 1988).

Participants in this study supported previous research by Corcoran et al. (1988) that found teachers felt they were ineffective in their classrooms as a consequence of conditions in the schools. Dee found that she was less likely to do projects and small-group work in a smaller classroom. The amount of space also determined the amount of active group work Anne planned for her classes. In her spacious new classroom she did more hands-on activities and movement. "I really felt I was limited because of my environment and I didn't realize I wasn't doing as much hands-on."

Environmental research has shown that the setting acts more as a moderator, a facilitator or inhibitor, of responses that combine in complex ways to result in different performance levels. Over time a dull monotonous environment promoted withdrawal, blocking of experimentation and a sense of lack of control over the environment (Steele, 1973). Teachers in this study described the negative effects that dull environments had on their teaching. Consequently, each teacher made a conscious effort to shape the environment to suit his/her instructional needs. For example, Dave recommended that teachers look at their classrooms from the point of view of the students. Institutional-looking rooms with bare walls have no personality, according to Dave, and they do not encourage learning and experimentation.

Teachers in this study believed that the physical environment sent positive or negative messages. Four of the six teachers talked about the need for a "professional" environment in the classroom. New facilities promoted a sense of professionalism in a way that older buildings did not, through light, openness, color, and up-to-date technology, including computers, telephones, and televisions in classrooms. These factors sent a message to students, parents and community about the expectations of the

school. Lamps, plants, pictures, and furniture helped make the schools look "more like a dentist's or physician's office," giving them a "more respectful tone," the teachers said.

Zeithaml and Bitner (2000) reported that the environment, or servicescape, can support or hinder the goals of the organization. Adequate space, proper equipment and a comfortable environment contributed to job satisfaction, causing an employee to be more productive, stay longer, and affiliate positively with co-workers. The servicescape can have an effect on people's beliefs about a place and their beliefs about the people and products found in that place. Viewed as a form of nonverbal communication, the environment can send a positive or negative message.

Affects of the Classroom's Physical Conditions on Student Behavior

Teachers in this study believed that physical conditions in the classroom affected student behavior. Students in trailers and older, poorly maintained buildings seemed to be more destructive and less appreciative of their facility than students in newer schools. One teacher reported "a lot more vandalism" while another saw "a more negative attitude" in the older, "second-hand" school.

Dee saw the effects of overcrowding when she taught in an old school with a large trailer population. The amount of vandalism and disruptive behavior led her to believe there was a direct relation between attitude toward school and the age of the school building. Anne also saw a difference in student attitudes at old and new facilities. Students in overcrowded classrooms, including trailers, seemed to be more destructive to their school. Jane, who saw a difference in behavior when class sizes increased, acknowledged that high school students need their space. "When you have a class of 28

in a room this small it limits mobility and with teenagers they don't want someone else bumping into them or touching them," Jane said.

Steele (1973) found that conditions in the environment, particularly overcrowding, affected behavior. People who could not get away from the sights, sounds and touches of others when their aggressive impulses were high, acted out on those impulses. Steele found that crowding was in part a psychological and social phenomenon, not an engineering measure. Whether a room seemed crowded depended on the norms and needs of the users.

Previous research showed there is considerable evidence that the classroom environment affected students' non-achievement behaviors and attitudes. High levels of density resulted in dissatisfaction, decreased social interaction, and increased aggression. Relatively minor design modifications introduced into already functioning classrooms were shown to produce changes in students' spatial behavior, increased interaction with materials, decreased interruptions, and more substantive questioning (Weinstein, 1979). More positive attitudes and behaviors may eventually result in improved student achievement. If a design modification can significantly decrease the number of class interruptions, then an increase in instructional time with a concomitant increase in learning may result.

Two teachers believed there was a relationship between student attitude toward school and the age of the school building. Students in older buildings seemed to be more destructive with their school. In a review of research on the relationship between school buildings and student behavior, Earthman and Lemasters (1996) found that school building age is a significant variable that influences student learning and behavior.

Students in a newly modernized building had better attitudes and fewer disciplinary behaviors than students in school buildings that were old and dilapidated. Earthman and Lemasters concluded that school facilities do effect student achievement and behavior. School buildings that are in a good state of repair containing modern equipment do provide a positive environment for students to succeed.

Teachers in this study provided evidence of the importance of classroom environments that are changeable and stimulating. Dave suggested that teachers put themselves in the students' place and ask whether they would like coming into that classroom 180 days. The possibility exists that milieu change, for its own sake, can be a stimulating experience. For example, new seating arrangements and changed learning centers can freshen experience and energize behavior. The capacity of novelty to alert and to arouse curiosity in children is well-established (Gump, 1987).

Teachers Exhibited a High Level of Environmental Perception

Environmental perception has several essential features, each characterized by particular questions. Affective reaction, the most basic feature, is based on the level of satisfaction the setting provides, or can be made to provide, and is characterized by the question "Does the setting suit my needs?" The next feature, orienting reaction, focuses on how the person relates to the environment, or to features of it, and asks the question "What is going on here?" The third feature of environmental perception, the identification of the categories of analysis, focuses on "What notions from my previous experiences may be useful here?" The fourth feature is the analysis of environmental contingencies, the identification of predictable sequences of events. The person might

ask, “What would happen if I acted this way?” as he tests out ideas about how features of the setting are related.

Teachers in this study reflected on their experiences in classrooms where they had taught and crafted thoughtful responses related to the four features mentioned above. Dave’s experiences can be used to illustrate these features. After teaching laboratory science in inadequate or shared classrooms at a large urban high school, Dave chose to move to a school where he had his own classroom (affective reaction). He analyzed the functional effectiveness of the room, particularly the storage, (orienting reaction) and applied past experiences where he had separate storage space (categories of analysis). Over time he decided to build walls to create a storage area in a corner of the room and create storage space for students, allowing him to gain a sense of order and predictability about the setting (environmental contingencies).

All participants in this study exhibited a high level of environmental perception. As National Board teachers, they had participated in a rigorous certification process that required them to reflect on their classroom environment and instructional practices. Teachers were able to articulate the positive and negative features and aesthetic values in the various classrooms as well as the messages that the different physical environments sent. Through interviews and observations they demonstrated how to make the room function to suit their instructional plans. They cited effects of the environment on teacher morale and student behavior. Each teacher described specific design improvements for their classroom based on curricular and instructional needs.

Results of this study did not support previous research concerning teachers’ perceptions of the school environment. In that study (Gehrke et al., 1982), middle school

teachers indicated that they did not use the environment or even see its potential as a curriculum variable. Results showed that teachers did not consciously plan for and use the environment in their efforts to teach a given curriculum. Wall space was seldom used for instructional purposes. Few teachers in Gehrke's study saw that the school could look more like a home or office and still function effectively.

Whereas Gerkhe (1982) found that teachers did not see the relationship between the environment and the curriculum, teachers in this study were clearly able to articulate those connections. Again, the difference in the findings of these two studies may be due in part to the National Board certification status of the participants in this study. Each participant identified positive and negative features in their respective classrooms. In addition to showing an awareness of aesthetic values in the room, the teachers explained how they made the room function to suit their instructional plans. Teachers in this study did see that the school and classroom could look and function more like an office. Most of the teachers wanted a more professional look in their rooms.

What was surprising in this study was the teachers' seeming lack of action toward making substantive changes in their environments. Putting up curtains and posters, or rearranging the furniture were common activities these teachers used to improve the classroom space. However, these actions were relatively insignificant in environments where ceilings dripped, blinds fell, desks collapsed, and pests roamed. It was remarkable how long these teachers put up with poor conditions in their instructional spaces before they received assistance or chose to move elsewhere. There was little evidence that these teachers received support for making improvements in their classroom spaces. Their

perceived sense of powerlessness in dealing with serious changes was a silence in the data.

Recommendations

Based on teachers' perceptions in this study, seven classroom design recommendations were identified. These recommendations came from the teachers themselves as they reflected on classroom conditions and how they use classroom space.

1. Construct adequate storage to house materials for instructional programs, particularly in laboratory sciences.
2. Plan for flexible arrangements of people, furnishings, and equipment by limiting built-ins and immobile fixtures.
3. Locate all technology resources together and away from windows.
4. Construct larger classrooms in secondary schools to accommodate student mobility and support instructional programs.
5. Construct additional space for computer workstations located in classrooms.
6. Build separate workspaces for teachers to use for planning and conferencing with parents, students, and colleagues.
7. Create professional classroom environments that include computers with internet access and telephones with outside lines.

Implications

Teachers are designers of classroom spaces. Strictly speaking, it is the professional architect who plans the facility, but practically speaking it is the classroom teacher who fits the physical structure with the program structure to create the learning environment. As designers of classroom spaces, the teachers in this study organized and

modified their classrooms to suit their instructional needs. These teachers, all National Board certified, saw the relationship between the classroom environment and the curriculum. What about others who are not Board certified? What training should be provided to develop a greater level of environmental awareness in all teachers? Additional research may be needed to examine the perceptions and use of space with non-Board certified teachers.

Teachers need physical arrangements that support instructional programs. It was frustrating to promote educational reforms, particularly in the areas of science and technology, when the facility was counterproductive to the teacher's best efforts. Teachers in this study reported that in both old and new facilities accommodations were inadequate for critical program structures such as laboratory science activities, small-group work, and instructional technology. Spatial configuration, storage, selection of furnishings, and placement of computer stations, for example, were not linked to curriculum and instructional goals.

Does the physical environment act as a facilitator or inhibitor of an instructional program or methodology? What is the implication of a particular design decision on the instructional program? Teachers with a high level of environmental perception should be involved in answering those questions with school architects and designers. As Jane said, "If we do not tell them they will not know." As good as these teachers were, they were left to wonder how much better they might be if the physical environment fully supported their programs.

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APPENDICES

APPENDIX A

Participant Letter

(address)
(city, state, zip)
February 6, 2001

Dear National Board Certified Teacher:

My name is Sue Ellen Snow. I am a doctoral candidate in the Department of Educational Leadership at the University of Georgia. As part of my doctoral dissertation, I am researching teachers' perceptions of the effects and use of classroom space. I am seeking your assistance with this research.

Participants in this study will be interviewed about the various classroom settings they have experienced during their teaching career. As a National Board Certified Teacher you have demonstrated the ability to reflect on your instructional environment and are, therefore, the most important source for evaluative data. The data will be handled confidentially and the findings will be reported in a summary form without identifying respondents.

I will contact you within the next few days concerning your participation in this study or you may respond to this request by phone or e-mail at the addresses listed below. I look forward to receiving your reply.

Sincerely,

Sue Ellen Snow
770-860-4236 (work)
770-929-3919 (home)
ssnow@rockdale.k12.ga.us
snows@mciworldcom.net

Research at the University of Georgia that involves human participants is overseen by the Institutional Review Board. Questions or problems regarding your rights as a participant should be addressed to Julia D. Alexander, M.A., Institutional Review Board, Office of the Vice President for Research, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address: IRB@uga.edu

APPENDIX B

Consent Form

Sue Ellen Snow
Rockdale County Public Schools
954 North Main Street
Conyers, Georgia 30012

May 11, 2001

(teacher address)

Consent Form

I, XXXXXXXX, agree to participate in the research titled "Teachers' Perceptions and Use of Classroom Space," which is being conducted by Sue Ellen Snow, Educational Leadership Department, University of Georgia, 770-860-4236, under the direction of Dr. Ken Tanner, Educational Leadership Department, 706-542-4067. I understand that this participation is entirely voluntary; I can withdraw my consent at any time without penalty and have the results of the participation, to the extent that it can be identified as mine, returned to me, removed from the research records, or destroyed.

The purpose of this study is to understand teacher perceptions and use of classroom space. The researcher seeks a further understanding of the relationship between the physical environment of the classroom and the teachers who work in them by examining how school size and capacity, spatial arrangement, building conditions, and teachers' perceptions of classroom space contribute to the way people react in various environments.

I understand that the only benefit to me will be an opportunity to read the research findings, reflect critically upon my own teaching, and build a relationship with a colleague. Hopefully, this study and the dissertation to follow will help facility planners and educational leaders better understand how the learning environment affects instructional practices, thereby maximizing the positive impact of effective school design and planning on student learning. I understand that I have been offered no specific incentive or compensation other than the fact that I will be allowed to read the results of the research when completed.

I have been told that this will be an interview study of six veteran secondary teachers who have had classroom experience in a variety of settings (urban/rural, large/small, sparse/dense, trailer/traditional, window/windowless) and are capable of reflecting on their instructional decision-making processes within the different environments.

I will be visited by the researcher some time during Spring, 2001, and observed teaching in my classroom. Notes will be taken on student and teacher movement and use of the

facility during instructional times. I will be interviewed some time during Spring, 2001, which will be audiotaped and transcribed. During the interview I expect to be asked by the researcher to make a sketch of the classroom I am describing. I will allow photographs to be taken of my present classroom and facility. In addition, I will participate in e-mail correspondence with the researcher to clarify any questions that may arise during data analysis.

I have been told that there are no forseeable risks involved in participating in this study. I have also been told that there is no deception involved in this study. I have further been told the results of this participation will be confidential, and will not be released in any individually identifiable form without my prior consent unless otherwise required by law. The researcher will not discuss my participation in this study with anyone else. She will not attach my name to any of the materials such as notes, audiotapes, or any of the archival materials previously listed. She will use a pseudonym during the entire data analysis process. I am aware that the audiotapes will be labeled to protect confidentiality and will be kept by the researcher indefinitely for future research.

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at 770-860-4236 (work) or at 770-929-3919 (home).

Please sign both copies of this form. Keep one and return the other to the investigator.

_____

Signature of Researcher Date

_____

Signature of Participant
Date

Research at the University of Georgia that involves human participants is overseen by the Institutional Review Board. Questions or problems regarding your rights as a participant should be addressed to Julia D. Alexander, M.A., Institutional Review Board, Office of the Vice President for Research, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address: IRB@uga.edu.

APPENDIX C

Interview Guide

1. Think about the learning environment where you currently teach and tell me about it.
2. Think about the instruction that occurs in that space and tell me about it.
3. Tell me about the effect of the space on your instructional decisions.
4. Tell me about the most important features of your classroom.
5. Tell me about the changes you have made in your classroom.
6. Tell me how you feel about this classroom (and others where you have taught).
7. Think about another learning environment where you taught and tell me about it.
8. Tell me about the things you did in that space that you no longer do in your current space.
9. What are the helps and hindrances you experience in this classroom (and in others where you have taught)?
10. If you were designing a classroom what would you want?

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Kay's small room.
Kay's windowless classroom is the smallest room she has ever worked in except for a trailer. To accommodate student mobility and increase spatial sense, she clustered the desks into groups of three or four. Note also Kay's use of lighting. Only half the overhead lights are used, along with five lamps located around the room. Two are shown here: an illuminated lamp near the wall watch and an unlit lamp near the overhead projector.

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Dee's shelves.
Built-in shelves in Dee's classroom take up valuable floor and wall space. Due to their lack of flexibility, there is "very little you can do to rearrange the room."

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Jane's computers.
The addition of twelve new classroom computers and computer tables (to the left and right of the periodic table display in this picture and in Appendix H) took away valuable floor space needed for movement around Jane's science laboratory classroom. Although students used them daily, Jane recommended removing classroom computers that are "in the way."

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Dave's storage.
In Dave's science classroom, his biggest problem is storage. This picture looks into the storage area that he created in the frontt corner of his room. In spite of the additional floor-to-ceiling shelves he built behind the wall at the right, he does not have enough storage. According to Dave, "we're just crammed in here." Note also the clutter on Dave's demonstration table (right, foreground) and the television on the cart (right, background), two features Dave addressed in his recommendations for design improvements.

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Jane's lighting.
This picture illustrates two lighting problems in Jane's classroom. On the right, sunlight from the windows created a glare on the computers that was "so bad you couldn't read the screens." On the left is one of several long counters that are so poorly lit they are practically useless for normal science lab activities because students cannot see their work. Covering the windows with white paper and curtains helped reduce the glare on the computers but it also reduced the available light for the lab counter.

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Lynn's window.
Lynn has "horrors of kids falling out" the floor-to-ceiling window at the back of her classroom, located on the second floor of the building. As a result, she kept a table in front of the window and stored the crank-handle opener in her desk drawer.

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Lynn's classroom conditions.
The corner of Lynn's room shows water damage caused by a leaking air conditioner, located on the flat roof directly over her classroom. Students and teacher "existed in this room for an entire semester with six 50-gallon plastic trash cans under the corner." The constant ping-ping-ping "was almost Chinese water torture." Note also the door in the corner that provides access to the school's central electrical system, a feature in the room that causes anxiety in Lynn.

APPENDIX D

PHOTOGRAPHIC DATA

Picture: Dee's technology design.
A computer drop and built-in computer table were installed in the back right corner of Dee's classroom, while the television was installed at the front left corner. "It would not hav taken a lot of thought to think you might want to use your computer in conjunction with your TV," Dee said.