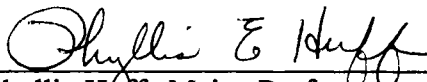
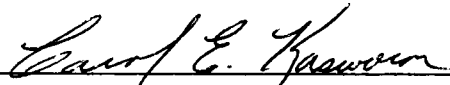


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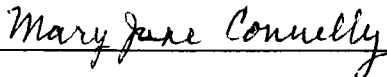
I am submitting herewith a dissertation written by Diana Venters entitled "Women Making Meaning of Mathematics: Perceptions of Successful Females in a Remedial Mathematics Program." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Curriculum and Instruction.


Phyllis Huff, Major Professor

We have read this dissertation
and recommend its acceptance:


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Accepted for the Council:


Associate Vice Chancellor
and Dean of The Graduate School

**WOMEN MAKING MEANING OF MATHEMATICS:
PERCEPTIONS OF SUCCESSFUL FEMALES
IN A REMEDIAL MATHEMATICS PROGRAM**

A Dissertation

Presented for the

Doctor of Education Degree

The University of Tennessee, Knoxville

Diana Venters

December, 1992

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DEDICATION

To my mother, Evelyn Garofalo, for your unwavering faith in my abilities and for your example as a life-long learner.

and

To my husband, Dennis, and my children, Steven, Donna, and Laura, for your continuing love and support.

ACKNOWLEDGMENTS

Many people have helped and encouraged me through the process of this dissertation. I would first like to thank the twelve participants in this study. These young women graciously shared their experiences with a stranger. During the many hours I spent studying their words, I feel that I came to know them well.

The findings of this study confirm the importance of having supportive and caring people throughout the learning process. With this in mind, I express my gratitude to the members of my doctoral committee for their support and concern. Their interest and enthusiasm for my dissertation topic and findings helped me persevere to completion. Dr. Phyllis Huff provided encouragement and friendship throughout the dissertation process. Dr. Mary Jane Connolly offered encouragement and advice throughout my doctoral program. Dr. Carol Kasworm expanded my knowledge and understanding of the adult learner and offered valuable advice in analyzing the findings and encouraging scholarly writing. Dr. Kathleen de Marrais introduced me to qualitative research, increased my sensitivity to gender issues, and helped me to organize the findings of this study into their final form.

Special thanks go to the members of the Qualitative Research Group and its facilitator, Dr. Kathleen de Marrais. They provided "another set of eyes" from the development of the interview questions to the analysis of data. For the past two years, this group has provided friendship and encouragement. Members of the group who completed their dissertations during this time were a continual confirmation

that this process can indeed be finished.

I thank the many members of the College of Education faculty and staff who have encouraged my professional growth and have been friends and role models. Dr. Betty Heathington started me on this journey and Dr. Donald Dessart encouraged me and offered collegial advice throughout my program.

Finally I thank my husband, Dennis, for his patience during a process which could not be hurried. My children, Steve, Donna, and Laura, were supportive throughout my studies. Laura, especially, was patient and understanding toward a mother who was often distracted. This dissertation represents my commitment to lifelong learning. I entrust the legacy of this commitment to my children.

ABSTRACT

The purpose of this qualitative study was to learn the meanings which successful female mathematics students attached to their previous mathematics experiences. The researcher interviewed a sample of twelve traditional-aged students from an East Tennessee community college developmental mathematics program and asked them to reflect on middle and high school mathematics experiences. Interview questions were used as a guide, but the participants were allowed to focus on events or people with significant meaning to them. High school transcripts and a demographic questionnaire provided background information on the participants.

Inductive analysis of interview transcripts produced themes within the three categories of questions asked. 1) **Internal Belief System:** Gaining confidence in mathematics, learning to value time (effort) in learning mathematics, and difficulties with visual and verbal mathematics. 2) **The Role of School:** Schools' use of time, teachers' time, teachers' attitudes, guidance counselors' lack of time, and the pace of the mathematics curriculum. 3) **Social Influences:** negative influences of peers and positive influences of family members. While most of the themes found in this study support the body of literature on females and mathematics, the first two themes under the internal belief system do not. The participants in this study perceived that their successes in their developmental mathematics course were due to their ability in mathematics and that earlier, less successful attempts at learning mathematics were due to lack of their own effort.

An additional theme pervaded this interview study - the lost year. A year of

school or mathematics was lost in some form by nine of the twelve participants.

Three participants did not take math in their senior year despite having above average achievement in previous math courses. Four of the participants lost much of one year of high school due to negative peer influences. Two participants were enrolled in "terminal" math programs which discouraged them from taking more than two years of math.

In this study, the participants corroborated current theories which stress the importance that female learners place on feeling a personal, emotional connection to those involved in significant domains of their lives. The twelve female learners who participated in this study discussed at length the importance of teachers who cared, teachers who offered time and encouragement, teachers who understood the insecurities of adolescence and helped them build their self-esteem. They looked to family members for emotional support and encouragement in their studies. A major implication from this study of female students of mathematics is the importance of caring and nurturing from the school organization, teachers, and family members.

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CHAPTER 1

INTRODUCTION TO THE STUDY

Introduction to the Problem

Many studies in mathematics education over the past two decades have documented the lower achievement of females in mathematics as compared to males. In the elementary grades, female students scored ahead of males in mathematics. By the time they reach middle and high school, female students have begun a slow and continual decline in mathematics achievement and participation (Fennema, 1990a; Sadker, Sadker, and Steindam, 1989).

Much of the research of the 1970s and 1980s identified gender differentials in various areas of mathematics. Research has continued to search for reasons for these differences. However, little research has yet been conducted on students' perspectives of the educational experience, especially in mathematics. Female students have brought unique experiences, attitudes, and expectations to mathematics learning. Therefore, researchers should explore these experiences, attitudes and expectations which influence females' success in learning mathematics.

Statement of the Problem

Female students capable of success in mathematics have not successfully completed courses in the academic mathematics tracks of secondary schools. Many of these students are required to remediate their mathematics skills upon enrolling in college. This study examined the meanings that successful female students from a remedial college mathematics program attached to their high school mathematics experiences.

Purpose of the Study

The purpose of this study was to learn the meanings female students attached to their high school mathematics experiences. Participants for the study were successful female students enrolled in a community college developmental mathematics program. While qualitative methods of data collection and analysis predominate, some quantitative data and analysis were used in this study. The following questions guided the research:

1. What internal beliefs did the female students have about themselves as learners of mathematics?
2. Which elements of the school environment were perceived by these female students to be influences on their mathematics experiences?
3. Which elements of the participants' social environment were perceived as

influences on their mathematics experiences?

Conceptual Framework

A conceptual framework guided the research of this study. Three categories were used to organize the research: perceptions of self as learner of mathematics, school influences on the learner, and social influences. For this study, these three categories emerged from the interview data and were used as the basis for subsequent organization of the literature review, data analysis, data description and findings. Using such a framework for qualitative research was described in Goetz and LeCompte (1984) as being important in providing focus for all of the components of the research study and for theory development.

Significance of the Study

Throughout the 1970s and 1980s, studies of achievement test scores have documented differences for males and females, which, after the elementary grades, favor males by an increasing margin. Using the National Assessment of Education Progress (NAEP) statistics for mathematics for these years (U.S. Department of Education, 1989), by the 12th grade, females had fallen several points lower than males in all areas of mathematics tested. (See Table 1.1.) Other indications of lagging female scores occur on the

Table 1.1

NAEP Mathematics Scores

(Possible scores increase to a high of 600 by 12th grade.)

	1977-1978	1981-1982	1985-1986
9-Year Olds	219	219	222
Male	217	217	222
Female	220	221	222
13-Year Olds	264	269	269
Male	264	269	270
Female	265	268	268
17-Year Olds	300	299	302
Male	304	302	305
Female	297	296	299

U.S. Department of Education. NAEP. January, 1989.

SAT (Scholastic Achievement Tests) and the ACT (American College Testing) college entrance tests (U. S. Department of Education, 1989). (See Tables 1.2 and 1.3.)

Since the mid 1960s, the results of the SAT-Mathematics have shown a consistent 40-50 point difference between males and females, favoring the males. For the ACT during the same period, males consistently scored 2 -3 points higher in mathematics.

Table 1.2

Average SAT-Mathematics Scores (800 possible)

	1966-67	1971-72	1976-77	1983-84	1989-90
Males	514	505	497	495	499
Females	467	461	445	449	455

U. S. Department of Education. NAEP. 1989.

Table 1.3

Average ACT-Mathematics Scores (36 possible)

	1969-1970	1977-1978	1980-1981	1983-1984	1986-1987	1987-1988	1988-1989
Males	21.1	19.1	18.9	18.6	18.6	18.4	18.3
Females	18.8	16.2	16.0	16.1	16.1	16.1	16.1

U.S. Department of Education. NAEP. 1989.

The practical implications for low-scoring females over the last decades have been fewer college scholarships, fewer admissions to more competitive colleges, lower self-esteem, and speculations about the quality of secondary mathematics education for females (Meyer and Koehler, 1990; Armstrong, 1985).

In addition to the low achievement scores, the issue of limited participation in the mathematics curriculum is significant. Instead of continuing through Algebra II and precalculus, many females have opted out of the mathematics curriculum as soon

as graduation requirements were met, often as early as 11th grade (Fennema, 1990a; Meyer and Koehler, 1990; Tartre, 1988). For those who did participate more than two years in the mathematics curriculum, the issue of tracking has been a problem (Oakes, 1985). Beginning in middle school, usually by 7th grade, students are placed in an academic track or level in mathematics. Those tracks are often identified as (from high to low achievement expectations) accelerated, honors, college preparatory, regular, basic and remedial. In ensuing years, the tracking system allowed for movement down but not movement up since the lower courses covered less and less mathematics (Goodlad, 1984). Typically a student who dropped from the regular track to the basic track in 9th grade would enter a two-year terminal course (consumer mathematics, general mathematics or a two-year Algebra I course). While these terminal programs satisfy graduation requirements, they are insufficient for admission to a four-year college. Because one or more years pass between mathematics study and college entrance and placement tests, long-term retention may be a factor in the lower mathematics scores of female students.

Much of the research already conducted in the area of gender and mathematics, especially that which has focused on the female student, has been quantitative research. Attitude and observation scales have been created (Fennema and Sherman, 1978) to study teacher and student attitudes toward mathematics as a subject worth learning and to study teacher and student attitudes toward each other personally. Observation scales have indicated that teachers, both male and female, may give more time to male students in the mathematics classroom (Leder, 1990b). Observation

studies revealed that teachers ask more high level questions to male students.

Teachers have indicated that mathematics may be more useful to their male students than to their female students (Fennema, 1990b). Whether these factors have important effects on mathematics learning for females has not been determined and remains for further research.

In the concluding chapter of Mathematics and Gender (1990), Leder and Fennema discussed the need to study the cognitions of learners which influence the learning of mathematics and the development of their internal belief system. They suggested that we cannot answer many of the questions which have emerged from research until we know what the learner is thinking.

The significance of this study was that it addressed the meanings which female students attached to their high school mathematics experiences. The researcher, having spent 20 years as a mathematics teacher, was familiar with the classroom setting in mathematics. In addition, as an observer/supervisor of beginning teachers for five years, the researcher had experience analyzing teacher/student interactions and their effects on learning. The researcher's familiarity with the culture of the mathematics classroom from both perspectives, as a teacher and as an observer, grounded the research study in her experience.

Because this study focused on the experiences of students and the meanings they attached to those experiences, the findings should benefit gender and mathematics research and should complement earlier studies which have determined problems in female mathematics achievement. Teachers of mathematics will benefit by learning

which of their behaviors strongly affect their female students. From these meaning researchers and teachers should be able to better determine what methods of teaching and what attitudes of teachers may deter or enhance female learning in mathematics.

Definition of Terms

For the purpose of this research study, the following terms were defined as follows:

Community College: A state-funded two-year college whose students reside in the local community.

Developmental mathematics: Courses offered in the community college to remediate mathematics deficiencies. The two courses in this curriculum cover high school Algebra I, and part of Algebra II. Students receive no college credit for these courses but must complete them in order to take the college level mathematics courses in their programs. The term **underprepared** (Franke, 1992) refers to students who are enrolled in developmental programs in community colleges.

Meanings: The strength of feeling people have about phenomena; the categories into which people classify items in their social and physical worlds (Goetz and LeCompte, 1984).

Placement tests: Standardized tests administered to community college students following admission. All public community colleges in

Tennessee use the same test, the AAPP (Academic Achievement Placement Profile) designed by the Educational Testing Service for the purpose of placement in English, mathematics, and reading courses.

Successful students: Students who received the grade of A for the final developmental mathematics course.

Assumptions

Some assumptions for this study are:

1. Participants will be capable of reflection on their previous mathematics learning experiences.
2. Participants will be truthful in their responses to interview questions.
3. Participants will not discuss interview questions with each other.
4. Participants will answer questions in the presence of an audio tape recorder in the same manner as they would without its presence.
5. Participants' current success in mathematics is evidence of earlier potential success in mathematics.
6. Participants' enrollment in a remedial mathematics program in college is evidence of previous difficulty in mathematics.

Limitations

The participants for this study will be limited to traditional-aged female students from one community college in eastern Tennessee. Traditional aged (18 - 20 years old) students were selected in the belief that their high school experiences would be recent enough for accurate memories. Successful mathematics students were selected because the researcher wanted participants to reflect from a perspective of success and confidence. The data gathered were limited to interviews with participants, high school transcripts and demographic information provided by participants.

Summary

The purpose of this study was to learn the meanings female community college students attached to their high school mathematics experiences. Previous research on mathematics and gender has not focused on the meanings female students have attached to their experiences in mathematics. In this study, the researcher analyzed transcript and demographic information to describe the participants as a group and as individuals. Interview data provided the basis for the major findings of this study. Inductive analysis of hour-long interviews with each participant resulted in three thematic categories: internal beliefs, the role of the school, and social influences.

Organization of Remaining Chapters

In Chapter 2, the literature relating to past research findings in gender and mathematics is reviewed. This chapter also presents literature related to community colleges and their function in teaching "underprepared" students.

Chapter 3 explains the research methods and procedures used for this study.

Chapter 4 presents the data and findings for this study.

Chapter 5 summarizes the study and the findings and discusses the implications for research and practice.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

The purpose of this study was to learn the meanings female students attached to their high school mathematics experiences. In this study, twelve successful female students from a community college developmental mathematics program were interviewed and asked to reflect on their mathematics experiences as part of their total high school experience.

Past research on gender and mathematics studied differences between males and females in mathematics achievement and factors which may contribute to those differences. This review of literature presents a synthesis of these studies as the first generation of research on females and mathematics (Noddings, 1990). The second generation of research has focused on the unique qualities of female learners and will be discussed in a later section of this chapter.

Since the mathematics experiences of students are part of the overall high school experience, this chapter will also include a review of current literature on the role of the school in students' lives. Finally, since participants were selected from a community college program, this chapter will present a short review of literature on the role of the community college in the higher education structure.

Gender and Mathematics

Research on gender issues and the teaching and learning of mathematics have gone through two major phases in the past twenty years. During the 1970s and early 1980s, research into gender issues in all areas of education focused on the differences between males and females. Standardized test scores, especially those from the SAT (Scholastic Achievement Test) were used to compare nationwide achievement of males and females at the end of their secondary education. The studies conducted during this time period attempted to identify factors within the educational and social environment which might contribute to these differences and offer solutions to correct the differences. This era of research has been referred to as first generation research by feminist theorists (Noddings, 1990).

During the 1980s the second generation of research on gender issues in education occurred. This research did not focus on the differences between males and females in educational and social settings. The second generation of research, especially that conducted by feminist theorists, focused on identifying the special, perhaps unique qualities that female learners bring to the educational setting and discovering the meanings female learners attached to their educational experiences. These researchers then suggested ways schools could adapt pedagogy to optimize learning by female students. These two generations of research will be reviewed separately in the sections which follow.

First Generation Research - A Focus on Differences

Much of the literature relating to gender issues in the area of mathematics from the 1970s and 1980s focused on comparisons between males and females on standardized test scores. In the elementary grades, females score equal to or higher than males in mathematics. As they entered the middle grades, female achievement scores fell behind those of male students. By the time they reached high school, females fell farther behind both in test scores and participation in mathematics courses (Sadker, Sadker, and Steindam, 1989).

The results of the 1989 National Assessment of Educational Progress (NAEP) for grades 4, 8 and 12 are displayed in Table 2.1. The 4th grade scores indicate a gap of four points between males and females in geometry. The average gap between males and females was smallest in the 8th grade, with females scoring equal or better to males in all areas except geometry. The 12th female scores were from two to ten points lower than male scores, with the widest gaps in geometry and measurement.

In examining the data regarding skill areas, females score higher in computation, a low level skill requiring only manipulation of given numbers. Males score higher in problem solving, a higher level skill requiring understanding of mathematical concepts along with analysis and synthesis of ideas (Thomas, 1992). Therefore, while the overall gap between males and females is not increasing, there is also no evidence that it is decreasing.

Table 2.1**1989 NAEP Mathematics Scores
Overall mathematics proficiency, by content area**

	%	Average	Numbers	Meas.	Geom	Stat.	Alg.
Grade 4	100	215.8	212.9	221.5	217.1	---	215.8
Male	51.7	216.7	213.3	224.6	217.2	---	215.4
Female	48.3	214.9	212.5	218.3	217.0	---	215.9
Grade 8	100	265.0	268.6	261.4	261.8	266.3	264.3
Male	50.0	265.5	268.4	265.4	262.6	266.3	263.8
Female	50.0	264.4	268.9	257.3	261.0	266.3	264.8
Grade 12	100	295.3	293.8	294.3	296.3	295.3	296
Male	48.8	297.7	296.2	299.1	299.2	297.5	297.1
Female	51.2	293.1	291.5	289.8	293.6	293.2	296.3

U.S. Department of Education. June, 1991

The next section of the literature review will discuss research from the 1970s and 1980s and will be divided into literature on the internal beliefs of learners, the role of the school, its personnel and policies, and the role of family and peers in the experiences of learners of mathematics. Research studies which overlap more than one of these areas will be discussed in the section where they present a stronger connection to the area under discussion.

Internal Beliefs of the Learner

At the heart of this study is the internal belief system of the learner, those factors which contribute to the female's perception of herself as a learner of mathematics. Research reported in this chapter will focus on the following components of internal belief systems: confidence in the ability to do mathematics and attributions of success and failure in mathematics.

Confidence in Mathematical Ability. Confidence in one's ability to do mathematics is a critical component of a learner's belief system. During the high school years, confidence influences persistence (Reyes, 1980) and participation (Armstrong and Price, 1982). Confidence influences a student's willingness to try new material and persist in difficult situations. Confidence also is reflected in a student's continued participation in mathematics courses beyond minimum requirements.

Fennema and Sherman conducted several studies during the late 1970s in which affective variables, including confidence, were studied as they related to mathematics. Using the Fennema-Sherman Mathematics Attitude Scales (Fennema-Sherman, 1978) and mathematics achievement tests as data, these studies found that male achievement on the tests was accompanied by higher confidence scores. However, female scores, whether equal to or higher than males, were accompanied by low confidence scores. Even high achieving females had lower confidence in themselves in mathematics than lower scoring males. When female students are not confident of their ability to do mathematics, they quit trying and drop out. Of all of the affective variables studied,

confidence was the most strongly correlated ($r = .40$) to achievement.

In Armstrong and Price's (1982) survey study of 1000 high school seniors to identify factors affecting students' participation in mathematics courses, confidence in ability to learn mathematics was rated as the second most important variable by females, following perceived usefulness of mathematics. For males surveyed, confidence was the third most important variable, following perceived usefulness and enjoyment of mathematics. This study focused on three categories of variables: attitudes towards mathematics, perceived usefulness of mathematics for future career and educational use, and influences of parents, teachers, counselors and peers. The researchers concluded that while these variables interact with each other to form a student's belief system, it was difficult to distinguish cause and effect relationships.

Other studies have found the highest confidence levels in female students who took the most mathematics in high school. Lantz and Smith (1981) studied factors contributing to students' decisions to enroll in optional mathematics courses. This survey study used three samples of students and questioned them about their intentions to enroll in mathematics courses for the following year. The study then questioned the same students six months later during the registration process. They found that confidence was a factor that separated students who intended to select optional courses and students who actually enrolled in those courses. This study also found that, despite evidence of good grades, females gave lower estimates of their future chances of succeeding in mathematics than did the males in the study.

One of the factors in a student's internal belief system is confidence in one's

ability to do mathematics. A second factor of the internal belief system to be discussed in this section of the literature review is that of attribution of success and failure in mathematics.

Attribution of Success and Failure in Mathematics. The areas in which a female student has been motivated to succeed can be affected by many internal and external factors. The phenomenon of women avoiding success to avoid being perceived as unfeminine was introduced by Horner (1972). Because the dominant culture of our society assumes such areas as science and engineering are male domains, success in these areas may have negative consequences for female students. They may feel unpopular and doubt their femininity if they pursue mathematics or science (Leder, 1990b).

An interesting component of the internal belief system, especially as it is related to motivation, is that of causal attribution. Causal attributions are defined as the reasons students gave for their own success or failure. Weiner (1972) proposed a framework for attributions of success or failure which has been used in many studies in mathematics. (See Table 2.2.) In Weiner's model, attributions vary on at least two dimensions, locus of control and stability. When these two dimensions are crossed with the dimensions of internal and external control, the results are the 2 x 2 matrix in the table. Ability is the label Weiner gave to the events that are both internally controlled and stable. Thus one perceives that ability is an internal trait which will not change. Effort is the label for the unstable outcomes which are also internally controlled. Thus effort may vary from one event to another depending on

the internal factors at work. Task difficulty is the label for externally controlled events which are stable. If a subject such as mathematics is perceived as difficult, the stability factor implies that this difficulty cannot be changed. Mathematics cannot be made easier to the person who places it in this category. The last factor is luck, which is perceived as beyond one's control and very unstable. Mathematics students

Table 2.2

Weiner's Classification of Causal Attributions

Locus of Control

Stability		Internal	External
	Stable	Ability	Task Difficulty
	Unstable	Effort	Luck

who attribute achievement to luck cannot depend on repeated achievement because they perceive their achievement was not of their doing.

Studies in mathematics using Weiner's model have found differences among males and females in attribution patterns. In a study of fourth-grade students, Nicholls (1975) manipulated success by telling some students they had done very well and others that they had done poorly on a geometry test. Results indicated that males were more likely to attribute failure to luck, while females attributed failure to lack of

ability. On the other hand, males attributed success to effort, while females attributed success to luck. While Nicholls' study used a small group of students, its findings have been replicated in other studies (Kloosterman, 1990).

Attribution theories explain why females do not persist in mathematical activities. Whether making a decision to persist on a homework assignment or to persist by enrolling in another year of mathematics, a student's perception of her potential for success will influence that decision. A student who attributed success to luck would be less likely to trust that her luck would last for a year.

Persistence and motivation are related. The areas in which female students have been motivated to succeed may be determined by many internal and external factors. Horner's (1972) study, which introduced the concept of success avoidance as a component of perceived femininity, analyzed female responses to story cues which involving successful scenarios for women. The percentages showing fear of success responses were: 47% of seventh graders, 60% of eleventh graders, and 81% of college undergraduates. Horner indicated that avoiding success should not be interpreted as the will to fail. Positively motivated women may be inhibited from attempts to succeed by thinking of the negative consequences. For the women in Horner's study, femininity and achievement were perceived as mutually exclusive entities. While this study was reported twenty years ago, the fear of success issue has remained an issue with female students. Because the dominant culture of our society has assumed such areas as science and engineering are male domains, success in these areas may have negative consequences for female students. They may feel unpopular

and doubt their femininity if they pursue mathematics or science (Meyer and Koehler, 1990; Chipman and Wilson, 1985).

An extension of the research in attribution models is research in learned helplessness. The term "learned helplessness" is applied to students who "learn" to be helpless in a subject. In mathematics, females who attribute success to luck and failure to lack of ability, in effect, **learn** helplessness. Repeated experiences of failure have taught them that continued failure was inevitable since their level of ability would not change. Helpless learners are often anxious learners who experience a heightened state of fear because they are not in control of the learning situation.

In a study which induced learned helplessness in participants by telling them they had failed mathematics tests repeatedly, Monaco and Gentile (1987) found that females subsequently performed more poorly than males on higher level reasoning and lower level mathematics. An interesting finding in this study was that females began to attribute failure in the subsequent mathematics tests to lack of effort rather than lack of ability. The control group used in this study did not participate in the learned helplessness activity. Their attributions stayed consistent with previous studies throughout the testing process. Thus, in this study, despite learned helplessness or because of it, female learners in mathematics changed their attribution pattern for failure from lack of ability to lack of effort, from an internal to an external cause. The significance of this study was that attribution patterns could be changed with intervention. One would hope future studies of this nature would attempt change from a more positive perspective.

The origin of a female learner's internal beliefs may be internal or external influences. One of the external influences on the beliefs of students is the institution within which they receive most of their formal education. The school - its organizational structure and policies, curriculum, and personnel - will be discussed in the next section of this literature review.

The Role of the School

The socialization of youth into their role in society has historically been a function of the family, especially for females. But a shift between the home and school as educators took place during the first half of the twentieth century in the United States. The depression of the 1930s removed job opportunities for youth who had only completed elementary school. By the 1970s over 90% of 17-year-olds were enrolled in high school (Goodlad, 1984; Bennett & LeCompte, 1990).

During the second half of the century, as schools became responsible for larger numbers of students, they were also mandated by Supreme Court decisions to provide equal access for all students to academic, vocational, social, and personal instruction. The recessions of the late 1980s and early 1990s along with an increasingly technological job market removed job opportunities for young adults who have only completed high school. Thus, larger numbers of students who have completed high school have enrolled in some form of higher education to prepare themselves for the job market. More students, including females, are spending more years within the organization of school and are being influenced by its socialization patterns for a

longer period of time.

Family structures have changed since the 1950s. Single-parent households and households with two working parents are more prevalent. Since families lack the time to socialize youth into their roles, the schools have assumed the role of socializer. School is now the primary agent for socialization in the United States (Bennett & LeCompte, 1990).

The Organizational Structure of the School. The organizational structure of schools is based on hierarchical models. The administrator of the school, usually a male, manages the staff of teachers and other personnel, largely female. Implicit in this hierarchy is the notion that jobs with responsibility belong to males. Females can have jobs of a lower position. Throughout their school experiences, then, female students observe a few males in roles of authority and many females in lower roles in the hierarchy. From these observations, they learn the roles women may aspire to in society (Bennett and LeCompte, 1990; Goodlad, 1984).

Teachers may encourage female students to aspire to positions of authority, but the reality they see tells them that those aspirations are unrealistic. Schools send out mixed messages to female students. On one hand, they are encouraged to succeed in their academic work so that they can take advantage of career opportunities. On the other hand, they see within the school organization that career opportunities will not be available to them. Therefore, female students do not participate in academic programs which might lead to careers in science and engineering. Whether their lack of participation is due to giving up or resistance (Holland & Eisenhart, 1990) has not

been determined and may vary among individuals. Whatever the reason, the majority of female students have not seen the school or its curriculum as meeting their needs for the future.

Within the organization of schools lies the curriculum, the plan for what is to be taught. In elementary schools, ability grouping begins to stratify students in a vertical system from high to low ability. In high schools, a hierarchical system of stratifying courses within a subject area causes differentiation of educational outcomes. Six or seven levels of one subject may be available. Higher level classes are labeled Honors, Gifted, or Accelerated, names which indicate some kind of superior knowledge is dispensed in these classes. Lower level classes are labeled Remedial, Basic, Proficiency, and Standard, names which indicate that less knowledge is available for students in these courses (Bennett & LeCompte, 1990; Oakes, 1985; Goodlad, 1984;Sizer, 1984).

In addition to course content differentiation, enrollment in various levels of subjects like mathematics often reflects socioeconomic status. Students of low economic status and minorities are disproportionately represented in the lower levels of mathematics and are seldom found in the top levels (Goodlad, 1984). While females do not represent the majority of students in the lower levels of mathematics classes, they are underrepresented in the top levels of mathematics, especially during the last two years of high school. Female students tend to be placed in the middle level courses in high school and remain there until they complete graduation requirements.

Students are placed in tracks according to their perceived abilities on standardized tests and classroom performance. Once a student has been tracked in a level of a subject, it is almost impossible to move upward. Less content and a slower pace of instruction cause students in lower levels to get farther behind each year (Oakes, 1985; Goodlad, 1984).

Other differences among the levels of a subject in high school have been quality and quantity of instruction. Teachers of high level classes have spent more time on direct instruction and less time on management. High level students have been expected to spend more time learning at home than low level students. High level classes spent more time on high level learning - making judgments, analyzing and synthesizing ideas. Experienced, master teachers were usually assigned to high level classes, a reward for seniority. Inexperienced teachers were often assigned to low level classes (Goodlad, 1984).

For those in the lower levels, the tracking system in high schools leads to a weaker learning environment, lower expectations as learners, and a cumulative loss of learning. In addition, the labels placed on levels of subjects become identity labels for these students both within themselves and throughout the school (Braddock & McPartland, 1990).

In addition to the levels of curriculum taught, the time organization of the curriculum affects students' perceptions. Learning in high schools is episodic. The 50-minute Carnegie Unit class period has defined and structured instruction. A great deal of time is spent moving from class to class and getting organized within each

class period. Within the time-frame of 50 minutes the teacher must organize various administrative responsibilities as well as instruction. At the end of the 50-minute period, instruction must end and students must leave whether learning has taken place or is just about to take place. No flexibility of time is possible in most high schools either before or after school. Teachers and students arrive a few minutes before the start of school and leave a few minutes after school. Busing schedules prevent students from extending their days for additional instruction if it is available. Students and teachers alike are trapped in a time frame for teaching and learning that may or may not fit their individual needs (Bennett & LeCompte, 1990; Goodlad, 1984). Implicit in this organization is the fact that organization and hierarchy dominate over individual needs.

Because the hierarchy of school reflects the hierarchy of society, students and their parents tend to trust the system and accept what is offered on faith (Sizer, 1984). Parents who are more educated push their children to achieve more in school. Those parents also make more demands on the school to give their children individual attention and guidance. Only the most motivated students receive adequate advice from school personnel. For female students who observe that this hierarchical structure has left them little room to ascend, other, more social aspects of school become dominant. For many female students, getting ahead in high school is associated more with social status than academic achievement. They create a social hierarchy based on wearing the right clothes, belonging to the right clubs and having the best personality (Bennett & LeCompte, 1990). Females can rise to the top of this

hierarchy. Whether this hierarchy was created by females as an organization within which they can succeed or whether this social hierarchy is part of the hidden curriculum, a curriculum which discourages females from ascending the academic hierarchy is not certain. Reproductionists believe the hidden curriculum is a covert plan to keep women, minorities and lower economic groups at their present levels (Holland & Eisenhart, 1990). Resistance theorists believe these groups create their own structures because they do not want to become part of the dominant group (Holland & Eisenhart, 1990; Bennett & LeCompte, 1990). Feminist theorists believe these groups create a structure which appeals to their inherent wish for more personal relationships and connectedness to each other (Belenky, et al, 1986).

The Role of the Guidance Counselor. The guidance counselor's position within the structural hierarchy of schools lies between teacher and administrator. The guidance counselor's job is to advise students in academic, career and personal matters. Each student is usually assigned to a guidance counselor for one to four years and meets with the counselor one or more times during the assigned term. However, since the ratio of students to guidance counselors in most schools in the United States is 350-400 to 1, guidance counselors do not have time to schedule individual conferences with students (Powell, et al, 1985). Guidance counselors spend the majority of their time administering achievement tests and coordinating data for students' records. Students who receive their personal attention are usually those in need of immediate intervention during a personal crisis. Career information may be available in guidance offices, but students will have to be aggressive to receive this

information.

In offering guidance to female students, guidance counselors have often not encouraged females to continue their study of mathematics and in some cases have discouraged them. Counselors do not appear to play a major role in the development of students' career interests (Fox, 1980). Female students get less information than males about college entrance requirements, career opportunities, and financial aid (Oakes, 1990). Because of high student/counselor ratios and other duties assigned to guidance counselors, the one person in the school personnel structure who should be seeing the students' entire four-year program as a whole does not have time to do this job.

The Role of Teacher. An important role of the teacher is in the development of students' internal beliefs about mathematics. In addition to research which has found the teacher to be a critical factor in all students' development of self-perceptions, common sense indicates that the person who guides a student through mathematics learning experiences and who asks and answers questions throughout this experience will influence how the learner feels.

In the early 1970s, studies based on classroom observations examined the differential classroom experiences of students. Good, Sikes, and Brophy (1973) observed 16 middle school mathematics and social studies classes. Interactions between students and teachers were coded using a structured observation system. This research concluded that male and female students were treated differently. Males were involved in more of all types of interactions with teachers and were asked a

greater proportion of higher level questions than females. Males initiated more contacts with the teachers and were rewarded with more positive and negative affective behavior from the teachers. These results were true for same-sex and opposite-sex teachers.

Using student/teacher interactions as quantitative data and participant-observation data as qualitative data, Becker (1981) studied 10 high school geometry classes for 10 days. Her findings were consistent with those of Good, et al. Teachers called on males more than females, males volunteered more than females, and teachers asked males more high level questions. Becker found that males received 70% of the encouraging remarks while females received 90% of the discouraging remarks. Teachers helped males for longer periods of time and interacted informally with males more than females. Becker's conclusion was that males had a more positive experience in mathematics classes than females.

Koehler (1990) conducted a process/product study which related teacher and student behaviors and interactions to achievement outcomes. Using pre-tests and post-tests as well as 10 classroom observations, Koehler again found differential treatment in favor of the male students. However, no clear-cut link between dominance in interaction patterns and achievement was found. Koehler concluded that, while teacher/student interactions are an important component, they were not the sole factor involved in achievement.

An interesting finding in Koehler's study involved two of the classes in which females had significantly different achievement scores. The two teachers had similar

styles of teaching, and both of the classes were labeled "honors." The two teachers differed in one trait: help given to students by the teacher. While common pedagogical theory would predict that the students who received more encouragement and help would perform better, that was not the case. Female students of the teacher who gave more opportunities for help and who encouraged students to seek help in class performed significantly worse than the female students of the teacher who offered less help. In fact, observation data showed that while this teacher did not discourage students from asking for help, she never initiated offers to help.

Fennema's (Koehler, 1990) Autonomous Learning Behavior (ALB) model was suggested by Koehler as an explanation for her findings. An autonomous learner was defined as one who increasingly assumed responsibility for the learning process. An autonomous learner persisted in spite of difficulty and developed confidence as the learner attributed success to effort, a factor within her control. The teacher who encouraged students to learn to work on their own, to help themselves, was encouraging the female students to become autonomous learners.

Koehler's study offered a different model of teacher than most pedagogy encourages for female students. The study suggested that a teacher who encouraged autonomous learning may be perceived as less caring because he or she has not offered help constantly. And yet the female students of this teacher began to learn independently and thus became less dependent on the teacher. The balance between helping and forcing independence was not clear in Koehler's study. Future studies should offer suggestions for the teacher's role in encouraging autonomous learning.

Beneath the interactions between students and teachers in a classroom lies the belief system of the teacher. Fennema (1990b) identified factors that were influences on the development of teacher beliefs in relation to gender differences in mathematics.

The first factor was expectancies: mathematics teachers have different expectancies for their male and female students. The second factor was the usefulness of mathematics. Teachers often were unaware of the usefulness of mathematics for their female students. They knew about engineering and science careers but considered them male domains and discussed them as such in their classes. The final factor discussed by Fennema was that of attribution. If teachers attribute success or failures of students to themselves, then they will do something to correct the failures. However, if they attribute students' failures and successes to the students' ability or effort, they do not feel as much responsibility to deal with failure.

Research has also shown that teachers' attribution patterns for their students successes and failures were similar to those of their male and female students for their own success and failures. Dweck, et al (1978) studied the evaluative feedback given to students by teachers and found significant differences. Males received positive feedback which encouraged their beliefs that they controlled their own learning. They were reinforced to believe that the more effort they exerted, the more successful they would be. Females, on the other hand, were negatively reinforced to believe that their failures were due to a lack of ability. Dweck, et al concluded that, while the evidence does not directly relate teachers' beliefs to students' beliefs, it was reasonable to hypothesize that teachers may contribute to attribution patterns in male

and female students.

Teachers have played a dominant role in the teaching and learning of mathematics. The research discussed here does not draw a conclusive picture of teacher behaviors which will result in optimal learning by females in a mathematics classroom. Some of the findings appeared to contradict current pedagogical theory which states that female students prefer caring, nurturing teachers. Fennema and Koehler's studies which concluded that female students achieved higher in mathematics with a teacher who encouraged independent learning and did not offer constant help. These teachers may be perceived as less caring by female students. While other social forces contribute to the attitudes and achievement of female students of mathematics, the role of teacher is among the most significant.

Social Influences on the Learner

While the majority of research studies on gender issues in education and mathematics in particular have focused on identifying social and educational factors which may contribute to lower achievement by females, the few studies which have focused on the possibility of biologically-based differences in mathematics performance have received the most attention, especially in the popular press. In the 1970s Benbow and Stanley (1980) conducted a study of gifted seventh grade students to ascertain achievement levels. The students used for the study were identified as gifted on the basis of scoring in the 95th and above percentiles on nationally normed

throughout the United States. As part of the talent search program, the students were required to take both the verbal and mathematics SAT in an attempt to identify those with the most potential for college.

By using students in seventh grade, Benbow and Stanley felt they were eliminating biases caused by differential coursework of males and females which was often cited as a reason for differences in mathematics achievement on the ACT and SAT which are usually taken at the end of high school. Benbow and Stanley based this study on the assumption that the gifted seventh grade students had all studied the same arithmetic courses during elementary school and therefore were not contaminated by course differentials. "We favor the hypothesis that sex differences in achievement and attitude toward mathematics result from superior male mathematical ability, which may in turn be related to greater male ability in spatial tasks" (Benbow & Stanley, 1980. p. 1264).

During the 1980s, research in mathematics classrooms disproved Benbow and Stanley's assumption that elementary mathematics students received equivalent instruction. In a major review of research on interactions between teachers and students in elementary school mathematics classes, Leder cited support with studies which revealed that both frequency and duration of teacher-student interactions favored male students (1990b). These studies also revealed that males were encouraged by teachers to use higher level thinking skills than females.

In addition to disproving the underlying assumptions of Benbow and Stanley's study, during the 1980s, the Educational Testing Service also admitted that the SAT

scores underpredicts girls' performance and overpredict boys' performance (AAUW, 1992). Thus, both the grounding assumption and the assessment instrument have been shown to be invalid for the purposes used in Benbow and Stanley's study.

Research continues to explore possible biological explanations for differences in male and female learning in mathematics. Physiological studies of brain development (Davis, 1986) have shown that the brain has the most neuronal synaptic connections between the ages of 3 and 11. Ten-year olds were found to have superior ability to learn new mathematics when compared to younger and older students. Scientists in this research cautiously speculate on the impact of hormones on neuronal development in the brain. They continue to study which parts of neuronal structure are involved in thinking about mathematics. While biological bases for mathematics learning remain unclear, some external factors which influence learning and attitudes towards mathematics have been studied extensively and will be discussed in the following sections.

Peer Influences. Bennett and LeCompte (1990) suggested that "a critical aspect in the maturation of contemporary children is their long period of schooling, where they learn from each other and establish collective ideas about the world" (p. 104). The more years age cohorts spend in school together, the stronger the relationships they develop with each other and the stronger the culture they develop among themselves, often in opposition to their parents and school authority figures. Peer groups appeared to play increasingly potent roles as students advance in grades. For female students, the influence of male peers became more important during the

high school years (Boswell, 1985). Students have wanted to conform to the behavior of their peers and at the same time they have not wanted to conform to the expectations of their parents. They struggle for independence, taking risks and challenging conventions (Bennett & LeCompte, 1990).

The expectations of others have a great influence on middle and high school students, especially females. The peer group acts as an important reference for socialization and often perpetuates sex-role differentiation through leisure activities, subject preferences and career plans. Peer influences are very active in the mathematics classroom, and are often associated with a student's perception of herself as a learner of mathematics, a category discussed earlier in this review. If a female student thinks mathematics is inappropriate for females, she may perceive that her peers do not expect her to succeed in mathematics. Especially during the middle school years when gender stereotyping of oneself is being established, female students do not wish to be perceived as less than feminine by their peers (Horner, 1972). These feelings continue through senior high school when judgment of peers is most critical. Female students are often sanctioned by peers if they make choices which are counter to the prevailing norms (Meyer and Koehler, 1990).

Parental Influences. While the family's influence on the socialization of females has diminished over the past century, family members have still been important influences on females. Just as females observe the hierarchical organization of schools, they also observe family organization. They perceive how labor is divided within the home, how personal relationships are maintained or broken. The financial

rewards of education and hard work are observed along with the hardships of a weak economy. Females may observe that their mothers work the same number of hours as their fathers but receive much lower pay. They may see that their mothers continue to assume responsibility for the home in addition to working while their fathers do not assume home responsibilities. Whatever their home situation, female use their observations to socialize themselves as family members. The following key literature addresses the role of parents as influences on female students in mathematics.

Eccles and Jacob's two-year study of students in grades 7 - 9 found that parents' gender stereotyped beliefs were a key cause of female attitudes towards mathematics (1986). The most important parental factor identified was the mother's estimation of mathematics difficulty for her children. Mothers especially underrated their daughters' ability to do mathematics. Other parental factors identified in this study were fathers' estimation of mathematics ability, and both parents' estimation of the importance of enrolling in mathematics classes. The social factors involving parents were stronger predictors of success for the participants of this study than self estimates of ability and difficulty of mathematics ($r = .33$ vs. $r = .03$). This study provides strong evidence of the importance of parents as critical socializers of sex differences in attitudes towards mathematics.

Another parental factor related to female achievement in mathematics is socioeconomic level. In a review of research on women's participation in science and mathematics, Oakes (1990) discusses an analysis of NAEP data from the early 1980s which found that home and community backgrounds accounted for 24% of the

variance in the mathematics achievement of 17-year-olds. Other studies in this review found children of better educated parents exhibited more positive attitudes toward mathematics. Parental involvement during high school years was found to be an important factor in participation of females in science majors (Oakes, 1990).

Research studying external factors influencing female participation and achievement in mathematics has focused on peers and family. While these external factors have been found to have significance in female achievement and participation, their significance is important because it affects the female student's perception of herself as a learner of mathematics.

Summary

The preceding literature review has concentrated on research from the 1970s and 1980s. Differences in achievement have been found between males and females in mathematics. Although the differences were not large in most cases, research continued to search for reasons for the differences, attempting to prescribe remedies which would help female achieve equity. The influences of the school, teachers, parents and peers were discussed as they related to the female learner's perceptions of herself. The following section will discuss the next generation of research on gender and mathematics studies.

Second Generation Research - A Focus on Meanings

Noddings (1990) describes the second generation of research on gender and education as that which explores the special qualities of women and is not concerned with women being assimilated into the male world. Much of this research emphasizes "moving the best female qualities into the public world (p.393)."

In mathematics education, much of the research conducted on gender issues during the 1970s and 1980s has been quantitative studies of achievement differentials between males and females. Most of these studies have been based on analysis of achievement test scores. Observation studies have usually quantified levels of thinking required by teachers' questions and the number of responses by each gender.

Eisenhart (1988), encouraged mathematics education researchers to begin using the methods of anthropological research. In discussing the difference between quantitative research in mathematics education and qualitative educational anthropological research, she contrasted the focuses of the two types of research. Educational research has attempted to refine the constructs of cognitive development, improve measurement devices and modify instructional techniques. Educational anthropology assumes human behavior and learning are responsive to contextual factors and are dominated by social relationships. Schools are seen as institutions which organize meanings and social relationships to support the social order of society. Anthropological research in education focuses on describing that social order and developing frameworks for understanding how students come to learn their place

in society. These two traditions in research embrace different ways of thinking, talking of and doing research.

Eisenhart concluded by encouraging mathematics education researchers to learn the methodology of educational anthropologists and unite the two types of research. While mathematics education researchers have seldom used sociocultural theories and educational anthropologists have seldom used cognitive theories, a union of the two might lead to more comprehensive theory development (1988). Some of the studies reviewed in the first generation literature combined elements of ethnography in the data collection procedures. However, such data were quantitatively analyzed. Observed interactions were counted, timed and correlated to achievement scores. Teacher and student comments were codified, counted and correlated. A deeper analysis of the meanings participants attached to their words was omitted.

This review of second generation research on gender and education begins with a discussion of Women's Ways of Knowing (Belenky et al., 1986). This interview study of 135 women was conducted in the late 1970s and early 1980s. Its purpose was "to explore with women their experience and problems as learners as well as to review their past histories for changing concept of the self and relationships with others (p.11)." Analysis of the interviews from this study searched for patterns of meanings in the words of rural and urban women. Belenky et al. created a five-stage model for women's development.

Among the most significant and often quoted findings of Belenky, et al., a finding which reflected Gilligan's (1982) earlier work on women's moral

development, was the importance to women of being connected. In school and social settings, women seek a connectedness to the situation and other people involved.

Women learn best in situations which stress connectedness and cooperation rather than separateness and competition. Women learn abstractions, i.e. mathematical principles, best if rules are preceded by observation, listening, and personal experiences.

Second generation research in education has begun to focus on Belenky et al.'s developmental model and use it as a basis for finding optimal instruction strategies for females.

Damarin (1990) discussed implications of Belenky, et al.'s findings for teachers of mathematics. First, she suggested all teachers become aware of the historical "maleness" imbedded in mathematics and science. The vocabulary and pedagogy of mathematics reflect the deep "gendering" of these subjects. The competitive classroom may need to be replaced with a more cooperative atmosphere, more conducive to learning among female students.

Tobias (1992), in discussing science education reform, used student opinions of their science education to make similar suggestions to Damarin's. Among the factors which college students identified as contributing to their difficulties in learning science were attitudes of professors and fellow students, the implicit conventions of science, exclusive use of lectures to introduce new material, and the absence of "community." Both male and female students found the science classroom to be a "cold and unfriendly" place to learn. Since science students are also mathematics students, it is reasonable to hypothesize that many of these comments would apply to mathematics

classes as well.

In discussing the way women learn, Scheuneman (1986) and Noddings (1989) discussed the central role of rules in mathematics. Since mathematics is defined by rules often taught from a rigid male perspective, Schneunman hypothesized that women may have different and less favorable attitudes toward this subject. Noddings, in discussing the total school environment, felt females may be uncomfortable in school settings which project a male ideology and require them to conform to rules. Female students exist in a culture which for centuries has rewarded them for obedience, service, and silence.

Noddings' and Schneunman's discussions reflect earlier research on gender differences in learning respect for rules and manipulating them (Mead, 1934; Piaget, 1932). Both Mead and Piaget felt that children's games were a critical factor in the development of gender identity. Later studies have had similar findings. In observing fifth grade children playing games, Lever (1976) observed that girls were pragmatic about rules, often made exceptions to them and were often innovative in interpreting and reconciling situations to existing rules.

A more recent ethnographic study of high school students conducted by the Center for Research on the Context of Secondary School Teaching (CRC) at Stanford University (Phelan, et al., 1992) is relevant to this research study and will be discussed here. During the 1990-1991 school year, a research team began a study whose purpose was to understand the nature of high school environments that support and promote positive learning experiences. Students' views were combined with those

of teachers to gain a holistic understanding of the school environment. Intensive interviews were conducted in combination with classroom observations and analyses of student records.

The first stages of this study "reveal that students have a great deal to say about school and classroom conditions that influence what they do, how they feel about themselves as students, and how they perceive their school as an educational and social setting "(p. 696). Students like classrooms where they feel they know their teacher and other students. "Students want to feel connected personally to their teachers....Students place tremendous value on having teachers who care "(p. 698).

Phelan et al.'s study also found that students have views about pedagogy which are similar to current cognitive theories which encourage active, transactional learning. Students in this study wanted to learn from teachers, not textbooks. Low achievers, especially, wanted teachers who were sensitive to their learning problems and who were willing to offer them extra time and help for successful learning. Students in this study also had perceptive observations about the overall school environment and the unspoken messages conveyed by faculty and staff about the meaning of school and the importance of being there. Early reporting on this study has not indicated any gender differences in comments.

The importance of CRC's study was that it allowed students to express their perceptions of school, acknowledged their responses as valuable data and searched for patterns of meaning in their words. That their responses were similar to recent research on teaching and learning has provided impetus to researchers to conduct more

research on students' perceptions of their educational experiences. Research on gender issues in education will benefit from letting female students speak and from finding the meanings they have attached to their educational experiences.

The following section of the literature review discusses the community college and its role in continuing the education of female students who have completed high school but are not prepared for the job market or the competitive four-year university.

The Community College

Females who have taken the minimum requirements in mathematics in high school tend to score low in mathematics on college entrance tests, do not have sufficient credits to attend a four-year college, and do not have sufficient skills to enter a competitive job market. At this point, community colleges, with their open enrollment policies, have entered many of their lives. The final section of this literature review will give a brief historical view of the role of community colleges in higher education.

Community colleges, in some places called junior colleges, have been a force in public and private higher education since the early 1900s, but have seen tremendous growth since the 1970s. Community colleges were created to serve the needs of the communities in which they exist and their programs vary from place to place (Brint and Karabel, 1989).

One program offered by most community colleges is the equivalent of the first

two years of an affiliated state college or university. These programs are usually in liberal arts, but may range from engineering to business administration. Another program is the two-year associate degree program in an area such as nursing, or data processing. These programs generally lead to employment after their completion.

The third and largest area of study in community colleges in the United States is developmental programs. Developmental programs were instituted to deal with the many "underprepared" students who are admitted to community colleges under open admissions policies (Franke, 1992). This category of students includes the female students who dropped out of the mathematics curriculum in high school and lack the background to study mathematics at the college level (Riggs, et al, 1990).

In a typical community college in East Tennessee, the schedule of courses for a semester might include 60 - 70% of English and mathematics coursework at the developmental or remedial level. All of these courses repeat high school course content and offer no college credit. Students who score low on the ACT are required to take placement tests. In mathematics, these tests determine placement in one of three levels of coursework ranging from arithmetic to Algebra II.

Community colleges are a haven for marginal students. For students who are unsure of their ability, they are a good place to get a start in higher education. They are "local" schools for those who cannot afford or do not wish to attend school away from home (Edmon, 1991).

For the students who enroll, the community college is the key to participation in mathematics and an opportunity to succeed in a career. Females who have taken

few mathematics and science courses in high school and who have received little encouragement in these areas, have, in the community college, an opportunity to achieve parity (Nora and Randon, 1990).

Summary

The first section of Chapter 2 reviewed literature on gender and mathematics. In this section studies related to female students' internal beliefs were discussed. The role of school organization, its hierarchical structure and curriculum, was then discussed using sociological studies of schools as a basis for discussion. Research which focused on characteristics of females as learners rather than male/female differences was discussed next. Finally, literature related to the community college and its role in continuing the education of female learners was discussed.

CHAPTER 3

RESEARCH DESIGN, METHODOLOGY, AND PROCEDURES

Introduction

The purpose of this study was to learn the meanings successful females attached to their high school mathematics experiences. Research design included a semi-structured interview as well as a review of high school transcripts and demographic information about the family back ground of participants.

The research questions for this study focused on three categories: perceptions of self as learner, influences on mathematics learning experiences, and the role of teachers in the participants' mathematics experiences. This chapter will present the methodology used in this study.

This study, which is primarily qualitative, should not be generalized beyond the population used. However, the findings from the study which confirm or dispute other research findings can be used as a basis for further research on mathematics and gender.

Identification of the Target Population

Because the researcher's plan was to study females who had completed high

school, first-year college students were chosen as the larger target population for this study. A second criteria for the research population was that they be females who had not been highly successful in mathematics in high school. The population was thus narrowed to students enrolled in a remedial mathematics program. A third criteria was that the participants be traditional aged students (18-20) so that they could reflect on their recent experiences in high school. Lastly, because the researcher was interested in studying perceptions of students who were successful, the target population was narrowed to females who had made the grade of A in the last remedial course offered by the community college.

White Community College (a pseudonym) was chosen because it is a large college (7000 students enrolled during fall semester, 1991) and because of the large percentage of its first-year students enrolled in its remedial programs (68%). The selection was also one of convenience since White Community College's three campuses were within a 50-mile radius of the researcher.

The target population, then, was narrowed to successful, traditional-aged female students who had completed the last course in the developmental mathematics sequence at White Community College with a grade of A during fall semester, 1991.

Review of Human Subjects Research

Before beginning data collection, this research study was reviewed and approved by the administration of White Community College and by the University of

Tennessee's Office of Compliances. Written informed consent was obtained from the individual participants in the study. (See Appendix C for consent form.)

Methods and Procedures

Theoretical Framework

Five elements of grounded theory as described by Stern (1980) guided this study. 1) The conceptual framework for the study was three categories which were generated by the data: internal belief systems, the role of the school, and the role of parents and peers. 2) The study attempted to discover the dominant processes in the participants' social environment which influenced their mathematics experiences. 3) Data were compared separately rather than collectively. 4) The study was modified when interview questions contradicted assumptions, and questions were added to adjust the focus of the study. 5) Several processes of analyses operated simultaneously throughout the study.

In addition to grounded theory, the theoretical perspective of symbolic interaction as proposed by Blumer (1969) is reflected in the researcher's belief that social influences determine the way humans define their environment. The critical element of symbolic interaction is the meaning people attach to their experiences. Meaning is not inherent in an event but is conferred by each individual involved in that event in any way. The same event may have a different meaning for each

individual involved.

Another principle of symbolic interaction that is important to this study is the belief that people define who they are in terms of how others perceive them. Through the process of interacting with others, people come to know themselves. People also change and grow as they learn more about themselves through the process of interactions. The purpose of this study was to learn the meanings participants attached to their mathematics experiences in high school and, in doing this, to learn their perceptions of themselves as learners of mathematics.

Participant Selection

The final developmental course enrolled 384 (51% female; 49% male) students during fall semester, 1991. Using the final grade reports from the 18 sections of the course, 77 females were identified as A students. Using birthdate information from school records, 31 of these students were identified as being ages 18 and 19. Each of these 31 students was then considered a potential candidate for the study.

Since White Community College had three campuses in two counties and since 20 or more high schools sent students to these three campuses, the researcher attempted a wide geographical representation for the participants hoping that only one participant would be selected from a given high school. Proportionate numbers of participants were selected from each of the three campuses. The researcher attempted to obtain as much diversity within the sample as possible so that the findings would be

more representative of the larger target population. Data could then be interpreted without the limitations of identical school settings and teachers.

Using zipcodes as a basis for identifying geographic locations, 21 zones were identified. Fifteen zones were represented by one student each and six zones had two or more students each. From these zones, a representative sample of seventeen participants was selected.

Another factor considered in the final selection of participants was that of ethnicity. White Community College has a 5% African-American student population. Of the 31 potential participants, 29 (93%) were white and two (7%) were African-American. No other minorities were represented. Since the two African-American students represented two different geographical locations - one attended an African-American, inner-city high school and the other a white, rural high school - both were selected for the final list of 17 potential candidates.

The Participants

Initial contact was made with the 17 potential candidates by mail. A letter introducing the researcher and the purpose of the study was sent along with a return note indicating willingness to participate were sent to each of the 17 students selected. The letter indicated that the interview for the research study would last approximately one hour and would be scheduled at the convenience of the participant. (See Appendix A.) Within two weeks, four of the 17 potential candidates indicated by mail that

they were not willing or able to participate in the study. One student indicated willingness to participate during this period.

Anticipating further unwillingness of the potential participants to be involved in the study, the researcher contacted the community college instructional staff through the mathematics department chairperson and asked the instructors to mention the existence of the research project to their classes. A week after this request was made, the researcher contacted eleven of the remaining twelve students by telephone and received their verbal agreement to participate in the study. The thirteenth potential candidate could not be reached by phone and did not respond to the mailed request. The final candidate was also dropped from the study.

Thus, twelve of the seventeen potential candidates agreed to participate in the study. Since they represented diverse geographic areas, and since the two black students were included, after consultation with committee members, the researcher decided to use the twelve as the basis for the research study.

Techniques for Data Collection

Development of the Interview Guide

An interview guide was designed to guide the participants in discussing their experiences with mathematics in high school. Using the literature on gender and mathematics, the researcher identified significant topics and wrote a series of open-

ended questions. A non-scheduled interview guide (Goetz & LeCompte, 1984) used the same questions and probes for all participants, but the order was changed for each participant. This flexibility allowed the interview to proceed more naturally. The interviewer used a response from one question to move to the most appropriate probe or next question. The interviewer checked that each question was answered during the interview, assuring that all participants were asked each question. Probes provided the opportunity to explore meanings attached to events or situations described.

At this point in the study, the researcher introduced the interview questions to members of the University of Tennessee College of Education Qualitative Research Group. This group of approximately ten members met weekly at The University to discuss and help members with their research projects. Most members of the group are involved in qualitative research in the College of Education. Several members are from the School of Nursing. Most members have studied qualitative methodology. The researcher discussed the purpose of the study to members of the group in attendance and the group discussed the questions and probes, especially the initial question which would get the interview started. The researcher added several probes as a result of this discussion. The final version of the interview guide can be found in Appendix B.

Data Collection Strategies

Interviews were conducted at the campus of White Community College

attended by participants. (The name of all people and schools involved in this study have been changed.) One of the participants, Andrea, had transferred to State University and was interviewed there. Interviewing participants in a setting familiar to them added to the external validity of the study (Goetz & LeCompte, 1984). Permission to use the campus sites for the interviews was obtained in the original request to use White Community College students for the study. The main campus of White Community College provided quiet conference rooms for the interviews. The Barkley campus, where the two black participants were interviewed, provided a conference room which was also a resource center. A vacant science laboratory was used for the Blair County campus interviews because the site had no conference room.

The twelve interviews were conducted within a month's time and each interview lasted 45 - 75 minutes. The interviews were audiotaped with the permission of the participants. The use of audiotapes added to the internal reliability of the study, insuring accurate, verbatim transcripts of the interviews (Goetz & LeCompte, 1984).

The first interview for this study served as a pilot for the study. Ericka, the first participant, was interviewed using the interview questions in the same order as the guide. Following the interview, the researcher made verbal and written notes about the information received during this first interview. From these notes, the researcher decided that the less structured, nonscheduled interview format would be more natural and would elicit more meaningful responses. Because the initial responses in Ericka's interview were very factual and contained little reflective

thought, the researcher extended the format of the interview to two parts. The first half of the interview went through the interview questions and elicited factual memories of events and people. The second half of the interview then repeated questions from the first half, asking participants to expand their remarks, probing the meaning of earlier responses. This format was a time-compressed version of Seidman's (1991) recommended interview format. Seidman's format recommends a series of interviews, the first of which concentrates on factual recall. The following interviews then would ask the participants to tell more about the factual incidents and would probe the meanings the participant attached to those incidents. This format was successful in the subsequent interviews.

Each interview began with introductions and informal conversation. The participants read and signed the informed consent form. (See Appendix C.) Participants were informed that there were no right or wrong answers to the questions they were to answer. They were asked to discuss whatever incidents or people the questions called to mind. The confidentiality of their responses and the use of pseudonyms was reiterated. The tape recorder was placed on the table between the researcher and participant and after an audio check, was turned on for the remainder of the interview. Using Question 1 to start the interview, the researcher then continued to question and probe, using participants' responses as a basis for deciding which question was the most natural to follow, at the same time checking that each question on the interview guide was covered before the end of the interview.

During the interview, the researcher made written notes of gestures or any

physical change in appearance which seemed relevant to the topic being discussed. The researcher attempted to make no comments or facial expressions revealing an attitude toward a response. The reactions of the interviewer were limited to smiles, nods of the head, and pauses for participants to decide whether an answer was complete. The interviewer concentrated on listening to the responses so that appropriate probes could be generated.

At the end of the interview, the tape recorder was turned off and the interviewer and participant returned to informal conversation. During this time the participants were asked to complete a demographic questionnaire.

(See Appendix D.) The interviewer discussed responses which required an immediate reply. Several of the participants had questions about their programs at the community college and the researcher directed them to appropriate staff for further help. Several of the participants mentioned how pleased they were to have been chosen for the study. Most indicated that the interview had been a positive, even pleasant experience. After the participant left the interview site, the researcher recorded oral comments about the overall impressions of the interview onto the same tape as the interview (Briggs, 1986).

Following the completion of the twelve interviews, the researcher, after consulting with committee members, decided to stop at twelve interviews. Since the information in the last few interviews was beginning to be repetitious, all involved felt twelve interviews would be sufficient for the purpose of this study.

The researcher transcribed the twelve audiotaped interviews. Each interview

transcription was between twenty and thirty pages long, single spaced. (Appendix E is a sample transcript.) The tapes of the interviews will have been destroyed at the completion of this research project. Only the researcher knew the identity of the participants and schools involved.

Transcript Data

The high school transcripts of the participants were another source of data for this study. Along with courses and grades for each of the four years of high school, ACT scores were recorded on transcripts and, for the majority of the participants, class rank at the time of graduation was listed. This information was used to corroborate statements made about courses and grades by participants about their courses and grades. The ACT scores were significant in that White Community College had used them as a basis for placement in the mathematics courses. The main use of the transcript data was to complete a composite picture of the group and of each participant separately.

Questionnaire Data

The questionnaire data (Appendix D) was used in a similar manner to the

transcript data to complete a composite picture of the group and of each participant separately. Family placement and level of education of parents were the main data collected on the questionnaire. This information was requested so that the researcher could verify impressions of the socioeconomic status of the participants' families.

Techniques for Data Analysis

The process of data analysis for the interviews began during the interviews as the researcher responded to the participants' remarks and probed for deeper answers to significant responses. The initial analysis continued after each interview as the researcher orally recorded early impressions of significant remarks from the interview. The pattern for the analysis of interview transcripts which follows incorporated suggestions by several qualitative design sources (Goetz & LeCompte, 1986; Bogdan & Biklen, 1992; McCracken, 1988; Spradley, 1980).

After the tapes and field notes were transcribed, each transcript was read by the researcher and marginal notes were made to identify significant remarks. A second reading of the transcripts by the researcher was accompanied by color-coding categories of topics which were emerging. The three categories which emerged at this time were perception of self as learner, influence of others, and the role of teachers. Computer software allowed the researcher to transfer quotes for each category to three separate files which were then printed for further analysis.

At this point, the researcher again presented data from this study to a meeting

of the University of Tennessee College of Education Qualitative Research Group. With the researcher guiding the discussion, the members in attendance at this meeting began the inductive analysis process for the data on the role of teachers. Each member of the group read through all of the quotes of one participant on the role of teachers in mathematics and suggested themes from the transcript. The researcher wrote the themes suggested by each group member on a large chalkboard and the group then analyzed the themes looking for patterns and meanings. At this meeting the researcher was encouraged to develop taxonomies for each of the three categories to help organize the data (Spradley, 1980). The researcher then continued the inductive analysis process, using a taxonomy to identify and organize themes.

The three resulting taxonomies helped organize the responses of the participants into themes. The three taxonomy categories - internal beliefs, the role of school, and social influences - were also used for the conceptual framework for the entire study. Within the three categories, dominant themes, themes which all or most of the participants discussed in their interviews were then identified for inclusion in Chapter 4. The table in Appendix F refers to page and line numbers from each transcript which relate to themes relating to teachers. In many cases, themes emerged from topics not initiated by the interview questions. Rather, the themes were topics which emerged as having significant meaning to the participants as they discussed their perceptions of their mathematics experiences.

Throughout the inductive analysis of the interview data, the researcher was aware of repeated discussions of time. Time emerged as a factor in all three

categories but with different meanings for each participant. In addition to these references to time, the interviewer became aware early in the research project that most participants had experienced a loss of time at some point in their high school education. The researcher felt that time was a significant factor in this study, but could not identify a comprehensive meaning to attach to time. At this point, the researcher reread all of the transcripts, marked each reference to time, and created a new computer file for this data.

The members of the Qualitative Research Group aided the researcher in inductively analyzing the "time" file. Each member read through one participant's quotes referring to time and the researcher recorded the patterns they found on a chalkboard. At the end of the 90 minute session, the researcher had a large list of possible themes, but no structure within which to frame them. The researcher then began writing Chapter 4, letting the category of time rest in the hopes that a thematic structure would reveal itself during the writing process.

The use of the Qualitative Research Group was very important to this study. After months of reading and rereading the transcripts alone, the researcher was so immersed in the data that initial analysis was difficult. It was helpful to have members of the group read the transcripts for the first time and begin to identify themes. The group helped the researcher keep the findings grounded in the data, and by having multiple sources agree on themes, added to the internal reliability of the study (Goetz & LeCompte, 1986). Each theme identified by the researcher or a group member had to be corroborated by interview data. The group also helped the

researcher initiate the inductive process, facilitating the remaining analysis by the researcher, which was done alone.

Chapter Summary

This chapter described the methods and procedures used to collect and analyze data for this qualitative study. The researcher prepared a nonscheduled interview guide and used this guide in interviewing the twelve participants in this study. Members of the Qualitative Research Group participated in discussions of the interview questions and the initial inductive analysis of the interview data. The researcher designed taxonomies to organize the data from inductive analysis into thematic domains. Participants' high school transcripts and questionnaire information were the remaining data for this study.

CHAPTER 4

PRESENTATION OF DATA AND FINDINGS

Introduction

The purpose of this study was to learn the perceptions female students had of their high school mathematics experiences. During interviews with the researcher, the participants, successful students from a community college developmental program, discussed their experiences in high school mathematics classes, often comparing these experiences to other high school and community college experiences.

This chapter will present the findings from the analysis of the interview data and data from high school transcripts and demographic questionnaires completed by the participants. The chapter will begin with a description of the participants as a group followed by a one-page introduction to each participant. After a discussion of one of the assumptions of the study, the findings will be presented. The findings will be organized into thematic units within the categories of internal belief system, the roles of the school, teachers, peers and family. Finally, findings related to the theme "the lost year" will be presented.

While the categories and most of the themes presented in this study are related to findings from earlier quantitative studies, it is significant that, for this study, the findings reflect the perceptions of the learners in their own words. The meanings

these learners attached to their experiences will help educators understand some of the factors which contribute to the beliefs and practices of female students.

The Participants

The participants in this study were twelve female students from White Community College. (Pseudonyms will be used for all people and places mentioned in this study.) During fall semester, 1991, these twelve students completed, with a grade of A, the final developmental mathematics course in a three-course sequence of mathematics remediation offered at White Community College. Using interview data, transcript analysis and answers to a brief questionnaire, the composite group will be described.

As a group, the participants were B- students in high school. Class rank data show the majority of them to have graduated in the upper quartile of their high school classes. Their participation in high school mathematics averaged 3.5 years. Grades in mathematics ranged from A's through F's, but most were B's and C's. For some participants, mathematics became more difficult as the content became more complex. For others, difficulties arose when subjects changed, as from algebra to geometry. (See Table 4.1 for a summary of transcript data.) The important point to make for this study is that all twelve participants received high school credit for Algebra II.

TABLE 4.1

Transcript Data

Participant	Mathematics			ACT Scores*			Class Rank	
	Year	Course	Grades	Eng.	Math	Reading		
Helen	9	Alg. I	D D	20	19	18	<u>116</u>	Top 1/3
	10	Alg. I	A B					
	11	Geom.	A A					
	12	Alg. II	B C					
Ericka	9	Alg. I	B C	22	17	20	<u>19</u>	Top 15%
	10	Alg. II	B C					
	11	Geom.	A C					
	12	----						
Tootie	9	Alg. I	D B	19	19	14	N/A	
	10	Geom.	D F/A					
	11	-----						
	12	Alg. II	B B					
Brenda	9	Int. Alg.	D C	16	19	14	N/A	
	10	Alg. I	C B					
	11	Alg. II	B D					
	12	Geom.	C D					
Linda	9	Pre-Alg.	B B	26	18	27	<u>244</u>	Bottom 1/3
	10	Alg. I	D F					
	11	Alg. I	B D					
	12	Alg. II	C F/C					
Andrea	9	Alg. I	B B	16	17	20	<u>12</u>	Top 10%
	10	Geom.	C B					
	11	Alg. II	A B					
	12	-----						

*36 is highest possible score.

N/A - Not Available

TABLE 4.1 (cont.)

Transcript Data

Participant	Mathematics				ACT Scores*			Class Rank
	Year	Course	Grades		Eng.	Math	Reading	
Toni	9	Pre-Alg.	B	B	17	14	18	<u>72</u> Top 217 1/3
	10	Alg. I	A	A				
	11	Geom.	B	D				
	12	Alg. II	C	C				
Michelle	9	Alg. I	B	B	16	19	17	<u>37</u> Top 175 20%
	10	Geom.	A	B				
	11	Alg. II	B	B				
	12	---						
Lisa	9	Alg. I	B	B	16	19	17	<u>51</u> Top 217 25%
	10	Geom.	B	B				
	11	Alg. II	B	A				
	12	Adv.Math	B	C				
Stephanie	9	Alg. I	B	B	27	22	25	N/A
	10	Geom.	B	B				
	11	Alg. II	D	D				
	12	---						
Shelly	9	Alg. I	C	C	18	18	20	<u>79</u> Top 330 25%
	10	Geom.	C	C				
	11	---						
	12	Alg. II	C	C				
Jean	9	Alg. I	C	C	23	17	20	<u>54</u> Top 320 20%
	10	Alg. II	C	C				
	11	Geom.	D	D				
	12	Adv.Math	D	-				

* 36 is highest possible score.

N/A - Not Available

DSM 0840, the course used for selection in this study, was a repeat of Algebra II for them. Therefore, their success in this course cannot be studied as success in a course with new mathematical content. This success must be viewed as success in mathematics which was studied previously.

Along with the developmental mathematics, nine of the participants were required to take developmental reading and English courses at White Community College. This is mentioned for several reasons. First, the researcher feels there is evidence of a connection between some types of difficulties in mathematics and abilities in English reading and usage. This group of participants, from their grades, ACT scores in English, and grammatical usage of the English as evidenced in the interviews, demonstrated substandard achievement in these areas. Second, when the participants' English grades from high school transcripts were compared to ACT-English scores and similar comparisons were made with mathematics scores, an inverse relationship emerged. Participants with higher grades in high school English and mathematics received lower scores on the ACT. Lower high school grades resulted in higher ACT scores. (See Table 4.2.) For this group of students, such inverse relationships raised many questions, but they affirmed the community colleges' rationale for using standardized tests rather than high school transcripts for placement purposes.

The high schools attended by the participants varied in their curricular offerings, but for this group of students, the similarities are more important than the differences. Four of the students enrolled in vocational programs focusing on

Table 4.2**Participants' Grades Compared to ACT* Scores**

Mathematics H.S. Average	ACT-Math	English H.S. Average	ACT-English
B	14	B	16
B	17	B	16
B	17	B	16
C/D	17	B	16
C	18	B	17
C	18	A/B	18
B	19	C	19
B	19	B	20
B	19	A/B	22
B	19	C	23
B	19	C	26
C	22	C	27

* ACT scores range from 0 - 36.

marketing and secretarial skills. Three of these four had planned to attend college and the fourth decided during her senior year to attend White Community College. The remaining eight participants studied an academic curriculum with the intention of attending college. As mentioned earlier, all twelve had at least three credits in mathematics in high school. Only six students had three credits in high school science, including chemistry. The other six had two credits, usually physical science and biology. Thus, for this group of students, science participation averaged one year less than mathematics participation for the four years of high school.

The final descriptive factor to be mentioned here is the socioeconomic level of participants. Of the twelve participants, one came from an upper-middle class home in which the stepfather was a physician. Three others had fathers or stepfathers with a college education. The remaining eight were from working class families where the highest level of education of parents was completion of high school. The mothers' educational level was lower than the fathers'. The mothers who had attended college left before graduation to get married. Most of the participants stated that their mothers' highest level of education was completion of high school.

As a component of socioeconomic level, the structure of the family unit was considered significant for these participants. Six of the participants had lived with both parents all their lives and were continuing to do so at the time of the study. The other six had experienced the pattern of divorce and remarriage (sometimes more than once) and had lived most of their school-aged years with their mothers and stepfathers. For some these experiences were more traumatic than others, but

financially the implications were that funds for college were not as readily or willingly available for the female students who were being supported by stepfathers, especially if the stepfathers had other children from earlier marriages to support.

Ten of the participants in the study were white females. The two black participants were from working-class families, and were the youngest of many siblings. Tootie, one of the participants, attended an inner-city black high school and received much encouragement to continue her education through minority programs offered at her school. Toni, another participant, attended a 99% white high school where there were no minority programs.

The participants, then, represent a diverse sample of what the researcher would call the "middle tier" of students. They were not A students and were not enrolled in the upper two levels of mathematics or other subjects. Some were involved in vocational programs, but most had planned on attending college since elementary school. The participants were B and C students in mathematics and other subjects, students who rarely needed or demanded intervention from administrators or guidance personnel since they were doing satisfactory work. The few who had problems early in high school seemed to get their lives back on track.

The following pages will introduce each of the participants and summarize what the researcher feels are significant incidents in their lives related to this study. Pseudonyms are used for all names and places.

Helen

Helen graduated from Sheridan High School in May, 1991. Born in North Carolina, she lived at home with her mother, half-brother, and stepfather, a surgeon. Helen had a difficult adjustment to Hampton High School and transferred to the smaller Sheridan High School halfway through her freshman year. Because of attendance and other problems, Helen received D's in both semesters of Algebra I and repeated Algebra I successfully in 10th grade.

Helen felt her early problems in high school were due to being easily influenced by the wrong kind of friends. She was advised by her parents to attend White Community College because it would be a good transition between high school and going away to college where she was afraid she might come under the wrong influences again. She seemed heavily dependent on her parents for guidance and resented being in this position. At age 19, she had few freedoms and felt that her stepfather, because he was from another country, was too dominant and restrictive. Conversely, she felt his beliefs were what made him successful.

A central experience in Helen's life was her work for a McDonald's restaurant. Helen often used the word "care" in relation to her work at McDonalds. She felt she cared for the way the store looked and how employees treated customers. She expressed a concern that perhaps she cared too much about the store.

At the time of the study, Helen was struggling with Pre-Calculus, upset with lengthy tests she could not finish.

Ericka

Ericka was a May, 1991, graduate of rural Woodlawn County High School which was 70 miles north of White Community College. Woodlawn High School serves the rural population of a mountainous area which depends largely on the local coal mines for income. In recent years, many of the mines have been closed and unemployment is high in the area. Woodlawn County is an area with conservative, traditional values and most of its young people marry before or by the end of high school. Ericka wanted more for her future.

Ericka decided to move to Huntsville and rent an apartment with a friend to attend college. White Community College was not the closest community college, but Ericka wanted to move to the larger city of Huntsville to attend college. The state university was also in Huntsville, but Ericka wanted to attend a smaller school.

Ericka was an average and above student during her three years of high school mathematics, taking Algebra I, Algebra II and Geometry her first three years. She registered for and began precalculus in her senior year but she and her friends decided they wanted to have fun their senior year so they dropped math.

During high school Ericka lived with her mother and stepfather until they divorced. Her father died when she was 16. She had a younger brother living with her mother. Ericka talked of becoming a lawyer but decided seven years of school was too much so she decided to enroll in White Community College's paralegal program.

Tootie

Tootie, a black participant, graduated from Packard High School in inner city Huntsville. She had taken three years of mathematics in high school . Because she had "goofed off" in 10th grade, Tootie had to repeat most of that year's coursework. She was a B student in mathematics and was the only participant with four years of high school science including chemistry and physics. She was part of a minority program recruiting students to engineering but decided she wanted to be a psychologist because she liked helping other people with their problems. Her information on what a psychologist is and does was obtained from watching the Oprah Winfrey show .

Tootie scored low (14-19) on the ACT in all areas and was placed in remedial reading and developmental mathematics at White Community College. She was enrolled in the second remedial reading course at the time of the interview. Even though her declared major was psychology, Tootie had already dropped her psychology course because of the large amount of reading it required.

Tootie spoke critically of many of her female high school classmates who had children while they were in high school. She thought they were lazy because they would not go to school to get ahead. She identified more with her male classmates who seemed to want to get ahead in the world and had goals.

Tootie had a supportive family. Her mother and aunts encouraged her to go to college and had high expectations for her. She was the first in her family to attend college. She had several older brothers but she dismissed them as role models.

Brenda

Brenda graduated from Decatur High School in Hunt County in May, 1991. She spoke of having moved often as a young child, but she had lived in Decatur for all of her high school years with her mother, stepfather and younger brother.

Brenda had four years credit for mathematics in high school, but her first two credits were for an Algebra I sequence. She studied Algebra II in 11th grade and geometry in 12th. Brenda's main interest was art. She studied art all four years of high school and also studied drafting in 11th and 12th grade. From Brenda's comments, it was evident that no one at her high school encouraged Brenda to combine these three interests and talents as a possible career. Brenda was interested in advertising as a career, but as yet had not discussed a major with any advisor.

Brenda had failed 9th grade English and was placed in the lower basic track of English for the remaining years of high school. She was placed in developmental English and mathematics at White Community College.

Brenda's mother was an influence on her life. Her mother's early marriage and divorce and the frequent moves of her early years caused Brenda to feel strongly about getting an education before she married. Her boyfriend was pressuring her to get engaged, but she was resisting until she was finished with school.

At the time of the interview, Brenda was enrolled in Fundamentals of Mathematics, a college-level course. She felt she was doing well and was feeling confident about her mathematics ability. She felt that "math liked her."

Linda

Linda graduated from the rural Frankfort High School in Clair County. She had transferred schools several times in high school. Of all of the participants, she was the weakest mathematics student. Linda failed Algebra I in 10th grade, repeated it successfully in 11th grade. In 12th grade, Linda failed Algebra II and passed it in summer school. Linda attributed some of her problems with mathematics to the many moves she made during high school and the negative influence of friends during 10th grade. She expressed a strong dislike for mathematics and felt she would do better in her present precalculus course if she took it again, a familiar pattern for her.

Linda's strength in high school was English and she scored high on the ACT-English. She spoke metaphorically of her mathematics experiences, using phrases such as being "blindfolded" and not being able to "cross the bridge" in learning mathematics. Linda's community college placement scores in mathematics were low even though she had just repeated Algebra II in summer school.

At the time of the interview, Linda was eight months pregnant, not planning to marry her boyfriend in the near future, and making plans to stay in school and take care of the baby. She was determined to get a two-year degree in medical transcription so that she could provide the baby with necessities.

Linda was an only child and lived with her mother and second stepfather, an engineer. She felt she had been spoiled by being an only child and appreciated her stepfather's insistence that she have some guidelines and rules to follow.

Andrea

Andrea graduated from rural Sumter High School in Logan County. Of all of the participants, she had the best high school record, graduating in the top 10% of her class of 150 students and being involved in activities, especially band. The lowest grade on her high school transcript was a C in first semester geometry.

Andrea's life was focused. She had worked in her father's business for years and felt confident of her abilities. Her ACT scores were low in all areas and she attributed this to her school not being equal to the "city" schools, referring to Hunt County schools. She placed into developmental English and mathematics at White Community College and felt she needed the remediation to prepare herself for the competitive environment of State University to which she had transferred.

In her senior year Andrea decided not to take the precalculus course so that she could concentrate on band. She did receive a band scholarship to State University and attended White Community College for one semester as part of a "parallel" program.

Andrea was enrolled in a precalculus course at State University and was a B student at the time of the interview. She was pleased that the course, while in a large lecture format, had mandatory proctoring sessions. Andrea was perceptive about types of learning environments which were conducive to student participation.

Andrea planned to major in business and minor in music and eventually manage her father's business. Her father's success in business was a strong influence on her and she admired his self-discipline and determination.

Toni

Toni was an African-American student who had graduated from Hillsboro High School in a rural area of Hunt County in May, 1990. She worked a semester and enrolled at White Community College in January, 1991. She had four years of high school mathematics beginning with the two-year Algebra I sequence. Geometry was her most difficult mathematics subject, accounting for the only D on her academic transcript. Toni was the only participant who had tested into the lower developmental course, DSM 0830, which covered the content of Algebra I.

Hillsboro High School was a 99% white high school. Toni discussed having friends of both races and felt that most of her experiences at Hillsboro had been positive. She felt some of her teachers were not sensitive to racial issues, but she also felt that she herself had an "attitude" in some of her classes. Toni mentioned that attending a mostly white high school had prepared her for the real world of Hunt County, especially for job situations.

Toni was the youngest of a large working-class family and had parental encouragement and limited financial support. An older sister who had graduated from college and had worked in Atlanta and New York was a strong influence on Toni's plans and goals for the future. Toni dismissed her brothers as a positive influence.

Toni was continuing her study of marketing from high school and planned on earning a two-year associate degree. At the time of the study she was experiencing stress with a full course load of college level subjects.

Michelle

Michelle was a 1991 graduate of Hillsboro High School. She graduated in the top 20% of her class and attending college had been part her plan since elementary school. Michelle was a B student in mathematics for her first three years of mathematics, but decided not to take Precalculus her senior year because she felt she did poorly in Algebra II because it contained so much new material.

Michelle's ACT scores were low in English and reading. Her mathematics score was 19 which would have exempted her from developmental mathematics except for a school policy which required students to take developmental mathematics if they were enrolled in developmental reading and English.

Michelle was a perceptive observer of her classmates and school settings. A serious young woman, she was the youngest child in her working-class family and the first to go to college. She spoke of her family's early financial struggles and the encouragement she received from her parents to go to college.

As an accounting major, Michelle was taking her first accounting course and experiencing difficulties, thinking of changing majors or dropping accounting. She felt she was doing satisfactorily in her precalculus course.

Michelle liked community college much better than high school. She felt the college students accepted her for who she was and did not judge her by how she dressed or how much money she had.

Lisa

Lisa was a 1990 graduate of Hillsboro High School and, like Toni, worked a semester before enrolling at Springfield Community College in January, 1991. Because she did not complete that semester, she repeated her courses at White Community College in the fall of 1991.

Lisa was the only participant with four full years of high school mathematics completing the Algebra I through Precalculus sequence with A's and B's. In 12th grade, Lisa received a B and C in Honors Advanced Mathematics, the precalculus course. Although Lisa's ACT-Math score was 19, she was required to remediate in math because her English and reading scores were low. She resented having to repeat Algebra II for no credit and had enrolled herself in Calculus during the current semester without her advisor's approval. She refused to "waste" another semester.

Of all the participants, Lisa had the most difficulty answering questions and staying on the subject for more than a few seconds. She seldom completed a thought. She spoke of her difficulties in English classes, especially on writing assignments. However, Lisa was an animated speaker and loved to talk, perceiving herself as a good communicator and was hoping to major in communications in college.

Lisa had recently moved to an apartment with friends in Huntsville and was supporting herself with two waitress jobs. Her family had moved often during her early childhood and during high school she had lived with her mother, two older sisters, her stepbrother and stepfather.

Stephanie

Stephanie was a 1991 graduate of Hampton High School in the most affluent area of Hunt County. Her early education had been in Boston, Massachusetts, suburban schools and only her last two years had been at Hampton. She lived with her mother and stepfather and had previously lived with her father and stepmother after her parents' divorce when she was 13. She experienced several difficult years following the divorce and was placed in an alternative school to repeat 9th grade. During that time she received extensive counseling for minor drug and emotional problems and at the time of the interview, Stephanie felt that her life was in order.

Having repeated Algebra I in 9th grade, Stephanie did well in geometry, but earned D's in Algebra II during her first year at Hampton and was not allowed to continue in the mathematics program. Even though she scored 22 on the ACT-Math, Stephanie chose remediate in math because of the D's she received in Algebra II.

Stephanie's father and older brother influenced her educational decisions. Her grades seemed to be of utmost importance to her father and she spoke with pride of making all A's her first semester at White Community College. Of all the participants, Stephanie had the highest ACT composite, 25. At the time of the interview, Stephanie was planning to marry the following summer. The friendship with her boyfriend had helped Stephanie begin to "like" high school after an unhappy 11th grade year. Stephanie was the only participant who spoke of such extreme emotional difficulties during her high school years.

Shelly

Shelly was a 1991 graduate of Frankfort High School in rural Clair County. Like Linda and Jean, she attended the smaller Clair County campus of White Community College. Shelly was active in sports her first three years of high school and had planned a secretarial career before deciding, with strong parental support, to attend college. Shelly enrolled in Algebra II in 12th grade so that she would have the entrance requirements for State University in mathematics.

Shelly graduated in the top 25% of her class, but her ACT scores were low enough (18) to require placement testing and Shelly was required to take developmental reading, mathematics, and English her first semester at White.

Shelly planned to be an elementary education major at State University or another state college and was enrolled in a 2-year transfer program in education. She worked part-time at an after-school daycare program and enjoyed working with 9 and 10-year olds. She was happy with her choice of majors and at the time of the interview was feeling good about the statistics course she was taking as part of that program. She had a B average and spoke with pride of using her new home computer to do her statistics homework.

Shelly was from a stable home environment. Her mother had quit work to raise three children and Shelly had fond memories of her mother or grandmother always being at home. Her older brother had completed a degree in religious studies at a small private college and Shelly discussed college decisions with him.

Jean

Jean was a 1991 graduate of Morton High School in rural Clair County. Her high school years were highlighted by her involvement in DECA, a vocational program. She served as president of DECA her senior year and travelled to England with the group. Jean received a Tennessee honors diploma, graduated in the top 20% of her class. Jean dropped Precalculus during her senior year because of low grades and little time to study. Geometry was difficult for her and, even though successful in the developmental mathematics course, she still "hated" math.

Jean had taken the ACTs twice and had scored low in mathematics the second time.. She resented wasting time repeating courses and enrolled herself in calculus, skipping precalculus, without her advisor's approval.

Jean had an extraordinary work and school schedule. Since 10th grade she had been working 30-40 hour weeks as a waitperson at a local restaurant/conference center. She also did volunteer work two afternoons a week. This work pattern matched that of her parents. Her father worked, had attended college for the past 10 years and was a part-time minister at their church. Her mother held two jobs and the family seemed to thrive on activity. Jean especially admired her father's persistence.

Jean had an engaging personality and found much humor in her reflections of high school. Like Andrea, she was a keen observer of school behaviors and had perceptive comments about teacher behaviors and student participation.

Findings

The following sections of this chapter will describe the findings from this study of female mathematics students. After a discussion of one of the assumptions for this study, the remaining findings will be presented as themes within the three categories of internal beliefs, the role of the school, and the role of peers and family members. These findings emerged from inductive analysis of interview transcripts. Pertinent quotes will be used to support the themes. An additional theme, the lost year, will conclude the discussion of findings.

An Assumption Proved False

During the interviews and the analysis of interview data and high school transcripts, it became evident that one of the assumptions used as a basis for this research study was false. It was assumed that participants, because they were enrolled in a remediation course, developmental mathematics, would have experienced difficulties with mathematics in high school and, thus, would have had minimal participation in mathematics. However, all of the participants had credit for at least three years of high school mathematics with grades ranging from A to C. The only failing grades in mathematics were received by Linda (65 in second semester Algebra I) and Tootie (F in second semester geometry). In both cases, the courses were successfully repeated. Helen repeated Algebra I because of an unstable 9th grade

during which she earned D's in Algebra I. She had to repeat Algebra I in 10th grade to continue in the academic mathematics sequence. She did this earning an A and a B in Algebra I during her sophomore year.

Stephanie also repeated Algebra I, but not in the same context. She failed 9th grade because of lack of attendance at her high school in Massachusetts. Her records reflect only the set of grades she received from repeating 9th grade successfully at an alternative high school.

The school districts involved in this study offered approximately the same six levels of mathematics in grades nine through twelve (from low to high expectations) : proficiency, applied, basic, academic, honors, and accelerated. None of the participants were ever enrolled in the bottom two tracks of mathematics in their schools. Three of the participants, Brenda, Linda, and Toni, studied prealgebra, a basic level course, in 9th grade. The label "Prealgebra" is a misnomer for this course. In reality, the prealgebra course covers the first half of the regular Algebra I text, while the next course, labeled Algebra I, covers the second half of the text. These two courses, in a two-year time frame, cover the regular Algebra I content. The intent of the schools is to give these students more time to master Algebra I. For Toni and Brenda, the two-year sequence was successful. For Linda, the first course was successful, but the second was not and she repeated it successfully in 11th grade.

Two of the participants, Lisa and Jean, enrolled in a fourth year of high school mathematics, precalculus. Jean dropped out after the first semester, but Lisa

successfully completed Honors Advanced Math with grades of B and C.

Ten participants took three standard, college preparatory, mathematics courses: Algebra I, Algebra II and geometry, receiving passing grades, in most cases above average grades. They were not the type of student anticipated in the design of this study. While they talked of instances of frustration and failure, overall their pattern of participation and success in mathematics was positive. Then, why were they enrolled in a remedial mathematics course in the community college? Why were they enrolled in a course whose content repeated high school Algebra II, when they had successfully completed Algebra II in high school?

While each participant had a unique story regarding her enrollment in developmental mathematics, the underlying reason was similar for the majority of the participants. White Community College, like all state community colleges, requires students to take placement tests for mathematics, reading, and English if they do not score 19 or above in that area on the ACT. In addition, even if a student made a 19 or above on the ACT-Mathematics, but the scores for English or reading were below 19 and the student tested into remedial or developmental reading or English, then the student was not allowed to take college-credit mathematics. The school's policy required that a student take all four developmental courses if two were required.

Five of the participants were enrolled in developmental mathematics because of the policy requiring all developmental subjects if two were required. Six of the participants scored below 19 on the ACT-Mathematics as well as in English and Reading. They enrolled in developmental mathematics because of the low scores.

Their subsequent placement tests corroborated the recommendation that they be enrolled in developmental mathematics. Only Stephanie, who scored 22 on the ACT-Math, chose to take developmental mathematics because she had earned two D's in Algebra II in 11th grade and felt she needed to review the course before advancing to college level mathematics. Therefore, eleven of the twelve participants repeated Algebra II because of school policies which did not include their high school transcripts as a basis for decisions. Only two criteria, ACT scores and placement test scores, were used for decisions on course enrollments at White Community College and other public community colleges in the state. (The discussion of Table 4.2, page 65, suggests reasons for this policy.)

The placement tests for fall semester, 1991, were administered in late August and repeated the first day of class in each course. Since most of the participants had not studied mathematics during the summer and were not informed of the content of the placement tests, they took the tests with no preparation and eleven scored at a level which required them to enroll in the last mathematics course in the remedial sequence. No college credit is given for this course.

The first major finding of the study, then, was that the participants were not the group of students that the researcher anticipated. They were not students who had experienced years of difficulty in mathematics in high school and had dropped out of the mathematics sequence. They were students who had taken three to four years of high school mathematics and, while not being among the top students, were nonetheless successful B and C students in high school mathematics.

As it became apparent during the interviews that the students did not match this assumption, a shift of emphasis in the interview evolved. While the interview questions remained the same, the style of the interview was changed to allow each participant's story to emerge. Since there were not major difficulties in high school mathematics to discuss, the focus of each interview became the story of each participant's high school mathematics education and whatever events or persons were significant to the participant. Because these students had participated in more mathematics in high school than anticipated, they had more stories to tell and could reflect on their mathematics education over a longer period of time. Since they had not dropped out of mathematics early in high school, their memories of mathematics courses were more recent. They also, because of their recent success in the developmental mathematics course, had a basis for comparing their high school education to community college education. Their success in community college seemed to validate, in their minds, their opinions about their high school experiences. From the researcher's point of view, they were an interesting population in that they represented the "middle tier" of mathematics students, the largest group of students in most schools, and yet a group which is seldom studied in educational research.

Internal Beliefs

"Students bring more to the mathematics classroom than just their books and pencils. They also bring a wide assortment of skills, prior knowledge, work habits,

attitudes and beliefs" (Meyer & Koehler, 1990, p. 60). The internal belief system is composed of all of the beliefs and attitudes the learner has about herself as a learner of mathematics. For this study, themes which emerged in this category were related to confidence, effort, and areas of mathematics perceived as being especially difficult.

Gaining Confidence in Mathematics Ability

In discussing themselves as learners of mathematics, both in high school and community college, the participants responses differed with previous research findings in one area: causal attributions. Research (Pedro, et al, 1981) has shown that female students attribute success in mathematics to effort rather than ability. However, many of the participants in this study attributed their success in the community college mathematics course to a new-found ability in mathematics.

"I'm more confident now about [mathematics] because I know that I can do it. In high school, I never knew that I could do it so I just, I always assumed that I couldn't and I would always go in with the wrong attitude and of course I got out of it what I put into it," was Shelly's response when describing how she felt about herself as a learner of mathematics.

Lisa has learned not to let complicated texts overwhelm her at the beginning of a course. "To look at it, it looks like a totally different language when you're looking through the book and you think, 'Gosh, how could I ever figure this out.' But after you've taken...the course, you're, 'I remember this and I remember that.'" She has learned to use past experiences as a basis for comparison in new situations, thus

relieving herself of any initial anxiety caused by scanning the large, somewhat intimidating calculus text used in her current mathematics course.

Jean, who has bad memories about algebra and geometry topics that "just wouldn't register with me," said, "Now it's a breeze....I can do it, given the time to study." For Jean, with her busy work and school schedule, time was always a factor in being successful.

Brenda was feeling good about herself and mathematics, and those feelings were continuing in her present mathematics course. "I really enjoy math. It comes, really, it comes kind of easy to me. I guess math likes me. I could just put it that way. **Math likes me.** But I just have fun with it. It reminds me of art and I love art."

The participants in this study were confident of their ability to do mathematics successfully. In addition to knowing their own abilities, their use of time in relation to effort emerged as a theme.

Learning to Value Time

Mathematics is a subject which requires active participation to learn. Mathematics also requires constant expenditure of time outside of the classroom for the practice essential to learning. Today's students are often passive learners. For many subjects in high school, classroom involvement consists of taking notes on lectures and reading prose text material. The study habits needed to be successful for these subjects may not be appropriate for mathematics. The participants in this study

had begun to understand that it took time in many forms for them to be successful mathematics students.

Participants mentioned time and effort in reference to mathematics courses in high school in which they had not excelled. "I didn't spend as much time as I should have on Algebra II," said Ericka. "I just wish I hadn't goofed off as much, but that's part of being in high school. Most people do it and you don't really think ahead."

In discussing her Algebra II experience in 11th grade, Stephanie said, "And I didn't do very well because I was still having problems living with my mom....That wasn't a real good year....I didn't do well, but I didn't try." Toni mentioned laziness, "I was lazy. I didn't like school. I went and did the work. I didn't really learn it. I did it, you know, just to get through the day or get me through the test. And sometimes I regret it because I ...knew it to get by but I didn't really learn it. It didn't stay in my mind."

Some participants mentioned effort as it related to available time. Jean began working 30-40 hours a week during 10th grade and was involved in volunteer activities as well as DECA. She successfully completed Algebra I and Algebra II in her first two years of high school. "And then my junior year I had geometry and I hated geometry. I couldn't do it....I just couldn't do it. It just wouldn't register with me. And now I think, well, if I had studied I probably could have done it because I can do it now, but I didn't like the teacher." In high school, Jean felt she did not have the ability to do geometry, but after experiencing some success in mathematics in college and reflecting on her own ability, she has decided that lack of effort may

have been a big part of the problem. It is important to note also that not liking the teacher was associated with lack of effort.

Shelly was involved in athletics her first three years of high school. "...I didn't apply myself or I didn't study much because I was into all the sports when I was taking [geometry]. During softball season, we played five days a week and sometimes didn't get home til 10 and 11 and I just didn't have the time. I didn't make the time, I guess....There's so many activities going on in high school. School work just sometimes isn't a major priority."

Brenda also mentioned school and social activities which affected her effort. "In high school, I didn't study. I just wasn't the studying type at all. I could not stand to look at books. It was just the same thing every day....it was just the same thing over and over again, week after week, day after day, all the time and it just, that got old to me, real old." In discussing her senior year and the geometry course she was struggling with, Brenda said, "I knew I could have done better, but it was my senior year and I was ready to graduate....that was all I could think about....and I was so tired and after lunch and after drafting and after having a big time in drafting I'd have to go to geometry and sit there and take notes."

Overall, most participants blamed themselves for lack of effort when they were having problems in mathematics courses. Some contrasted their effort in mathematics to their effort in other courses in which they were succeeding. In speaking of a senior government course taught by her favorite high school teacher, Shelly said, "I mean I wanted to learn in that class. I would go in the class prepared for that day. She

made it fun....the debate, we worked so hard on it. My partner and I worked so hard on it."

Difficulties with Visual and Verbal Mathematics

Throughout the interviews participants would mention parts of courses which they strongly disliked or which gave them the most trouble. Word problems, geometry and graphing were the topics in mathematics that were referred to by most participants. Helen, who otherwise was a successful mathematics student, both in high school and the developmental course, said, "I've just never been able to do the word problems. For some reason, it doesn't click....It's getting the problem set up that I have trouble with." Tootie's remarks were similar: "And I always did good in math, except for when it came to graphing and word problem, I hate it....I'm pretty good in all of it except when it comes to graphing and I've gotten better in word problems, but graphing was really my weak spot....Graphing was just so hectic to me because if you messed up one number,...the whole thing was messed up and I really saw no purpose in it....I really hated graphing."

Lisa, the only participant who finished a precalculus course in high school, also mentioned word problems as an area of trouble. "I'm not really too good at those word problems." Like many of the other participants, Lisa was required to take developmental reading and English when she entered White Community College. Although her mathematics skills were sufficient, her verbal skills were weak.

Andrea had an unusual explanation for her feelings about geometry. She felt

she had an "algebraic mind" and that geometry was hard for her. "[Geometry] just seemed a lot harder for me. I don't know why, what there was about it. Doing some postulates and stuff like that, I could remember them, but when you had a problem that you had to prove, it was hard for me to prove that by using the postulates and theorems that we had to use.

Linda, while not fond of mathematics in general, expressed strong feelings about Algebra II in 12th grade. "And I had no problem with it first semester...and then when they got into all that graphing, I just went (gestures wildly), 'I don't know what's going on.'...When you hit graphing and you have to shade to one side, ...that's where everything just kind of screeches to a halt."

Brenda who studied geometry in 12th grade, stated, "We started in theorems and stuff like that and I was lost....It was the theorems. It just wouldn't stick. It sticks now. I remember a lot of it, but it just didn't stick then."

Toni did not mention proofs as a problem in geometry but did have a problem with various geometric shapes. "Geometry, that was hard....I really didn't understand, the shapes, the triangles, and degrees and everything." Toni also did not recall ever learning any of this geometry, "perpendicular and all that, no, none of that," in middle school.

Jean took geometry in 11th grade. "I hated it. The things they did like when they worked with graphs and stuff and where you had to graph parabolas, I just couldn't do that. It just wouldn't register with me."

Visual and verbal mathematics were areas of mathematics perceived as difficult

to many of the participants of this study. Their beliefs about the use of time in learning mathematics and their feelings of confidence about themselves as learners of mathematics complete the dominant themes within the internal beliefs of the participants. The following sections will discuss influences which, though external to the participants, also contribute to the formation of their internal beliefs.

The Role of School

Time: Freedom, Flexibility and Responsibility

From the previous discussion of internal beliefs, the issue of time and effort evolved as important components of learning mathematics. Time and effort as a theme also emerged from the data in which participants discuss their high schools' time structures. Participants spoke of the scheduling of time in high school as incompatible with their needs. Help was never available when they had free time. The rigid schedules of their high schools did not allow time during the day for any supplementary learning activities. As college students, they now were responsible for planning study time for mathematics and other subjects. They realized the importance of practicing mathematics as soon as possible after attending class so that they would retain what they learned in class. The freedom of a more flexible time schedule in college required them to take responsibility for planning study time. Time was now a controllable component of their day. They valued and were more aware of its usefulness in their learning of mathematics.

Brenda found the variety of school days at the community college more conducive to learning. "I like college more because you have...different things every day and in high school it was just the same thing over and over, day after day, week after week."

At the time of the interview, Shelly had a set routine studying for her Tuesday and Thursday statistics class. "I'll usually try to do it the day of class...start on it and will come back to it Wednesday night or Monday night." She compared these study habits to high school. "Once I got in high school and in all the sports I was in, there's no way I would have certain times I had to study...There's so many activities going on in high school. School work just isn't a major priority."

Lisa decided that taking mathematics courses during the daytime was not a good idea for her. She preferred to work at her job during the day and take courses in the evening. "I look at it like this. During the day between 10 and 2 either I'd be in class or eating or, in the summer, be out in the sun...I would not be studying. I will not study during the day."

Participants appreciated the community college's flexible scheduling and freedom between classes. Tutoring was available at the Learning Center for those who needed it. The important issue for the participants was that it was now up to them to arrange their schedules to allow time for class, work and studying and they appreciated the opportunity to be in control of their time.

The Importance of Teachers' Time

Two themes reflecting the use of time related to the availability of teachers' time and the use of teachers' time during classroom instruction. Nine of the participants mentioned the importance of availability of teachers for helping students both during and outside of classtime. The constraints of a high school schedule do not always allow for free time for students or teachers for tutoring, but many teachers seemed to find ways to make themselves available for students. In many cases, even though the students did not take advantage of the availability of the teachers, they still mentioned it as a sign of the teacher's willingness to help students.

Several participants mentioned before and after school help sessions offered by teachers. Ericka spoke of staying a lot for tutoring sessions offered by a mathematics teacher. Linda and Michelle spoke of help sessions offered by their Algebra II teachers, even though their after-school work schedules kept them from attending often. Andrea's Algebra II teacher came to school a half hour early every day and tutored any students who attended. "She [did] anything she could to help you progress." Andrea also appreciated the availability of the proctors in her precalculus class at State University. Because she was aware of students' hesitance to approach teachers for help, she appreciated having a proctor assigned and available for her after every mathematics lecture.

Helen spoke of her Algebra I and Algebra II teacher. "She was always there after school, before school, anytime you wanted to go see her." Jean, although she dropped the precalculus course in 12th grade, spoke of the attempt her teacher made

to be available to her. "She would take the time and say, 'Would you meet me after class and we'll go over this?' She would take the time out for you." Jean also mentioned that her calculus instructor was "forever telling us before he leaves class everyday, 'My office hours areYou can meet me in there if you need to talk."

Shelly's comments about her teacher's willingness to walk to students' desks to check their work can also be interpreted as a sign of availability. Shelly also spoke of her Algebra I teacher. "She offered a lot of help. She would tutor and stuff after school if we needed it. I didn't ever have time for it because I was in sports."

In addition to the importance of the availability of teachers' time in and out of class, the time structure of a class period was important to many of the participants. The participants were aware that teachers organized the class period into time components and expressed opinions about how much time was allotted to teaching activities. Helen talked of a middle school mathematics teacher. "She took a lot of individual time with you. Sometimes in math it takes a minute for it to click with me." When speaking of her Algebra I teacher, Tootie said, " She took a lot of time during and after class to help you....there was always time for her and us to work out what we really needed to know. I always thought she was the best because of that."

Brenda, when speaking of her Algebra I teacher, said, "She just taught real well, and you know, with us having pre-Algebra, she took it real slow and she explained everything she was supposed to explain and made it real clear."

Linda was critical of her Algebra II teacher's time management in class. "You'll spend 35 minutes on last night's homework and we only get 50 minutes for

class and there's 15 minutes left to cover the next night's homework and he never gets done. And [my high school Algebra II teacher] was the exact same way. And I don't like that." Linda resented teachers who spent the majority of class time on other students' questions and did not allow time to teach new material. "What about tomorrow's homework? I don't know how to do it....Why couldn't you just save this instead of taking up everybody else's time?"

In contrast to Linda's feelings about teachers spending too much class time on homework problems, Tootie appreciated when a teacher would do just that. In speaking of her Algebra I teacher, she said, "She was the greatest teacher in the world....I mean she would take the whole class period and work one problem if somebody didn't understand it." Tootie saw this use of time as evidence of the teacher's genuine concern for the students to learn.

Often, the teacher's use of class time was discussed as a symbol of that teacher's attitude toward the students and toward teaching. The following section discusses the importance of teachers' attitudes as a theme.

Teachers' Attitudes are Important

Teachers of mathematics were a dominant category throughout the interviews as the participants discussed their experiences in mathematics. Their discussions of their teachers reflected much of the second generation research on gender issues (Belenky, et al, 1986; Gilligan, 1982) focusing on the importance of relationships to females. Participants mentioned teachers' attention to time on instruction in class,

willingness to give time for individual help outside of class, a teacher's taking time to walk around a classroom to monitor students' progress and offer encouragement. These times were perceived as symbols of the teacher's caring attitude toward students. They spoke of liking teachers who were friendly, who showed concern, who made learning fun. They were critical of mathematics teachers who were not understanding of how teenagers think. They spoke of not being as close to their mathematics teachers as they were to other teachers. The "connected" relationship to teachers was important to the participants. Many spoke of this connectedness and openness of communication in relation to their community college teachers. It was part of their new confidence in mathematics.

Participants' perceptions of teachers' attitudes were usually the result of teachers' words or actions. In some cases, the fact that the teacher walked around the room to see how students were doing on a homework assignment was perceived as a caring attitude. Conversely, a teacher who sat at her desk and required students to come to her for help was perceived as not understanding how peer pressure prevented students from doing just that. In other cases, a teacher's impatient response to a question implied lack of concern. These young women perceived deeper meanings in the words and actions of their teachers. Table 4.3 displays references to teachers' attitudes by all twelve participants.

Toni spoke of the language teachers use as an expression of their attitude toward students. In discussion the importance of having the opportunity to ask questions in a class, Toni said, "That's why a lot of students don't ask....Teachers

Table 4.3

Teachers' Attitudes Are Important

Participant	Descriptive Quotes
Helen	Our geometry teacher, to help prepare us for college, she would give notebook and...reading quizzes.
Ericka	She made sense to me and she helped me a lot after class and stuff. She was just a real nice person. I liked her as a person and as a teacher.
Tootie	My Algebra II teacher, she was a lot more caring than my other teachers...My senior English teacher, she was just so spunky....She'd let us talk about things...I loved her a lot.
Brenda	Developmental math teacher: I told her, "I just love your class." She was real friendly...She was just a real nice person, and she would joke with you and things like that.
Linda	If I don't like my teacher, I have a real problem in class..Last semester, I liked my teacher and I passed that class with no problem.
Andrea	She wanted them to learn....She helped you; she helped anybody that wanted help.
Toni	A lot of teachers [say] "Well, you should already know this. You don't need to ask this question." That's why a lot of students don't ask....They feel embarrassed....So they go without knowing.
Sherri	I think their attitudes [are] more important than [they are].
Lisa	My instructor now is really good....He's really good because he wants us to learn the procedure.
Stephanie	French teacher: Most didn't like her, you know. She wasn't a very likeable person....You had to be ...mature enough to handle her....but I liked her because I started to learn.
Shelly	Home Economics teachers: I was real close with them, but I never got close to any of my math teachers, except for Ms. Walker, my last year math teacher.
Jean	Algebra II: I liked the teacher....She sort of come across hateful but she wasn't....She wasn't very mean about it...but nobody really asked questions in that class....You would go up to her desk...and you didn't want to get up and walk in front of the class.

treat them like, 'You should already know this. Why are you even asking this question.' Or they feel embarrassed and don't want to ask so they go without asking."

While most of the perceptions of teachers' attitudes were positive, the negative impressions were very strong. These young women were noticing words and actions which conveyed positive and negative attitudes about students and learning. They were aware of teachers' attitudes toward them, toward teaching and toward the subject matter.

Guidance Counselors Have Little Time for Students

The role of guidance counselors in the high school experiences of participants of this study was negative or nonexistent. In discussing the role of guidance counselors on their high school decisions, only two participants had positive comments. Tootie respected the new guidance counselor in her minority high school because she took the time to contact students to talk to them. Erica's rural high school guidance counselors "were very encouraging....We would always go down and talk to them....They drilled it into us that we should take all the mathematics we could." The remaining participants perceived a lack of time and interest from their high school guidance counselors. Their assigned counselors did not have time to see them and were hard to get in touch with. Lisa and Michele felt their guidance counselors "only cared about the ones who were going on to college." They felt they were not perceived as members of this group. Most of the participants remembered

speaking to their guidance counselors only once or twice during their four years of high school. Helen's guidance counselor "was a busy person...I tried to get in touch with her, but you never could." Brenda, the participant whose high school credits included four years of mathematics, four years of art, and two years of drafting, received no career counseling from her school. "I was wanting to do advertising and they didn't have many things on advertising...So I really didn't get much use out of it...Most people got a lot out of it because everybody wanted to do something pretty common and you know, be a teacher or a lawyer or a doctor...but they didn't have much on what I wanted, so I didn't go for advising that much."

Andrea's comments on her high school guidance counselor were critical. "We didn't have a very good guidance counselor. We just kind of made our decisions....I never even went to talk to him. I went to try to talk to him a couple of times and he didn't seem to help me any." The critical comments about guidance counselors were all critical in the same area: time. Guidance counselors did not have time for them and so decisions were made alone, perhaps with some advice from teachers or parents. Many of the participants made decisions to drop out of the mathematics curriculum during high school. Michelle's counselor commented on that to her the following year, but took no role in helping her make that decision. The one person in the school who was to oversee the total school experience for these students, the guidance counselor, was not available. For the participants in this study, the minor role of the guidance counselor appeared to be the most conspicuous way in which the organization of the school had neglected them.

Curriculum Pace may be a Factor in Success

Another component of time recognized by the participants in their reflections of their own learning of mathematics was that of repetition of courses as a possible method of achieving success. All of the participants had studied Algebra II in high school, some as recently as summer school and some as far back as tenth grade. All acknowledged the fact that learning algebra was much easier the second time around. Linda, for whom the developmental course was the third time to study Algebra II, had decided that this must be the way for her to be successful in mathematics. As she discussed her problems in the precalculus course she was taking at the time of the interview, Linda said that she knew if she took the course again she would do well. She needed to take the course a second time for the content to be understood. Many of the participants mentioned how surprised they were that Algebra II was so easy and had been so difficult in high school. Michelle spoke of always having difficulty with mathematics if there was a lot of new material. For these students, taking a course for the second time was a significant component of their success.

Social Influences

Peers can have a Negative Influence

The high school years are seen as a period when peer influence and pressure replace that of family influence. For many of the participants in this study, negative peer pressure led to lost time in school. Nine of the twelve participants spoke of

yielding to peer pressure in relation to attendance, effort, and participation in mathematics. The participants who did not yield to peer pressure themselves mentioned how they saw its effect on other students by their lack of participation in class.

Helen felt easily influenced by her peers. While middle school had been a happy and successful time for Helen, when she entered Hampton High School, a large (2400 students) suburban school, she "got in with the wrong group, the wrong crowd....I started skipping school a lot." After a semester of problems, she transferred to Sheridan High School, half the size of Hampton and did much better. "My friends got better as I transferred, but a lot of them were pretty much just average students and they would call me all the time wanting me to go places and I guess that took me away from school, because I'm very easily influenced."

Tootie also experienced a year when her peers influenced her not to do well in school. In 10th grade, Tootie stopped studying and lost a year of coursework in mathematics and several other subjects. "I guess I was going through that stage. All my friends,...I guess we were heading through puberty then....really interested in boys...and my friends were kind of wild."

Linda had a similar experience to Tootie's and Helen's in 10th grade. After a successful freshman year, "my sophomore year I started dating this guy...and he was so much trouble....I got to where I cared more about being around him than I did about school." Linda failed Algebra I in 10th grade, repeating it successfully in 11th grade.

Stephanie repeated her entire 9th grade year in an alternative school in Massachusetts where she was living. She felt the friends she had in Massachusetts were a bad influence on her and that was one of the reasons she left with her brother and came to live with her mother in Tennessee. She was vague in describing 9th and 10th grade, mentioning attendance problems, minor drug use and family problems. "My friends weren't good friends at all from the start of seventh grade on.... I started smoking when I was 12. I mean I don't blame my life on them or anything, but they weren't great influences and I wasn't either...but it affects your life, definitely. Other kids really do affect your life."

Andrea and Jean were reflective when discussing the role of peers during their high school years. Andrea spoke of having friends in a class. "If you've got a class with a lot of your friends,...and some of your friends, they don't care about their grades,...I think it holds people back to ask questions....I think a lot of people won't ask questions because maybe their friends aren't interested and they don't want to seem interested because of their friends." Andrea was aware of the influence friends could have on students, but "I never let that bother me."

Jean, in discussing a teacher who required students to walk up to her desk for help in a mathematics class, said, "You really didn't want to ask her...she was always nice but nobody really asked questions in that class....You would have to go up to her desk and ask her and you didn't want to get up and walk in front of the class. It was just that inferiority complex that you had in high school."

Ericka's group of girlfriends who dropped precalculus with her in 12th grade

were an example of the influence peers can have on high school students. While a teacher or counselor may have some influence over an individual's decision, the influence of a group of peers upon each other makes intervention by outsiders difficult. Brenda experienced a different kind of peer influence as one of two girls enrolled in drafting classes during 11th and 12th grade. She and Kelly were often teased by the male students and worked on projects together because the male students "gave us such a hard time."

For the participants in this study, peers seemed to have a negative influence during their early years of high school. For many of these participants, strong family support and encouragement provided incentive to stay in an academic program and succeed in high school.

Family Encouragement Makes a Difference

Family members emerged as strong influences on participants in this study. In discussing educational and career goals, parents, step-parents and siblings were often mentioned both in giving direct advice and providing role models to emulate or avoid. The discussion relating to family focuses on influences on school-life in general rather than mathematics specifically. The dominant family influences are described for each participant in Table 4.4.

For the participants in this study who were among the first generation in their families to attend college, their parents' encouragement appeared to be based on a desire for their children to achieve higher economic status than they had. These

Table 4.4

Family Encouragement Makes a Difference

Participant	Descriptions and Quotes
Helen	Helen's stepfather was from a foreign country and she spoke with anger of many restrictions he still imposed on her social life. She tried to explain that the restrictions were "for my own good" but was beginning to raise questions about their necessity. "Foreign countries are stricter in education."
Ericka	Ericka's mother encouraged Ericka to take academic courses.
Tootie	Tootie's parents, especially her mother, encouraged her to go to college. "It's going to be real important for my family (for me to attend college)...They supported me a lot so it will mean a lot to them because this is what they've expected of me." Tootie's brothers had both quit high school and she wanted to do better than they had.
Brenda	Brenda's mother and stepfather encouraged her to get a college education. "My mother wants me not to end up how she is...She stayed on me all through high school." Brenda's mother also was very involved in Brenda's course selection for college. Brenda's stepfather encouraged her to choose the college major she was the most interested in. As a role model, however, "he was having trouble finding a job because he only had a two-year degree....I see that and I think, well, I don't need to stick with a two-year degree."
Linda	Linda was an only child and lived with her mother and second stepfather. The stepfather, an engineer, imposed some rules on Linda which she resented but seemed grateful for. At the time of the interview, Linda was eight months pregnant and Linda's mother encouraged her to finish her associate's degree so that she could support the baby.
Andrea	Andrea's father was a strong influence on her future ambitions. Andrea was proud of her father's business success and planned to manage his company after she finished college. She attributed her father's success to "self-discipline and the will to be successful." Her father's encouragement in school was important to Andrea. "He told me I could be anything I wanted to be if I just went for it."

Table 4.4 (cont.)

Family Encouragement Makes a Difference

Participant	Descriptions and Quotes
Toni	Toni's parents talked with her about school. "They want me to have a better life....They want me to get an education because they didn't get one." Toni's older sister was a positive role model. "She's the only one I talk to when it comes to school....She's real smart....She's really pushing me to go to college." Toni's five older brothers were "an influence on me to do more than they [did]. Their lifestyle is something I don't want."
Michelle	Michelle was the youngest child in her family and her older sisters had married soon after finishing high school. Her parents encouraged her to go to college before marrying. Their early struggles to provide for their family made a strong impression on her.
Lisa	"My parents never helped me through school as far as learning anything." Lisa's strongest family influence was her maternal grandmother with whom she lived for several years. "She told me that things are out there and the only thing I've got to do is make myself go get them."
Stephanie	Stephanie had lived through five troubled years during and after her parents' divorce and remarriages. Her older brother encouraged her to stay in school. "He's into school, just like my dad. He also helps me because he tells me to do all these things that make you feel better about yourself."
Shelly	Shelly had strong positive home influences. Her parents encouraged her to attend college and an older brother who was already in college often talked to her about what college was like. Her decision to be a teacher was influenced by the traditional home and religious values of her environment. She wanted a career which would allow her time with her family.
Jean	Jean's busy school and work schedule reflected that of her parents. Both worked two jobs and her father had been attending night school for ten years. Jean was very proud that he was about to complete a business degree and receive a promotion at work. Jean's strong work ethic appeared to be modeled on that of her parents, but she also spoke of strong family and church ties.

parents saw a college degree as a way to achieve that status. These parents tried to provide financial support so that their children could attend college and not have to work full time. Participants whose parents had some college education and were employed as professionals also emphasized to their children the need for a college education in the present job market.

For the participants who were the youngest or only children in their families, their parents saw them as the last chance to have one of their children succeed. Older siblings had not done well in school or had married young or had not gone on to school. The youngest child felt the burden of having to succeed where their siblings had not.

For the participants who had succumbed to negative peer influences in their early years of high school, parents appeared to be especially important in continuing their support for their children. As these participants discussed their later successes in high school, the positive influences of parents and other family members seemed to be the factor which turned them around. Whether it was stricter discipline, as in the cases of Helen and Linda, or increased encouragement and higher expectations, as seen in Tootie and Stephanie, these interventions led to successful completion of high school.

The Lost Year

The participants in this study were selected from a small population of thirty-

one traditional aged female students who were successful in a developmental mathematics course for one semester. While they were not unsuccessful students of mathematics in high school, there were subjects within the mathematics curriculum which gave them trouble at times. However, they usually passed with C's and in many cases with B's and all graduated with at least three credits in high school mathematics, one more than the minimum required. Except for Linda who graduated in the bottom third of her class, all of the participants would be classified as above average students in their high schools, graduating in the top 25% of their classes.

Nine of the twelve participants lost a year of mathematics in some form during high school. Whether they had to repeat a failed course in mathematics, dropped mathematics because they had completed other graduation requirements, or were advised not to take more mathematics because of low grades, three-fourths of the participants had a year in high school during which they did not take mathematics or were repeating a failed course. In all cases, social pressures contributed to their failing or dropping of mathematics classes. Except for Linda, ability in mathematics was never an issue in these situations. Three-fourths of this sample of above-average female students yielded to social pressures which caused them to lose a year of mathematics study in high school which then contributed to their losing a semester of time in college by having to take remedial courses.

During the analysis of data for the twelve interview transcripts in this study, the subject of time recurred often enough to be considered a theme for the study. After the first four interviews were completed, the researcher noticed that an entire

year had been lost by several of the participants. The eight subsequent interviews revealed more data on this subject. The year lost by participants varies from an entire school year being repeated by Stephanie to several of the participants casually dropping a year of mathematics. A discussion of the lost year follows. (See Table 4.5 for a summary of this data.)

Stephanie repeated ninth grade in an alternative school in the Boston area. She talked of severe emotional problems after her parents' divorce, getting involved with friends who were a bad influence, and minor drug use. She was forced to repeat ninth because of poor school attendance. In mathematics, Stephanie did well repeating Algebra I and earned B's in geometry in tenth grade. In eleventh grade, Stephanie decided she needed to get away from the continuing negative influence of her friends and moved with her older brother first to Michigan, then to Hunt County to live with her mother and stepfather. Stephanie was not happy at Hampton High School her first year there. Being friendless, having to ride the schoolbus with younger students, and adjusting to life in a new family environment were all factors which contributed to a poor academic year for Stephanie. She earned D's in Algebra II for the year and was not allowed to continue studying mathematics her senior year. Although Stephanie made up the first year she lost in school, she lost her senior year in mathematics. In spite of this, Stephanie scored 22 on the ACT-Mathematics her senior year, the highest mathematics score of any of the participants. That high score also indicates that Stephanie had the potential to succeed in precalculus in high school.

Like Stephanie, many of the participants lost a year of mathematics their senior

Table 4.5
The Lost Year

Participant	Description
Helen	In 9th grade, Helen's friends were a negative influence. She transferred schools and was required to repeat Algebra I in 10th grade because of low grades.
Ericka	Ericka and a group of female friends dropped precalculus in 12th grade to have a "fun" senior year.
Tootie	In 10th grade, Tootie's friends were a negative influence. She failed several subjects and took no math in 11th grade because she had to make up failed subjects.
Brenda	Not applicable.
Linda	Linda failed Algebra I in 10th grade and repeated the course in 11th grade.
Andrea	Andrea dropped precalculus her senior year to concentrate on band and other activities in school.
Toni	Not applicable in high school. Toni stayed out of school 6 months before beginning college.
Michelle	Even though she earned Bs, Michelle did not enroll in precalculus because Algebra II had been hard.
Lisa	Not applicable in high school. Lisa stayed out of school 6 months before beginning college.
Stephanie	Stephanie repeated all of 9th grade due to attendance and personal problems. She was not allowed to take math in 12th grade because of Ds in Algebra II.
Shelly	Shelly did not take math in 11th grade because she had completed a "terminal" two-year program in math. She resumed math study in 12th grade.
Jean	Jean dropped precalculus halfway through 12th grade because of low grades and little time to study.

year. Ericka stayed in precalculus a few days but, with a group of friends, decided to drop the course "just to have an easy senior year....I felt I could do it. I just really didn't want to." Despite her teacher's encouragement to stay in the course and offer of help, Ericka decided that she already had three years of mathematics, enough to enter college. Andrea's decision not to take precalculus was not made lightly. "It was my senior year and I was dedicating a lot of time to band and I didn't want to push myself. Actually, that's what it was." Senioritis was also mentioned by Brenda as a reason she "slacked off" in studying geometry as graduation approached.

Michelle, despite earning B's in Algebra II in eleventh grade, felt she had struggled with the course too much and was afraid of precalculus if it "was all new" material like Algebra II had been. Jean had a semester of precalculus her senior year, but dropped the course because she had earned a D. With her busy work and activity schedule, she decided to drop the course even though her teacher offered to help her through it. These five students, all of whom had the potential to succeed in another year of mathematics, all of whom were preparing for college, did not take a fourth year of mathematics. Four of the five scored low enough on the ACT to require placement testing and were required to repeat Algebra II at White Community College for no credit. Stephanie opted to take developmental mathematics because of the low grades she had earned in Algebra II in eleventh grade. Not only did these young women lose a year of high school mathematics, but they were required to lose a semester's credit in mathematics in college by repeating a high school course.

Two of the participants lost a year of mathematics in eleventh grade. Tootie "played around a bit in tenth grade....I guess I was going through a stage." She blamed the negative influence of friends for lack of attendance during tenth grade. She earned an F in geometry, but made an A repeating it in summer school. Because she had so many other subject to make up in eleventh grade, she did not take mathematics that year. It is interesting to note that Tootie had four years of science, including chemistry and physics her last two years. She took Algebra II in twelfth grade, scored a 19 on the ACT-Mathematics, and was required to take developmental mathematics because her reading and English scores were low and the school required students to take the entire developmental program if a student tested into two of the courses.

Shelly had no mathematics in eleventh grade because she had taken a "terminal" geometry course in tenth grade. This geometry course was for students who were struggling with mathematics (Shelly had earned C's in Algebra I and geometry) and who had completed the two-year mathematics requirement for graduation and did not plan to attend college. Shelly spoke of not being ready for Algebra I in high school. She wished she had taken pre-Algebra in high school before taking Algebra I.

By the end of eleventh grade, Shelly had decided that she did want to attend college and enrolled herself in Algebra II for twelfth grade. Shelly was tracked into a terminal mathematics program based on her ninth grade achievement in Algebra I. This system would have had her take no mathematics her last two years of high

school. This system assumed that Shelly "could not" do mathematics. Shelly earned high C's in Algebra II, scored 18 on the ACT-Mathematics and repeated Algebra II successfully at White Community College.

In addition to losing a year of high school mathematics, Shelly had an interesting story to tell about eighth grade. She attended a small, rural, K-8 elementary school and felt she was one of a special group of girls there. She spoke of being one of her teachers' favorite students and of being active in basketball in seventh and eighth grade. In eighth grade, her male basketball coach-social studies teacher gave the girls' team special treatment. "I mean I never had to go to class, just about. I was always doing something. We did like a 2-week project where we drew a map of the United States out on the blacktop....It was basically the basketball players....The guys used to get so jealous because [the coach] favored the girls over the boys....He let us out of class to grade papers. I graded so many papers in middle school." What Shelly considered special treatment from her coach in eighth grade might also be considered as a lost year of preparation for high school in all of her subjects.

Helen had an experience similar to Stephanie and Tootie. After a successful three years at Hampton Middle School, Helen had a difficult adjustment at Hampton High School. She felt her new friends at Hampton High School were a bad influence and she began skipping school. She transferred to Sheridan High School where her school work improved. However, since she had a poor start in Algebra I and earned D's for the year, she had to repeat the course to continue in the college preparatory

mathematics program. She was an A/B student for the rest of her high school mathematics, "slacked off" during her last semester, scored 19 on the ACT-Mathematics and was required to take DSM 0840. Since Helen had to repeat Algebra I, she graduated with three years of mathematics. Her grades indicate a potential to have succeeded in precalculus in high school. Because of the low ACT scores, she lost a semester of college credit in mathematics by having to repeat Algebra II.

Of the twelve participants, Linda was the weakest mathematics student and had the lowest class rank of the group (bottom third). She discussed problems with being test anxious in mathematics and spoke of her experiences of learning mathematics as being "blindfolded." Like Tootie, Stephanie and Helen, Linda spoke of having negative peer influences, especially in tenth grade. She failed Algebra I that year and repeated the course successfully in eleventh grade. She failed Algebra II in twelfth grade and repeated it successfully, first in summer school and immediately after that at White Community College. Linda had resigned herself to a pattern of repetition as a requirement for successful completion of mathematics courses.

The previous discussion involved nine of the twelve participants in this study. The remaining three participants did not fit into this pattern of having lost a year of school or mathematics during high school. Brenda and Toni took four years of mathematics in high school, beginning with a two-year Algebra I sequence. Lisa was the only participant with four full years of college preparatory mathematics including honors precalculus. Toni and Lisa had both graduated a year earlier from Hillsboro High School and had taken a year off school before enrolling at White Community

College. Toni scored 14 on the ACT-Mathematics and was required to repeat both Algebra I and Algebra II in the developmental program. Lisa had scored low in English and reading and thus was required to repeat Algebra II at White Community College.

Finding that nine of the twelve participants lost an entire year of either mathematics or all subjects in high school raises the question, "Is this a pattern for many females in high school?" Do schools perceive female students as having time to lose or waste? Do schools and society discourage females from continuing their mathematics education because no need for these courses is perceived? Do secondary school personnel know that students will have to repeat courses for no college credit if they score low on the ACT? Does the time lost affect retention of mathematics, thereby affecting ACT and placement test scores?

Summary

Participants in this study were not unsuccessful mathematics students in high school. Their grades in mathematics ranged from As to Fs throughout high school. As a group they would be categorized as B- students.

Participants attributed their success in the community college developmental course to a new-found ability in mathematics and attributed problems with high school mathematics to a lack of effort on their part. They valued taking responsibility for their own use of time and appreciated the time teachers had given in helping them

with mathematics in and out of class. Guidance counselors had been available for little time to advise them in high school.

Peers often had negative influences on the participants in high school, both in keeping them from studying and encouraging them to drop mathematics courses. Family members' encouragement was valued, but family members remained uninvolved during decisions about mathematics courses.

Finally, nine of the twelve participants lost a year of school and/or mathematics during high school. This finding was unexpected and needs further study to determine how common a pattern this is for female students.

CHAPTER 5

OVERVIEW, SUMMARY OF FINDINGS, AND IMPLICATIONS

Overview

The purpose of this study was to learn the meanings female students attached to their high school mathematics experiences. The population for the study was females students, aged 18-19, from a developmental mathematics program at an East Tennessee community college. These students had been successful in the developmental mathematics course and had been assigned A grades. A sample of twelve students agreed to participate in a one-hour interview during which they reflected on their high school mathematics experiences. The interview transcripts were analyzed inductively for thematic patterns. Additional data from high school transcripts and a demographic questionnaire provided background information to help in the analysis of the interviews.

Analysis of transcript and demographic data revealed that most of the participants had graduated in the upper quartile of the graduating classes from ten different high schools. Their grades in mathematics ranged from F's to A's, and overall, they were B- students of mathematics for their four years of high school. Most of the participants were from working-class families and were among the first in their families to attend college.

The major findings from the analysis of interview transcripts were discussed within the framework of three thematic categories: internal belief systems, the role of the school and its personnel, and the social influences on the participants. An additional thematic category which emerged from the data, the lost year.

Summary of Findings

This qualitative study interviewed twelve successful female students from a community college developmental mathematics program and asked them to reflect on their high school mathematics experiences. From an inductive analysis of the interview data, themes emerged within the three categories established by the three research questions. This section summarizes the findings of this study related to these categories and the additional category of the lost year.

Findings Related to Internal Beliefs

Three themes emerged within the category of internal beliefs. The first, and most dominant was that of gaining confidence in the ability to do mathematics. Many of the participants, while they would not have been classified as weak mathematics students in high school, because of scoring low on ACT and AAPP tests, did not have much confidence in their ability to do mathematics. Their strong performance in the final developmental mathematics course, along with encouragement from

developmental teachers, had given them a newfound confidence in their ability to do mathematics. Brenda's words summarize this theme: "I'm more confident now...because I know I can do it."

The second theme within the internal belief system of participants related to learning to value time. This theme focused on the participants' use of their own time in its relation to success in mathematics. Most participants felt they had not given mathematics study sufficient time during high school. As they reflected upon their high school years, they often mentioned lack of time for study due to peer pressures to "have a good time," busy work and athletic schedules. The busy schedules often kept them from attending after-school help sessions offered by teachers. In this sense, time relates to effort. The participants in this study felt that when they had done poorly in high school mathematics, it was because they had not expended sufficient time and effort. Their use of the term "time" in these discussions was often in comparison to their present use of time, for which they perceived they had much more control and responsibility than when they were in high school.

These first two themes are contrary to recent research on attributions of success and failure for females in mathematics. The usual pattern for females is to attribute success to effort and failure to lack of ability. Most of the participants in this study attributed their success to a newfound belief in their ability to do mathematics and attributed earlier difficulties in mathematics to lack of effort. These participants are a year or two older than most of the students in the earlier studies. The roles of maturity and the experience of success in these reversals of attribution warrant further

study.

The third theme involving internal beliefs focused on the participants' difficulties with visual and verbal mathematics. Deductive geometry proofs were often mentioned as a stumbling block to success in the year-long geometry course. Participants had no sense of the purpose of graphing, the geometric modeling of numerical and algebraic ideas, in any of their mathematics courses. These findings are very similar to earlier studies of females and mathematics.

Difficulties with verbal mathematics, usually designated "word problems," are not uncommon for female students and are cited in much recent literature on gender and mathematics. Word problems require translation of the vocabulary of mathematics into meaningful ideas which then have to be translated to mathematical symbols. For the participants in this study with their overall weaknesses in reading and grammatical skills, difficulties with verbal mathematics were not surprising.

The three themes involving internal beliefs were 1) gaining confidence in the ability to do mathematics, 2) learning to value time, and 3) difficulties with visual and verbal mathematics. The first two themes contradicted earlier studies of younger females and mathematics beliefs and attributions. The third theme was consistent with earlier findings.

Findings Related to the Role of the School

The role of the school is interpreted to include organizational policies or school

personnel. Five themes related to the role of the school emerged from the interview data as the participants in this study discussed their high school mathematics experiences.

The first theme in this category was labeled time: freedom, flexibility and responsibility. In the previous discussion of time as a theme within internal belief systems, time was related to the personal effort of participants. This discussion related to the school's time schedule as often incompatible with the participant's schedule. Comparing the time schedules of high school to their more flexible and open schedule at the community college often prompted comments on the inflexibility of high schools. In high school, tutoring was offered before or after school and participants had activities, work, or personal preferences which prevented them from taking advantage of extra learning opportunities. The sameness of daily schedules in high school was a deterrent to quality learning for some. Having geometry sixth period each day following lunch and drafting class made concentration difficult for Brenda during her senior year. In addition to the participants appreciation for the flexibility of their college schedules, they also valued their role in assuming responsibility for their use of time in studying.

The second theme within the role of school also relates to time, in this case, the teachers' time. Participants had high regard for their high school mathematics teachers who took time before, during and after school to offer extra help and encouragement to students, even if they personally could not take advantage of that help. They appreciated teachers' organization of class time to allow for thorough

instruction and monitored practice. As the participants gained an appreciation for their own use of time, the way others involved in their education used time became more meaningful to them.

Along with the time teachers had to give to students, the attitudes of teachers of high school mathematics were very important to these participants. Consistent with recent literature on female learners (Belenky, et al, 1986; Gilligan, 1982), the participants in this study felt "liking" their teachers was an important component of their own attitudes toward the subject. The uses of time mentioned in the previous paragraph were perceived as evidence of teachers' care and concern for students. The participants wanted to "get close" to their teachers and often mentioned that it was sometimes hard to do with their mathematics teachers. Some participants felt their mathematics teachers did not understand how peer pressure operates within the classroom. Overall, the attitudes of mathematics teachers were perceived as positive, but the few negative impressions were very strong.

Within the organization of school personnel, the one position which is designated to oversee the students' total program is that of guidance counselor. The majority of participants in this study had very few personal contacts with their designated guidance counselor. Most of the participants had given up on using guidance counselors because of time constraints within their schedules. When participants did get to see counselors, they felt "he didn't seem to help me any." Counselors had little information for careers participants were interested in and did not encourage students to stay in mathematics programs. The participants in this study

perceived that their guidance counselors did not have time for them.

The last theme to be discussed under the role of the school is the pace of the mathematics curriculum. These middle level mathematics students found it difficult to be successful in the high school mathematics curriculum. Some had problems early in algebra and others experienced difficulties later in geometry and Algebra II. For all participants, DSM 0840 was a repetition of Algebra II. Many of the participants had earlier repeated algebra and geometry courses successfully in high school. The roles of repetition and quantity of time needed for mastery and retention warrant further study.

Within the discussion of the role of school, the themes were 1) time: freedom, flexibility and responsibility, 2) the importance of teachers' time, 3) the importance of teacher's attitudes, 4) the little time guidance counselors have for students, and 5) the curriculum pace. While several of these themes are consistent with current research, some new questions were raised for further study.

Social Influences

Two social influences were discussed by participants in this study: peers and family members. The discussions in these two areas were about the high school years in general and often did not focus on mathematics. Peers were most often described as negative influences. Several of the participants "got in with the wrong crowd" early in high school and lost time in mathematics and other subjects.

Participants who did not yield to negative peer pressure observed it in their friends. A subtle form of peer pressure was described as a student not walking to a teacher's desk to ask for help because peers would observe her. Peers encouraged several participants to drop mathematics courses with them. Abundant evidence of negative peer influence emerged from participants in this study.

Counteracting the negative influence of peers for participants in this study was the positive influence and encouragement of parents and family members. Parents and step-parents stressed the importance of education. For participants whose parents were not college-educated, sending their daughter to college was perceived as giving her an opportunity for a better life. For some participants, older brother and sisters were often the most credible source of information and encouragement. Participants told the stories of the successes and failures of siblings and appeared to have arrived at a focus for their own lives from these stories. For most participants in this study, the role of family was seen as positive and encouraging.

The social influence themes for this study were 1) peers can have a negative influence, and 2) family encouragement makes a difference. Participants' internal beliefs, the role of the school in their experiences, and social influences comprised the three major categories for this study.

The Lost Year

Throughout the analysis of the data for this study, the theme of a lost year

recurred. As the participants discussed their high school experiences, it became evident that many of them had lost time during the high school years. Nine of the twelve participants lost a year of mathematics or a year of high school due to negative social or school pressures. Evidence for this theme ranged from one participant who was required to repeat an entire year of high school to individuals who chose not to take mathematics for one year during high school. For the group as a whole, there was a recurring sense of lost time. As the other themes relating to time emerged within the study, this theme of lost time pushed itself to the forefront. The time lost in high school had to be made up. For all of the participants, lost time in mathematics resulted in lost time in college repeating a course they already had credit for. The forces which led to this lost time, in most cases negative social influences, as well as the value society places on the time of its youth, warrant further study.

Implications for Research and Practice

Implications for Research

Throughout the preceding summary of this research study, topics which warrant further research were mentioned briefly. In this section, the findings which the researcher feels most deserve further study will be discussed.

1. Participants in this study attributed success to ability and failure to lack of effort. Both of these attributions contradict earlier findings. Further research is

recommended in examining the relationship between success in mathematics and these attributions. Successful high school females as well as successful females from four-year colleges, both from remedial, regular and advanced levels of mathematics should be studied to determine their attributions for success and failure in mathematics. Such studies could use qualitative or quantitative methods or both.

2. Time emerged as a dominant theme throughout this study. Further research is recommended which would focus on students' beliefs about their own use of time, especially as it relates to learning mathematics. One group of mathematics students could receive continual instruction throughout a school year on best ways to optimize time within their own learning style. This group could be compared using quantitative and qualitative methods to a control group receiving regular instruction. This type of research might provide information on the usefulness of intervention in valuing time.

3. High schools exist which have flexible time schedules. Qualitative studies might address the value of time to students in those schools as compared to students in rigidly scheduled schools. Do such schools help students value their own time and take responsibility for its use earlier?

4. Research should continue on the roles of parents and peers on female students. Programs which coach parents on the importance of their roles and which coach students in ways to deflect negative peer influences should be studied using quantitative methods to study achievement and qualitative to determine change in beliefs.

5. Research on the relationship between language skills and mathematics skills should continue. While there is not sufficient evidence to state a cause and effect relationship, there is sufficient evidence to warrant further studies. Studies which address the ways students process information, whether verbal or quantitative, may provide a link between verbal and quantitative learning or identify them as separate skills.

6. A replication of this study at a community college in another part of the country using a similar sample and population is recommended. The themes which emerged from this study may be unique for this population. Of special interest would be themes related to time, especially of the lost year.

7. Society's perception of the value of an individual's time during the ages of school attendance should be studied. While the results of this study suggest that valuing time is an important issue in the developmental process of female students, the organizational structure of the school does not appear to place a high value on the time of some of its students. Does society lower its expectations for accomplishments by average students during these years and accept lost time as the norm? Other cultures have high expectations of teens. Further study of society's perception of the value of the teen years would clarify the perceptions of the school in this area.

8. A final recommendation is for further qualitative study of female mathematics students both during and after completion of courses. If educators truly believe that reflection on learning is a vital component in the process of mastery of learning, then research studies must use the reflections of females to learn the

meanings they are attaching to their mathematics experiences. Unless qualitative research is added to the wealth of quantitative research, educators will never know the meanings that learners are placing on events, ideas and people within their learning experiences. If the purpose of research is to identify and isolate factors within the educational experience which are impeding learning so that these factors can be removed or positively altered, then research must study these experiences from the perspective of the learner, in the learner's own words.

Implications for Practice

Each theme in the findings of this study provided several areas for recommendations for practice. The following discussion will focus on the recommendations for practice which the researcher feels most relevant.

1. Success appeared to be the most influential factor in creating participants' positive feelings about themselves in mathematics. Educators must provide more opportunities for mathematics learners to be successful and must be aware of the importance of success as a motivator.
2. Teachers must help students learn how they best study and learn mathematics. Different strategies for use of time and effort can be taught. Teachers can model behaviors for handling frustration in problem solving and teach persistence. Mathematics success must be seen as the result of hard work and persistence, not of good luck and a special talent for mathematics.

3. Teachers must help students learn the language of mathematics and show its relationship to and differences from everyday language use. Language skills in mathematics must be taught from elementary grades through high school.

4. School administrations must provide smaller student/guidance counselor ratios. The guidance counselor is the only person in the school with the responsibility for the student's school and personal life. This role has been minimized by large student/counselor ratios and by requiring counselors to be responsible for a variety of clerical duties which take time away from student contact. Someone in the school has to care about the student as a whole person. As this study and others have shown, students are aware of people who care and don't care about their welfare. It is time for the role of guidance counselor to be equated with that of a caring person who has time for students' needs.

5. Teachers must be aware of the perceptions students have about their uses of time within and outside of the classroom. Availability for help is interpreted as a sign of caring and concern for students' success. The school organizational structure must make it possible for experienced mathematics teachers to be available during convenient times for students to get help. Tutoring could be provided during study halls by teachers assigned to this duty as part of their teaching duties. Teachers should organize class periods to optimize time on instruction and monitored practice. The teacher's use of time provides a model to students for their use of time.

6. Programs should be established to coach parents to be positive influences on their daughters' education. Such programs should start in elementary school so

that as the students progress through the middle grades and peer influence becomes more prominent, the parents have learned positive intervention techniques.

7. The curriculum of high school mathematics is in the process of reform. The National Council of Teachers of Mathematics (NCTM, 1990) has published Curriculum and Evaluation Standards for Mathematics and has encouraged schools, teachers, parents, textbook authors and all involved in teaching mathematics to reconsider the curriculum of mathematics for all grades, but especially for grades 5 through 12. The findings from this study indicate that the pace and content of the present curriculum does not promote success for the average learner. NCTM's recommendations included an integrated curriculum in which algebra, geometry, statistics, etc. are studied in incremental levels every year from grades 7 through 11. This plan would eliminate the present repetitious curriculum of grades 6, 7 and 8 and would also allow time for more relevant mathematics subjects such as statistics to be included in the curriculum. This plan would also allow average students more time to assimilate learning from year to year rather than the present "express" trip through each subject in one year. Success in mathematics must be possible for the average female student.

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APPENDICES

APPENDIX A

INFORMATION SHEET FOR POTENTIAL PARTICIPANTS

I am currently involved in a research project as part of my doctoral dissertation in mathematics education at The University of Tennessee. My research participants will be successful female students from a community college developmental mathematics program. Through an interview, I hope to learn their perceptions of their high school mathematics education. There have been many studies comparing test scores and grades. My project will study the thoughts and memories of female students about their high school and perhaps middle school mathematics courses, teachers, etc.

You have been identified as a possible participant for this study. If you agree to participate in this study, the following would be required of you:

1. Sign a consent form to participate.
2. Respond to a series of interview questions.
3. Fill out a brief questionnaire.

The interview will last approximately an hour and will be audiotaped and later transcribed. You will be assigned a pseudonym at the beginning of the project and you will not be identified at any time during the project. Only I will know your identity. All information from the interviews will be strictly confidential and will be kept in a locked drawer in my office at home. At the completion of this project, all tapes will be destroyed. A summary of the findings will be made available to you if you are interested.

Participation in this study is entirely voluntary. You are free to withdraw at any time and/or refuse to answer any questions without incurring any penalty or prejudice. If, after reading this information sheet, you do elect to participate, you will be asked to sign a consent form that acknowledges your understanding of this project, its purpose, and your role in it.

I will be glad to answer any questions that you may have at any time about this study. The process of reflecting on your earlier mathematics education may benefit you and give you insights into your success at the community college. I can be reached most easily at my home number below.

Diana Venters
1831 Hickory Glen Road
Knoxville, TN 37932
691-2663

APPENDIX B

INTERVIEW SCHEDULE

Diana Venters

Question: Using successful female community college mathematics students as participants, what are their perceptions of their high school mathematics education?

1. Summarize your education from elementary school til now.
2. Tell me about the last mathematics course you had in high school.
 - a. Why did you decide not to continue?
 - b. Tell me about anyone you talked with when you were making the decision to quit mathematics.
 - c. What else was happening in your life during this time?
3. Describe how you prepare and do a mathematics homework assignment. Go through the details of a typical experience.
 - a. How do you feel if you can do all the problems with little struggle?
 - b. How do you feel when you get stuck? What strategies do you use?
 - c. Do you ever call someone on the phone or ask for help?
4. Tell me about a math class that stands out for you.
 - a. Describe what the teacher did.
 - b. Describe what the students were doing.
5. What role did your parents play in influencing how you felt about mathe?
 - a. Did they talk with you about the classes you were taking?
 - b. Did they talk to you about going to college?
6. What role did your peer group play in influencing how you felt about math?
 - a. What math did your close friends take?
 - b. What math did your boyfriends take?
7. Think about when you were in high school. What dreams did you have for your future?
 - a. Plans?
 - b. Hopes?
 - c. Careers?
8. How did you come to be in the developmental math program?
 - a. Was the placement test a good measure of your math ability?
 - b. Did developmental math prepare you for precalculus?

9. Tell me about your success in the developmental math class.
 - a. To what do you attribute your success?
 - b. When you don't do well in math, what do you think about?
10. Tell me how you feel about yourself as a learner of math?
 - a. When you do well, how do you explain it to yourself?
 - b. When you have trouble with a certain part of math, what do you think is the reason?
11. Tell me about girls and mathematics.
12. Tell me about boys and mathematics.
13. You mentioned earlier your dreams were..... What are your dreams now for your future?

APPENDIX C

CONSENT FORM

I am conducting research as part of my doctoral dissertation at the University of Tennessee-Knoxville. The title of the study is "Perceptions of Successful Female Students from a Community College Developmental Mathematics Program of their Middle and High School Mathematics Education."

Having met the criteria for participation, you are being asked to participate in the study. Your responses to interview questions will provide the majority of the data for this study. Additional data will include your courses and grades from high school and demographic information from a short questionnaire you will complete.

You and your schools will not be identified in the study. All participants will remain anonymous as will any people you mention in the interviews. I alone will have access to the tapes and other documents from the study. They will be kept in a locked file in my home office at 1831 Hickory Glen, Knoxville. If you have any questions, I can be reached at 691-2663.

Participation in this study is voluntary and you may terminate your participation at any time without penalty. This study is not connected to Pellissippi State Technical Community College or its programs in any way. I will be glad to share the results of the study if you are interested.

Diana Venters

I, the undersigned, have read and understand the above explanation of the research project. I give my consent to Diana Venters to use any data I have provided during the course of this research project. Diana Venters has my permission to see and record data regarding my high school coursework.

Signature

Date

I give my permission for the interview to be audiotaped.

Signature

APPENDIX D

Pseudonym

QUESTIONNAIRE

Please fill in the answers for the following statements and questions.

1. Birthplace: _____
City, State
2. Present residence: _____
City, State
3. If you have lived in other cities since your birth, please name them.

4. Family members. Include stepfamily residing with you.

Brothers: _____
How many? Present Ages.

Sisters: _____
How many? Present ages.

5. Check the appropriate description(s) of your residence during your high school years.

_____ Resided with both parents.

_____ Resided with mother and stepfather.

_____ Resided with father and stepmother.

_____ Resided with mother.

_____ Other. _____
Please describe.

6. Briefly describe any work experience you had during your high school years.
Include the type of work, name of business, hours per week.

7. Parents' highest level of education.

Mother _____

Father _____

APPENDIX E

SAMPLE INTERVIEW

1 DV: This is an interview with Andrea M. on March 2, 1992. We're at
2 State U. and in the Howard Library Learning Center. Again thank you for
3 participating.

4 I want you to start of by just giving me a short biography of your
5 education, all the schools you've been to starting back with elementary.

6

7 AM: I started in first grade. I didn't go to kindergarten. I started in first
8 grade at Lakeville Elementary school in Logan county and that runs from
9 kindergarten through 8th grade but I didn't go to kindergarten. Then I
10 went to Sumter High school which is made up of four elementary schools
11 in the county and they combine together to make a class. And I went to
12 Sumter high school for four years. And then I went to White for one
13 semester and then I went here.

14

15 DV: Ok. So you were a full-time student at White last semester?

16

17 AM: Yes. Uh huh.

18

19 DV: And you attended the main campus?

20

21 AM: Yes. Jonesville.

22

23 DV: So your middle grade years were spent at the Lakeville elementary
24 school? AM: Yeah.

25

26 DV: If you can, think back about any math instruction, maybe in those
27 middle years, maybe 5th, 6th, 7th grade. What do you remember?

28

29 AM: Uh, math has always been easy to me, easier, I won't say easy
30 because theres' been things that, you know, stunned me, but most of it's
31 been easy. English is my hard subject. But, um, I adapted to all the
32 things we had to adapt to easy, like decimals and stuff like that. I adapted
33 to all of them fairly easy. It's just always been something that's been fairly
34 easy to me. The only reason I took the, well I tested into that class at
35 White State because I had taken in high school, I took my math classes in
36 my freshman, sophomore and junior year and I didn't want to come over
37 here and be put into that, and I made good grades in math there. I made,
38 geometry was hard for me. I have a more algebraic mind than geometry.
39 And I made like, I had, in my junior year, I took Algebra II and I made an
40 A and a B for my two semester grades. But I didn't want to, it was not
41 fresh on my mind so I, I tested into that class anyway, but if I hadn't tested
42 into it, I probably would have signed up for it anyway because it would

1 have, I didn't want to, I don't like to go into something unprepared. I
2 can't stand that.

3
4 DV: So the last math you took in high school was Algebra II?

5
6 AM: I didn't take advanced math.

7
8 DV: Any particular reason you didn't take Advanced math?

9
10 AM: Um, I worked really, really hard. I took six classes, I took full
11 time, I mean, I didn't have any study halls or anything my freshman and
12 sophomore, I might have had a study hall my junior year as a teacher's
13 assistant I think. But, um, it was my senior and I was dedicating a lot of
14 time to band and um, I didn't want to, I didn't want to push myself
15 actually (laughs), that's what it was.

16
17 DV: So your senior year, what did you do instead of taking math?

18
19 AM: I took, my classes were Spanish II, American History, English, I
20 was on the Journalism staff, and I was in band and I don't remember what
21 the other class was, economics I think.

22
23 DV: So you didn't actually have a math class then your senior year?

24
25 AM: No, none.

26
27 DV: Do you remember if you talked to guidance counselors or anyone
28 about that decision not to take math that fourth year?

29
30 AM: We didn't have a very good guidance counselor. We just kind of
31 made our decisions upon ourselves. He, I never even went to talk to him.
32 I went to try to talk to him a couple of times and he didn't seem to help me
33 any. Um, a rural(?) area is different anyway. We only had one guidance
34 counselor but now there, they've got a new one so I hope he'll help them
35 better than the one we had, because I mean he wasn't much of a, I
36 wouldn't call it a guidance counselor. But, I mean, that's my opinion.
37 But, they have one now that may be better.

38
39 DV: How about your parents, when you decided not to take that fourth
40 year of math. Do you remember if they had any comments or advice?

41
42 AM: They didn't really, my dad was, he was a really smart person in
43 math. He went, he's got his own business right now. And um, daddy, I
44 had done real good in the other ones, in my other math classes, well, better

1 than average. But, and they didn't have much to say about it because I've
2 always been one to try to look at the best thing for me. And I should
3 have, now I see that I should have took, taken math, but they didn't take
4 that so they didn't know much about it to tell me to. Now my brother, on
5 the other hand, he went to White State night school because he got married
6 right after he got out of high school and he told me to take everything I
7 could but I didn't want to listen to him because I didn't want to take it.

8

9 DV: How much older is your brother?

10

11 AM: 10 years older than me.

12

13 DV: So he went to White also? (right) Did he finish up at White?

14

15 AM: Yeah. He has an associate's degree in engineering downthere. He
16 went for two years but it took him like four or five because he went all
17 nights. He had kids and he worked during the day and stuff.

18

19 DV: Ok. And what kind of a job does he have now?

20

21 AM: He works for my dad.

22

23 DV: Oh. So does he use that engineering?

24

25 AM: Yes. They uh, my dad, he would do the bidding and everything on
26 our jobs that we done and now my brother's taken over that part, like
27 measuring. We do underground gasoline storage tanks. So he has to
28 figure out how long the _____ has to be and everything like that. So
29 he can use that.

30

31 DV: Ok. So, I'm going back, so you had Algebra II for your last class.
32 Let's talk a little bit about that. Tell me about the class and teacher
33 and how things went.

34

35 AM: I had an excellent Algebra II teacher. I was lucky because they've
36 got like two or three teachers at the high school and I, in my opinion,
37 she's the best teacher at the high school. She don't give you nothing,
38 anything. You take, I mean you work for what you get in there. Um,
39 some teachers will give you leeway and stuff like that, but she didn't.
40 Anything you got, you done it because you knew or you tried really hard.
41 And she would help you if you, you know, but she always wanted you to
42 ask questions if you didn't understand something. And she had like, our
43 school started like, at 8:25 we had to be in our classes, and she would come
44 every morning at 8 o'clock for anybody who had any questions or anything

1 like that. She was really willing to help but you also had to be willing to
2 learn or she wouldn't help you. If you wasn't willing to learn then she was
3 like, "Well all the other students are willing to learn." Like there was
4 some that didn't care what they made in the class as long as they got a D-
5 out of it, you know, and she would help anyone who was willing to learn.
6 Um, Algebra II, I loved Algebra II. I liked that class a lot. I didn't like
7 geometry, but I liked Algebra II.

8
9 DV: Uh, you used the phrase, "willing to learn" in reference to this
10 teacher. Explain what that means.

11
12 AM: She taught, like for everybody. She would teach for everybody to
13 learn. But some people would sit in class and talk and not turn in
14 homework and stuff like that. And she wanted them to learn, but if you
15 didn't come to her for help, she wouldn't bring help to you. I mean, she
16 would help you in the classroom, but she wouldn't come hunt you up and
17 say, "Hey. You need to work so come in my room and do that." She
18 wouldn't do stuff like that, but she could help you even if those people
19 realized what they had done and come to, she would help you like that.
20 She helped you, she helped anybody that wanted help, like that.

21
22 DV: Ok. So she would be there before school in the morning ?

23
24 AM: Yeah. And she would stay after, too.

25
26 DV: She would stay after school?

27
28 AM: Yes. She done anything she could to help you progress.

29
30 DV: Did a lot of students take advantage of extra time she offered?

31
32 AM: The year before I took it, the whole entire class was full everyday
33 because when we walked around, I would see, I mean there was, the whole
34 class was full, there was probably 40-45 people in there, but the year I
35 took it there wasn't that many that stayed. It didn't seem to me, I didn't
36 notice as many people staying. I went a few times, but I mostly got mine
37 in class and if I didn't get it, I asked her questions and stuff like that.

38
39 DV: Do you feel most students in high school are willing to ask questions?

40
41 AM: Hm. It depends. If you've got a class, it depends if you've got a
42 class with a lot of your friends in there and some of your friends are like,
43 they don't care about their grades or nothing like that, then I think it holds
44 people back to ask questions because they don't want to do that. That's my

1 opinion. I think a lot of people won't ask questions because maybe their
2 friends aren't interested and they don't want to seem to be interested
3 because of their friends, you know what I'm saying?
4

5 DV: Ok. So how your friends feel about...
6

7 AM: Some of them, I think. I never let that bother me because I mean,
8 they always asked me to help them, teach them how to do it. So, I
9 mean, but there was this one guy and he was super intelligent. I mean he
10 was so intelligent. We would be in class and she would go over something
11 and she would ask him the first question every time because he would talk
12 the whole time and he would know the answer. But, he, I mean he was
13 just really intelligent, but he wouldn't ask questions because other people
14 was around.
15

16 DV: Yeah. So you think he wanted to keep that image of being super
17 intelligent. And if he asked a question that wouldn't...
18

19 AM: That way And he didn't want to ask a question. HE didn't want to
20 show his intelligence a lot. He held back from showing his intelligence.
21 (really?) Yes, because a lot of people around him weren't, they could have
22 been, they just didn't study. He had it naturally.
23

24 DV: Do you think there is natural, people have this natural ability?
25

26 AM: Yes. I do. I think it can be, um, people can develop their ability
27 more and more. I don't think there's a maximum to what you can learn.
28 You can always learn more than you know, but, uh, I think math, is, I
29 think it's a lot easier for some people than it is others, and I think that has
30 something to do, I don't know if it's the background you have or what, but
31 I think there's something different because it's really hard for some people,
32 whereas it's easier for me.
33

34 DV: Um, what other subjects in high school, how much science did you
35 take?
36

37 AM: I just took two years of science. I don't like science.
38

39 DV: Which science did you take?
40

41 AM: I took general science my freshman year and biology I. I signed up
42 for Biology II my senior year but I didn't take it. I dropped it and took
43 journalism.
44

1 DV: Hm. Earlier you mentioned geometry. That was your sophomore
2 year?(right) Talk a little bit about geometry and how it was different.

3
4 AM: The first part of geometry was really hard for me. The first
5 semester of it. I don't know why it was. It was just really hard. It was
6 something, I mean I made a C in it. I passed it and everything. I mean I
7 had a solid C, but I'm not one, I don't like to settle for Cs, but I couldn't
8 do it. It just seemed a lot harder for me. I don't know why, what there
9 was about it. Doing some postulates and stuff like that, I could remember
10 them, but when you had a problem that you had to prove, it was hard for
11 me to prove that by using the postulates and theorems that we had to use.
12 I finally at the end of geometry, I could do, prove the easier ones, but I
13 could never prove the hard ones. But then the second semester of
14 geometry was more algebraic related, had more formulas and stuff like
15 that, I was one point from an A for the semester. So, I was more algebraic
16 related than I was geometry.

17
18 DV: Thinking back to your middle grades, did you study geometry much
19 in those middle years?

20
21 AM: No. Uh hm. No, we didn't. Uh, I'm glad to see it more now
22 because my little brother's in 7th grade and they're already learning some
23 algebra and stuff like that. I learned some, but I didn't learn as much as I
24 think that elementary kids need to learn. But my brother, he's learning a
25 lot more. He comes home and they're solving for x, learning how to solve
26 for x and things like that and I'm glad to see that because that will give
27 him, we're at a disadvantage in a way, because of the county. It's a rural
28 area. They don't, I don't know what it is about it, but there's just
29 something, it's not on as high a level, I don't think as city schools. I don't
30 know why. I have no idea why it's like that, but it is, it seems to be like
31 that now that I've come to school at State U. and White State, too. I was
32 with people who were in city schools and they learned things a lot sooner
33 than we did.

34
35 DV: Sooner, you feel like they had it earlier?

36
37 AM: Yes. But now it's changing now because my little brother has it now
38 and I'm glad he does because that will give him an advantage to work
39 with.

40
41 DV: He 's in the 7th grade?

42
43 AM: Right.

44

1 DV: Ok. So you have an older brother and a younger brother. Are there
2 any other?

3
4 AM: Uh hm. My oldest brother is 28 and I have another brother that's
5 26. He died when he was 16 days old but he would be 26. And then my
6 next brother is 23. I'm 18. I have a 16 year old sister and a 12 year old
7 brother.

8
9 DV: Um, you mentioned that your older brother talked to you about
10 taking all the math you could in high school, have any of your older
11 brothers been an influence on your education?

12
13 AM: Yes, my oldest brother, he was a really intelligent person. We're
14 really fortunate because all of us, all of my family are average or better
15 than average students. And, I mean it's really fortunate. But my mom,
16 when we were in grammar school, we could not bring a B home on our
17 report card. I mean if we got a C, we, I didn't make a C til I was a
18 sophomore, and we, we could not make em. She wanted As. If we
19 made a B and we could tell her why then she accepted it. But if we
20 couldn't tell her why, then we should have an A then. And my brother, he
21 got married right after he got out of school. He married a girl from
22 Dalton, Georgia, and um, he didn't go right into college and he regretted
23 it. He still regrets it today. And he told me, "I went to White State with
24 the intentions of going two years." And he was like, "Angie, you do not
25 need to do that. You need to go four years. You don't have nothing
26 pushing you. You don't have.." I have responsibilities, but not
27 responsibilities as in marriage and stuff like that. And he said, "You don't
28 have that and you need to go." And he always encouraged me to do that.
29 And my next brother, he was a student here at State U. He was really
30 smart, but he was more like, he played football and he played sports and he
31 wanted to have fun. He went here, I think for 3 years. He went to Carden
32 one year and he went here three years and now he's in the Navy and he
33 comes back to me now. Me and him are closer in age than my older
34 brother was so he would already experienced by the time I was going into
35 it while me and my 23 year old brother were kind of experiencing it at the
36 same time. So he didn't, he always wanted me to go to college. He told
37 me to pursue my music because I've played my clarinet for 10 years. AND
38 he was like, "Andrea, you can be a good clarinet player. You can go to
39 college and be good," and I got a scholarship here. (Oh?) And so, he
40 always encouraged me in that sense. I've been doing that.(?) So Randy
41 encouraged me about doing the studying and getting all my maths and
42 everything like that and then Tony encouraged me, which is my 23 year
43 old brother, encouraged me for my music and stuff. He always wanted me
44 to go to college so he told me never to even think about not going to

1 college, so.

2

3 DV: So you're the oldest girl in the family, and you have a younger
4 sister. Do you talk to her much about what she's taking in high school?

5

6 AM: Oh yes, yes, I tell her to take it, Julie, take it. I told her to take her
7 ACT test right after she gets done. I feel that if you take your ACT after,
8 right after you finish your Algebra II course, you'll do, it's not, I don't
9 think that you ever forget how to do it, because when I went down to that
10 class at White, as soon as she started showing me how to do that stuff, it
11 come back like that right there (gesture). And I waited until the end of my
12 senior year before I took the ACT test and I made an 18 in math but I had
13 been out of math for a year and a lot of that stuff, a lot of those formulas
14 that are fresh on your mind, they diminish in a year. Of course, if I had
15 had somebody show them to me, you know, a week before, then I could
16 have done it. I could have made a lot higher in math, but I tell her to take
17 everything. She's a really intelligent person. She really is.

18

19 DV: So what year is she in high school now?

20

21 AM: She's a junior.

22

23 DV: And so she's taking what, Algebra II.

24

25 AM: She's taking Algebra II right now. I think she's going to take
26 advanced math. I told her it would help her. It would prevent her from
27 having, from taking 119 here. The reason I took that after I took the
28 course at White is, I had Nina Bonds as my instructor down there and she
29 is a really good teacher, I mean she really helps you. And she told me to
30 take it because it would develop me for computer science and I have to
31 take that. And she took it here too. I guess she went to all of her school
32 here. I really don't know, but she took calculus here and she told me that
33 I could go into 121 and make an A or a B, but she said that if I wanted the
34 background it would be better for me to take it for computer science.

35

36 DV: Talk a little bit about your semester at White, your math and what
37 kind of a transition was that from high school to college?

38

39 AM: Um, the transition. I always heard that the transition from high
40 school to college was drastic. It's not been that drastic for me. I mean,
41 everybody said, "It's such a big difference, you'll never want to go back to
42 high school," and all this stuff. And, school is school to me and it's still
43 school and you still have to study and you still have to work. And I did
44 that in high school where a lot of people didn't. There's a guy that goes to

1 school here and he didn't do anything in high school, didn't study or
2 nothing. He came down here and it like socked him in the face, I mean
3 because he had to study. Well, I studied in high school, so I mean, it was
4 just like another step in the education to me. I wanted to take that course
5 at White State, the math, because I had not taken it since my junior year. I
6 felt like I could do it, but I, I didn't want to come into the higher math
7 unprepared. So I took that down there and I think it really, I think I got an
8 advantage by taking that, because all this we've done so far in 119 is just a
9 review of what we done down there whereas if I'd have been back in high
10 school, if I hadn't have done that, I would have been trying to catch up,
11 you know. Going to White it was a lot more like high school level, not
12 high school level as in, not degrading White, I'm not trying to degrade
13 them, because I think it's a good school. I think it's a really good program
14 if you've been out of school for years and you go back. I think it's a
15 really good program, but I it's not, like I had, there was probably 30
16 people in a class down there versus 120 up here. You have a lot more one
17 on one action down there than you do up here, which it's not anybody's,
18 you know you can't do anything about that. But, it's uh, it was a lot
19 different down there. It was more like a high school class teaching wise,
20 teacher-student ratio than it is up here at State U. But I like it up here just
21 as well as I did down there. Actually I like it a little more. One of the
22 reasons I switched from White to State U was not because of the program
23 down there. It was because of band up here. I marched last semester in
24 the band down here because they're parallel schools, State U and White are
25 parallel schools. (They let you march?) I could march in the band up here
26 and attend White State. It was really hard on me, though because I had to
27 go back and forth from the schools. (Yeah, the practice.) I mean we
28 practiced all day Tuesday and Thursday out here and I had to go back and
29 forth. So that I wanted to do it at once because I can get a better
30 education and I realized after I started that it wouldn't take it, feel like as
31 long as it sounded, because when I thought of going to school for 4 years,
32 four more years, I couldn't hardly stand it, but then that semester was over
33 before I even realized it. So, I come up here and picked up my scholarship
34 and decided to go up here.

35

36 DV: What other courses did you take at White besides Developmental
37 Math?

38

39 AM: In, uh, rural counties, the writing education is not as accurate, I
40 don't think, as it should be, because I mean, we didn't have very much
41 and I took a writing class down there. (ok) It was total writing. It wasn't
42 big papers. It was smaller papers, you know, like 200 word papers, or 300
43 word papers and stuff like that. We did a research project down there and
44 it was just preparation for this up here. All I took down at White was

1 preparing courses for up here.

2

3 DV: Ok. So you took Developmental Math and English.

4

5 AM: And since I was in those two, they put me in a study skills class.

6

7 DV: Ok. So all of your courses at White were in preparation for coming
8 to State U this semester. So that was part of your plan all along.

9

10 AM: Yes. I was intending on, no matter where I got placed, I was going
11 to take the developmental math and English because I didn't feel I was
12 ready to come to State U and take these courses because of what I had
13 heard they were so, it was intense, you know, and stuff like that.

14

15 DV: So this semester at State U you're taking the 119, is that the
16 algebraic reasoning?

17

18 AM: No 115 is algebraic reasoning. 119 is precalculus. It's advanced
19 math in high school.

20

21 DV: Ok. And, what are you majoring in in college?

22

23 AM: I'm majoring in business, as of now, deciding whether to be a
24 business major or a music major. Uh, if I go into business major, but I
25 will try to get an associate's degree in music ed or music performance, one
26 or the other.

27

28 DV: If you go into the business major, what kind of math courses will be
29 required?

30

31 AM: I'm going into management so I think the highest math is 121 and
32 122, if I'm not mistaken. Uh, I might be mistaken because I'm just
33 starting out, you know, and I don't know really what I'm getting into, but
34 if I'm not mistaken, it's 121 and 122.

35

36 DV: Ok. Do you have to take accounting?

37

38 AM: Oh, yes. I'll have to take accounting and all the business oriented
39 classes I'll have to take marketing, accounting and all this, you know. But
40 in marketing and accounting I'll be more of the baseline, you know, 100
41 classes, and then I'll go up in the 2s and 3s in the management. But I'll
42 have to take a whole business education and then you're centered in on
43 management, you know. But if I'm not mistaken, you have almost all of
44 the business courses to get a degree in any business.

1 DV: Ok. and then the music would be, can you get an associate degree?

2

3 AM: It's a minor. It's not an associate degree like you get at White, but
4 it's a minor, like if I took the classes here then I could probably come back
5 in two years and get a degree or it might be 3. It would just be according
6 to what I took and stuff.

7

8 DV: If you took, if you continued on with the music courses, would you
9 take music theory courses?

10

11 AM: Yes.

12

13 DV: Have you taken any of those yet?

14

15 AM: No. Music and counting the rhythms and stuff like that has a lot of
16 math, a lot of fractions, a lot of fractions. Because you've got like one
17 beat and you have to get 32nds, it's divided into 32nds. And there's a lot
18 of math that has to do in music.

19

20 DV: I know, just from what I've heard of music theory courses, they get
21 very complicated with math. Uh, what would you do with your music then
22 if you went ahead and got the minor?

23

24 AM: If I was to minor in music, I could not major in business and put my
25 ability to business and be a band director, too. I mean, it wouldn't allow
26 me to be fair to one or the other. I couldn't, because my major, I want to
27 devote most of my time to, but if I was to major in business and minor in
28 music, I would minor in music performance probably and teach privately.
29 I wouldn't teach privately on the college level but I probably would be
30 eligible to teach privately up into high school. Most high school students,
31 there's some very, very talented high school students and they would have
32 the ability, they should be taken from a college instructor, private lessons.
33 But on the average, I could probably teach through high school, private
34 lessons.

35

36 DV: Um, how did you arrange the scholarship at State U, how did that
37 come about?

38

39 AM: I, um, my band director at high school, was um, Dena Wilson She
40 called Miss Pamela Rose I always came down here when I was in high
41 school for State U honors band and you always try, most people try out for
42 the honors, try out for the State U band in the spring before the fall. They
43 try out in April if 91, say if you're not going to attend school til the fall of
44 91, but you have to try out that early. And I had, I couldn't come to the

1 honors band that year. I had to go out of town that weekend and um, she
2 called Miss Rose and she wanted her to come up and rehearse our band
3 before we went to competition and she asked her while she was up there if
4 she could just listen to me try out cause I had set up an appointment with
5 Pamela Rose and she had to go out of town. And so, she said, yes, I could
6 try out up there, and when I got finished playing, she told me that, uh, if I
7 would come to State U that they would give me a scholarship.

8

9 DV: So you have a tuition scholarship?

10

11 AM: Yes. She's a clarinet player, too.

12

13 DV: So you were in the State U band in the fall. Did you get to travel
14 with the team?

15

16 AM: Uh, yes. We went to, we stayed the night in Alabama. We went to
17 Kentucky just for a day and to the Notre Dame game and we stayed in
18 Chicago and then we went to Arizona for the Fiesta Bowl. (ok) So I went
19 everywhere the band did. The only away games we didn't go to were the
20 South Carolina game, which was the opening game. And we didn't go to
21 the Florida game.

22

23 DV: How does being in the band make you feel as a State U student?

24

25 AM: It makes me have pride because I know that everyone knows that
26 the State U band is the pride of the southland and you know, you hear that.

27

28 AND I've always watched the band on TV when I was in band in
29 elementary school and high school and I never imagined myself being in
30 the band. I never thought of it as me being anywhere in the band. But
31 when the opportunity came, I took advantage of it and I'm glad I did,
32 because I've just been in it since August and it's already enhanced me a lot
33 since I've just been in that long.

34

35 DV: Um, you mentioned that you never imagined that you would be in the
36 band. Back when you were in high school, what kind of plans did you
37 have for your future?

38

39 AM: Business. I just, well, when I was in the upper, like 7th and 8th
40 grade and through 9th grade and stuff like that, I wanted to be a
41 schoolteacher. I always wanted to be a schoolteacher. I always liked to do
42 that because it made me happy when I helped people to see, um, take what I
43 had taught them and go with it. And I did that in band, because the kids
44 that would come in like that were freshman, and I was a junior and senior,
I helped them add to their basic knowledge and it excited me to see them

1 learn from what I had taught them. I'd always wanted to be a teacher. I
2 taught my little sister when I was in first grade and I was 6 years old and
3 she was 4. I taught her everything I learned. If I learned something, I'd
4 teach her and she knew how to add and subtract when she was 4 years old.
5 And she knew how to multiply when she was in first grade because I
6 learned it in third grade (almost laughs). And we played school all the
7 time. All the time we played school and I would teach her how to do that.
8 I always enjoyed teaching. And then when I got more into my music and
9 started devoting a lot of my time to that, um, I thought about being a band
10 director, but, um, I really didn't know what I wanted to do about that.
11 And then I've always had a dream, too, like opening up my own business,
12 like having, (laughs) I've always wanted to open up a ladies' dress shop
13 when I was little. That's what I always defined it as, you know. But if I
14 take in business, I will um, I will go out, I will work with my dad for
15 years, for a few years til I get myself established. I might open up my own
16 business some day and I might not. It's just according to what comes. But
17 in high school I imagined myself as a business, an associates' degree in
18 business is what I was going to get, at White State. And then I got into
19 band and I liked that a lot at State U. It was a lot different cause we
20 marched around 300 people last year and my high school band was 20
21 members my senior year, so it was a big difference and the band has
22 always been small. And if I went into music, I would want to go back to
23 my county and teach, because I would want to upgrade the program to
24 where it would be, to where we would have, I know we would never have
25 300 members in a high school band, but maybe like at least 100, we should
26 have at least 100 out of our county.

27
28 DV: How big is the high school there?

29
30 AM: There's about, well, the 8th grade from one of the elementary
31 schools comes to the high school, so that increases it by about 180, so
32 actual high school member, I mean actual high school students is probably
33 650, 700. But with the 8th grade it's like 800 students.

34
35 DV: So you always had planned on some kind of business job.

36
37 AM: Yeah, I think it's because of my dad. He's been in business all my
38 life.

39
40 DV: Ok. So he's had his own business all that time.

41
42 AM: He started his own business, I think it was 73, which was the year I
43 was born. He and my mom got married in 61 and my brother was born in
44 63 and he was working all that time, and I think he started doing side jobs

1 when my brother was young, 7 and 8 years old, but then he actually quit
2 his job and went into his own business in 73. So he's almost been in it 20
3 years.

4
5 DV: Um, how much math do you see as part of his business?

6
7 AM: A lot, a whole lot. Um, it's a lot of accounting, you know, in the
8 office area and then like, they survey, like you have to be able to get the
9 hole they dig to put the tank in so many feet down. You have to be able to
10 calculate in your mind the, how much pipe would go over a large area,
11 maybe. Like you had 3 tanks that you had to connect together. Then
12 your pipes would have to go into the ground and you would have to figure
13 out how many feet you would have to go left and how many feet right and
14 stuff like that. There's, I think there's a lot of math in his business.

15
16 DV: Does he have math in his background?

17
18 AM: Yes. He was a very, very strong math student.

19
20 DV: How much education did your father have?

21
22 AM: My daddy's mother died when he was 11 years old and father died
23 when he was 17 and he had 5 brothers and sisters. And he had to quit
24 school when he was a sophomore in high school and make a living for his
25 family because he had a younger brother and two sisters who were older
26 than him but they couldn't, you know, go out and make a living for the
27 family. So when he was a freshman and sophomore in high school, he and
28 like 2 or 3 other people were like very close in a race for being
29 valedictorian. I think it's sad because he had to quit, but there was no
30 other choice he had. There was no other way that he could have done that
31 because he would have left his brothers and sisters and he couldn't do that.

32 -----
33
34 DV: Does your mother work for the business?

35
36 AM: (laughs) My whole family does. My little brother's 12 and he goes
37 out on the job every Saturday. Through the summer I work with my dad.
38 I work part-time now, with him. Since I decided, he wanted me, he asked
39 me if I was interested in going into business. He knew that I had always
40 wanted to or had an interest in, but I really didn't know what I wanted to
41 do with it. And he told me if I would go and get a management degree,
42 that I could manage his business. It was started out really small, and it's
43 really got a lot larger in the past few years, I mean a lot more successful, a
44 lot more competitive, and um, he needs to expand now and um, he told

1 me, the type of work he does, he has uh power tools and stuff like that,
2 and he asked me if, while I was going to school, if I would manage his
3 shop, and that's like keep the grease and oil , etcetera, in his shop and
4 keep up with all his power tools because it's impossible for him to keep up
5 with it and do all that he has to do and make sure he has everything in the
6 shop. So it's like a small managing degree while I'm going to get a
7 managing degree. So actually it gives me time to utilize what I learn after
8 I learn it.

9
10 DV: Do you do any bookkeeping or accounting?

11
12 AM: During the summer I was, I did payroll for the company and I was
13 learning that part of the business, but now, when I started school, it's
14 really hard with my band practice and school and everything to work
15 inoffice hours, so he felt it would be easier, and I did, too, if I took on
16 something, as the shop manager, because I could go there after school and
17 check everything, make sure it's going all right and everything like that.
18 So I go up there in the afternoons. So really now, bookkeeping is not so
19 much a part of what I do.

20
21 DV: Was there a lot of math involved in payroll?

22
23 AM: Um, not really, it was nothing really complicated. You had to
24 multiply their hours and do social security tax, and then you had to do
25 withholding tax and stuff like that. It wasn't nothing that was too hard for
26 me to do.

27
28 DV: What's your experience with computers?

29
30 AM: None. I have none, I have barely any experience with computers.
31 We did computers when I was in 8th grade. They just got the computer
32 program, like when I was in 7th grade and they got computers in our
33 elementary school and I did very, very little in my 8th grade year because
34 they were very new and everybody was just trying to learn what to do
35 with it and stuff like that. But now at the elementary school they have a
36 lot of, they go to the computer like, my little niece, she's in kindergarten
37 and she goes like once or twice a week and stuff like that. It's really
38 improved a lot, my county schools, since I left and I'm glad it has because
39 it will give people the ability, the knowledge to go on, give them the, I
40 don't know what to say, the encouragement, maybe to go on, the
41 confidence to feel like they can compete. BEcause the confidence level
42 coming out of the rural school like that in a lot of people is down a lot
43 because they know, you know when you're there, if you have any other
44 cousins or family that goes to other schools that your school's not doing

1 what they are, you know. And a lot of the confidence, I think, gets a lot
2 of people and holds them back from going to college because they feel they
3 can't compete.

4

5 DV: You came to White from your area. Where do most of the high
6 school students that go on to college from your high school, where do they
7 go to school?

8

9 AM: Really, it's really spread out. Some go to Lincoln Memorial
10 University and um, some come to State U. Some go to White State and
11 some of them don't go to the main campus though. They go to the Barkley
12 Street campus. A lot of the students out of my senior class, well not a lot,
13 but some of them went to Springfield State. I was trying to think if there
14 was any more that people went to. Some of them went to like 2-year
15 colleges like career-com or technical schools. A lot of, some of the boys
16 did that, went to the technical schools and some of the girls went to
17 cosmetology school and stuff like that. But that's the basic, you know. A
18 few people went to Kentucky and there's one guy that went to Ellisville
19 College, I know. But the majority went to White, Springfield State and
20 State U.

21

22 DV: About what part of your graduating class went on to some kind of
23 school after high school?

24

25 AM: I would say better than 50% and I was glad to see that because in
26 years past there's been a lot of people not. And I was glad to see that, I'd
27 say there was 50%, maybe better, out of my class, and I was glad to see
28 that. Because there's intelligent people everywhere, you know. I think
29 everybody's intelligent. There's just some people don't have the, they
30 don't want to pursue it as much as others do. I don't know for what
31 reason, but it doesn't seem to me that some do. But I think everyone is an
32 intelligent person as far _____.

33

34 DV: Let's go back and talk about your math a little more. There are a
35 couple of topics we haven't covered. You're taking a math class now.
36 Has any part of it given you any trouble?

37

38 AM: Not yet. I just work my homework problems and go back before the
39 test and pick out the problems that are hardest that have answers in the
40 back of the book to check myself. I don't use the back of the book as a
41 prop. You can't, I mean, if you just work at the back of the book to get
42 the right answer, then you're not learning math. A girl I knew was really
43 having a lot of trouble and I asked her, with math, and I asked her. She's
44 taking 115 and I asked her, I said, "Are you working the problems to get

1 the right answer or you working the problems to understand it?" Cause I
2 think that has a lot to do with it. If you work it to get the right answer,
3 then you're not learning math. You're just doing it mechanical, you know.
4 And if you learn the basics and you learn the logic of math, then you can
5 do any problem. I mean, I think that's the outlook I take on it. I mean it
6 always works for me.

7
8 DV: So you think there are people who just work the problems (for the
9 answer) for the answer and without thinking about what

10
11 AM: What the purpose of the problem is.

12
13 DV: If you have, can you think of any area, even in developmental math,
14 was there any part of it that was harder than the rest?

15
16 AM: The only thing that I really, I really, I mean it wasn't hard, but that
17 you had to think more about, was inequalities, where you've got the
18 number line and you've got to divide it up to see what part's true and false
19 about it, that's what we're doing right now in the other class, and um, that
20 seemed to, it was just a little more difficult than the other parts of it.

21
22 DV: When you come across a topic like that, that's a little bit harder for
23 you, what kind of strategies do you use to learn?

24
25 AM: I, um, work the problems to be consistent. I don't like to work a
26 problem to get it right and get the next one wrong and get the next one
27 right and the next one wrong. I don't like to do that. I learn to work them
28 in a way that I can understand them and that I can use basically I can use
29 every time. I know there's going to be time when you can't use the exact
30 same thing, but a basic form to do all the time to where I can be consistent
31 and get the right answers. Because if you're fluctuating on your
32 homework, then you might be that way on your test. If you can't get the
33 right answers every time on homework problems, you won't get the right
34 answers everytime on a test, I don't think, unless you just luck up on it.

35
36 DV: Would you do more problems, then, than are assigned?

37
38 AM: Um, if all the problems were, answers in the back of the book. I
39 don't think it helps to do problems that aren't in the back of the book
40 because, if they're not graded in class. If they're graded in class, that
41 helps because then you get to, it's like a test, it's like a mini test. But like
42 in the class I'm taking, you don't go over the homework problems in the
43 class. The proctors, if you have any questions, will help you with that, the
44 teachers' assistants, whatever. They'll teach you how to do the problems

1 you don't know how to do, you don't understand, but if there's problems
2 in the text that's not been assigned on the sheet we have to do, but that are
3 more odds, the odds are always in the back of the book, yeah, I'll do
4 them. I'll do problems that I've not done before, so I can make sure I
5 know how to do them. A lot of times, too, like when you do the
6 quadratic, you can solve by the quadratic formula or by taking the square
7 root of both sides or squaring both sides and stuff like that. I'll do it two
8 different ways to see if I get the right answer.

9
10 DV: You mentioned the proctors in this class that you're taking, now,
11 explain the setup of the class here at State U..

12
13 AM: Ok. There's a, I'm taking 119, it's a self-help class, I guess is what
14 you want to call it. You, there's units 1, 2 and 3 and it covers certain
15 portions of the book. You go to class, all the lectures are required unless
16 you passed the test early. You take the unit test when you want to, when
17 you feel you're ready. The teacher, her name is Bonita _____,
18 and then you have like, I think there's 10 proctors in my class and there's
19 like 10 to 15 students assigned to each proctor. So it's like your personal
20 teacher, you know. I like that about it. But you take the test when you
21 feel you're ready. You have to do all the homework problems that's
22 assigned before you can take the test. Then you take the unit test and then
23 you go into unit 2 and then unit 3. And then at the end of Unit 3, each
24 test is cumulative, too. Like from unit 1, you take the unit 2 test, and
25 there'll be problems from unit 1 overlapping so you won't forget what you
26 learned. But I think math builds on itself. If you learn it from the
27 beginning, you don't forget what you did. But then you take, at the end of
28 the unit, it's grouped in 3s, then you take a final test. The final test is
29 what determines your grade. If you took all those tests on time, the 3 unit
30 tests, then you get 10 points extra credit on the final tests. And then you
31 have 3 final tests, 3 it might be 4 final tests. Like 300 to 330 points is an
32 A. On the first test I made a 97 without extra credit and got the 10 points
33 extra credit so I had 107. So I was really happy about that. There was
34 one problem I didn't work and that was the one I missed. And I got all the
35 rest of them right.

36
37 DV: How do you work with the proctors?

38
39 AM: They come to our class, we have my class on Monday, Wednesday
40 and Friday. It's like a 2-hour class, but only 1 hour lecture. And the
41 proctors come in at 9 o'clock, like my class is at 8. The proctors come in
42 at 9 and you ask them any questions or take your test or if you don't have
43 anything, you just do your homework if you're not ready to take a test or
44 whatever, then you just do your homework.

1 DV: Do you go to separate rooms then for the proctor meetings.

2

3 AM: No you stay in the same room.

4

5 DV: In the lecture hall? (yes) Then how do you get together with your
6 proctor?

7

8 AM: They sit in the front of the room or any other place in the room and
9 when you have a question you just go ask them and then go back to the
10 desk you were sitting in or to sit around them, it doesn't matter really.
11 You just do what you want to.

12

13 DV: So the proctor just answers questions that you come with and gives
14 you your tests. (yes) And so that's the precalculus. ARE you going to take
15 calculus next semester? (next semester) Is that the one, 121, for business.

16

17 AM: Yeah. It's 141 and 142 is engineering majors' calculus. 121 and
18 122 is all other.

19

20 DV: Calculus A and B I think they call it for business. So what do you
21 think about taking calculus? What have you heard about calculus?

22

23 AM: Well, a lot of people tell me that precalculus was hard too, and they
24 just thought it was hard. I have the outlook on math if you learn from the
25 beginning, if you LEARN, not just learn to pass the test, but you learn it
26 because, I mean, you acknowledge what you're learning, and you really
27 learn it, then you don't forget anything. You might, something might be,
28 you've not used it in a long time and it will be rough, but then after you've
29 worked a problem or two with it, with like a formula or whatever, like the
30 quadratic formula, then it all comes back. I don't think - math is built on
31 itself to me and like when you, precalculus will build into calculus. I don't
32 know, I haven't experienced calculus but that's the way I picture it to be.
33 It's the way Algebra II, they just built into one another.

34

35 DV: You're going to have to take 121 and 122 as part of your
36 management program, two semesters of calculus. Let me see here. Since
37 you've been in college, describe the method of teaching of most of your
38 college teachers.

39

40 AM: Um, they, um, I'm very lucky from what I hear to get ones that
41 really, they explain it and they give you problems that you can work.
42 Like, they're a lot like, the one here, Betty _____, she'll go over a
43 section of the homework and she'll give example problems and I'll always
44 write those down for reference. When I come home and get stuck on a

1 problem I can always go back to the one she done. And then after she
2 does that, she'll put like 5 or 6 problems on the board, exemplifying
3 everything you just learned and then you do all the problems and she goes
4 back and works them and you check your answers with hers and if you
5 don't get the right answers then you can go and ask her questions. She's
6 also in her class, in her office during her proctors' hours and if you have
7 any questions that they can't answer then you can go to her.
8
9 DV: So you have time in class to work problems,
10
11 AM: Oh, an hour. You have an hour to ask a proctor questions. You can
12 go over your homework. They don't get up in a class and teach. You
13 have a question and they teach it to you. But you can sit and work your
14 problems and if you run into a problem you can't do then
15
16 DV: Are you required to stay that second hour?
17
18 AM: No. The only thing you're required for is the lectures. You have to
19 stay, you can't take the unit tests during class hours. So you have to stay
20 at least 3 lab periods so you can take the tests.
21
22 DV: So then you decide when you're going to take the tests. (right) Do
23 you all take the same tests?
24
25 AM: No. There's like, see you can take the test. There's 15 problems on
26 the unit test. You have to get 13 out of 15 right to take the next one. So
27 there's, you can take it as many times as you need to to pass it. There's
28 like they have different forms, like A, B, C, D, whatever, things like that.
29
30 DV: Do you ever study with other students?
31
32 AM: I really haven't, but people's asked me to study with them to teach
33 them how to do it and I've done that. But as far as me having to study
34 with somebody and let them teach me how to do it, I've not had to do that
35 yet.
36
37 DV: Hm. But people have come to you and asked you to help them?
38 (yes) Has that happened here or
39
40 AM: There's a guy in my class that I had Algebra II in high school with
41 him and he's in this class here and I showed him things that he don't
42 understand. He goes, "Angie, I don't understand how they got that."
43 And I, I always work the problem first and get the right answer before I
44 even let him see the problem, because if you get the wrong answer then it

1 just confuses them that much more. So I always work it first and get the
2 right answer and then I explain to him. But I did that in Algebra II a lot.
3 There was a girl behind me, I helped her a lot. There was like 3 or 4
4 people who set around me and I helped them a lot.

5
6 DV: This was in high school? in Algebra II.

7
8 AM: Actually one time the girl was about to, she was messing up on her
9 test and the instructor said, "You need to go over to Angie's house this
10 weekend and let her teach you how to do this because you're going to fail
11 that test and you don't need to." _____

12
13 DV: So you did really well in high school with Algebra II.

14
15 AM: I felt really confident with it.

16
17 DV: When you decided not to take math your senior year, did any of the
18 teachers talk to you? Did they know about it?

19
20 AM: Not really. I didn't talk to any of them about it. I just signed up for
21 classes and, I didn't really talk to anybody about, to ask whether I should
22 or not.

23
24 DV: So you give advice to your younger sister? (yeah) What kind of
25 general advice would you give just to anybody in high school?

26
27 AM: Tell them definitely to take Algebra I, II and geometry and it's
28 according to what their plans are as to whether to take advanced math.
29 But I think it helps everyone to take it but in high school, because it keeps
30 you from having to take 119 down here, you know, it's an extra semester
31 of math that you could have taken in high school and you're in the same
32 thing. But I also think it's easier, as you get older it's easier to learn. I
33 found that to be true. Because there's things that was hard in Algebra II in
34 high school to me and then when I got to White State it was just, math was
35 just a repetitive class of Algebra II, just at a higher pace. You do in one
36 semester what you did in a year in high school. IT wasn't hard. The
37 things that was hard then wasn't hard and um, it, I don't know if it was
38 just because I'd already done it or it was just easier to learn as you got
39 older, I don't know what it was, but it was easier for me to learn it, when
40 I learned it at White State.

41
42 DV: In the developmental math at White State, was there much geometry?

43
44 AM: Not very much. When you had the graphing, but as far as, there

1 wasn't any proofs(laughs). That's the one thing I remember about
2 geometry is those proofs. But, I covered everything in Algebra II that I
3 did in high school plus more at White State. It was more in depth than in
4 high school I think. Like the infinity, you know, the infinity sign and stuff
5 like that, I don't recall doing that in high school. I always did the sets,
6 like 3 is less than x _____-instead of using the infinity symbol.
7 And that sometimes gets a little confusing because you're used to writing it
8 the other way and you'll be writing it down and wait a minute, this is
9 wrong, you know. You got to do it the other way, you know. I
10 caughtmyself doing that because I knew the other way in high school.

11

12 DV: When do you plan to graduate then from college? Do you have a
13 projected date?

14

15 AM: 95.

16

17 DV: 95. So you're going to go through in 4 years. Will you be going to
18 summer school?

19

20 AM: If I have to later on, I will. I'm not going at first because I feel like
21 if you take too much school, college, at one thing, is different, you know.
22 You have the pressure on yourself. Your teachers don't tell you you need
23 to do this and I'll let you make this up if you'll come to my class.
24 You'llhave to do it yourself, and I feel like you'll get, it's a lot more load,
25 you have to study, you HAVE to study to even make a C in the class, you
26 know you Have to study to make a C. And I think if you went consecutive
27 all the way through, I think I would be burned out,I think, not burned out
28 as to not coming back, but burned out as to studying as much and making
29 as good a grade and having the excitement to make good grades and stuff
30 like that.

31

32 DV: Um, this fall when you come back to State U, you'll be taking your
33 calculus. What other courses will you take?

34

35 AM: Um I will take a light semester with band because we travel and we
36 have Tuesday and Thursday band practice. So I planned on taking English
37 102 and I'm going to take my calculus class and taking astronomy and that,
38 with that and my private lessons and my band classes, that will give me 13
39 hours. I shoot for 15 hours a semester, but 13, you know 12 is a full time
40 student, you know. I'll be full time. But it's a lot harder, it tends to make
41 your grades slip. And I would rather take 3 and have good grades than
42 take 4 and make average grades or below average grades in all of them.

43

44 DV: Do you have a regular advisor here at State U?

1 AM: Well, I'm just, I don't have one yet, but I'm going today to get
2 mine. So I don't have one yet.
3
4 DV: Would it be in the business school?
5
6 AM: Yeah. Right. If I switch to music, I have a private teacher here and
7 he told me that he would set me up with somebody, he told the man's
8 name. I don't know what it was. But he told me he would set me up with
9 him in music, so it's really just to me now to decide which one I want in.
10
11 DV: Um, let me finish up with my questions and ask you just, at this
12 point, now, what are your plans, projecting into the future?
13
14 AM: If I major in business, I want to work probably at least 5 to 10 years
15 with my dad, 5 - 10 years with my dad, possibly more. I might spend my
16 whole life working with my dad. Or his business, you know. Um, I
17 might do that, I don't really know, but if I did, the only other alternative
18 would be to start my own business, but it wouldn't be in the construction
19 way. It would be in um selling, you know. Then I want to teach
20 privately, because I don't want to let all the work I've done in my music
21 all my life, since I've been 9 years old, I don't want to drop all that when I
22 get out of college. So, I'll probably teach privately or maybe be an
23 assistant band director at my high school or something like that. If I go
24 into the music field, I want to go back to my county to teach because I
25 want to see the program upgraded there, and I feel like that I could do, I
26 feel like I could upgrade the program because, um, I'm from the county. I
27 understand the people of the county. I understand, you know, there's
28 different counties of people have different ways of doing. I've lived there
29 all my life. I've lived in the same house, I was born in my house and so,
30 you know, I was, I know the people around there and I feel like I could
31 go back in and teach in a way to get people interested and make
32 em _____ because band is good, I think. I
33 think it gives people, students a way to excel, you know. You can, you
34 know, it's enjoying, like going to Arizona and all these places, you know.
35 It's really fun. In my senior year in high school I marched in London,
36 England in a parade on New Year's Day. So, I mean, band has its
37 rewards. You have to work for it but it has its rewards. And it gives
38 people something to do because because you have, you know, you go to
39 ballgames and you play at them and you have band competitions in high
40 school and there's things like that, so I would want, if I went in the field of
41 music, I want to go back to my county and teach and then I would
42 probably work part time with my dad. I don't want to leave my dad's
43 business and I don't want to leave music so, somehow they'll go hand in
44 hand in whatever plans I do decide in the future.

1 DV: You have lots of good plans for the future. Well, that's all my
2 questions. Do you have any just general comments on math or education.

3
4 AM: I think education is essential definitely for everybody, nowadays
5 more than past because my dad doesn't have a high school degree and he
6 has his own business, but there is no way that somebody could do that
7 now, I don't think. There's too many other competitive people out there
8 that, I mean, I don't think NOW, 20 years later, that if I quit, that if I had
9 to quit high school my 10th grade year, I don't think there's any way that I
10 could have started a business by myself and deal with that like my dad did.
11 Times are different and I think um a higher education than high school is
12 necessary, whether it's an associates' degree or just a one year program or
13 I think some form of higher education is necessary for you to excel in a
14 job. I think that. I think it's what's essential.

15
16 DV: To what to you attribute your father's success, then? If he didn't
17 have the formal education, to what do you attribute the success?

18
19 AM: His self discipline and will to be, to be successful. His whole idea
20 of making his business was for us, for us kids. He wanted to make us
21 something we could have when he wasn't here. He, um, he was really
22 poor when he was little. Of course I mean he farmed, he lived on a farm
23 and they had food and stuff like that, but they didn't have things that they
24 wanted all the time. And I don't have everything I want all the time
25 either, but if I need something or I want something really bad, I mean I
26 work and pay for my way but he also gives me a lot too. And he wanted
27 to make something that was for us, that we could have and give our kids.
28 That's why he was doing his business. I think it's he had lots of discipline
29 and lots of self drive to do it. He's worked hard all of his life, since he
30 was 17. He's held down a job the whole time. And I mean my dad's
31 almost 50 years old now and he's still, well he's 48, and uh he works late
32 nights and I mean, he works in the field. He don't sit, he sits behind a
33 desk and makes all the decisions, but he also goes out and works, too.
34 When he's the president of the company, and very rarely
35 _____, I've learned from being associated with that.
36 Probably never find the president of the company out in the field, and he
37 does. I think he feels it's essential to make the company excel and I
38 believe that too because he knows more than some of his employees would
39 know because they don't have the experience. But I think that's why he
40 done it because of his self discipline and self drive too.

41
42 DV: That's quite a compliment to him. Well, thank you. I'm going to
43 turn off the tape recorder at this point.

44

1 After this interview, I walked with Andrea back to the business school and
2 we talked about her band activities and her family's interest in getting
3 tickets to football games to watch her march. As we parted, she mentioned
4 that her father had told her that she could be anything she wanted if she
5 just went for it. She really admires and respects what her father has built
6 up. OF the 12 participants in this study, Andrea seems the most focused.
7 Even though she has two options for careers, they are both grounded in
8 personal experiences rather than some unknown area that she has seen
9 on TV or read about. She is much more reflective than most of the
10 participants have been in all areas, especially the math. She has the same
11 determination most of them have, but with the strong, unified family
12 support, she appears to be more likely to make it. I noticed her mother
13 was not mentioned in much of her dialogue. When I questioned her about
14 her mother, she immediately steered the subject elsewhere.

15
16

APPENDIX F

Example of Transcript Analysis
Category: Teachers

Themes

Participant	Availability Page: Lines	Attitude Page: Lines	Time Page: Lines
Helen	2: 44 3: 13	7: 8-19; 31: 44 19: 30-36; 3: 5-10	1: 32-35 5: 1-2
Ericka	2: 7-10 7: 4-9, 19-34		7: 4-9
Tootie	3: 22-30	2: 44-52; 3: 1-15 7: 49-52; 25: 27+	3: 26-30; 4: 37+ 8: 23-31; 18:49+
Brenda	7: 340-348	3: 133-137;8: 386-408; 9: 417-466	7: 344-348
Linda	3: 28-29	3: 34-41 21: 26-30	4: 20-30 27: 12-15
Andrea	3: 32-41 4: 1-8	3: 36-32 4: 1-8	3: 33-35 27: 12-15
Toni	3: 14-16 7: 41-42	2: 1-17; 8: 38-44 9: 1-10; 17: 17-19	1: 36-40 3: 26-31
Michelle	5: 39-42 7: 1-14	8: 5-19	1: 1-4, 32-51 3: 22-32; 9: 10+
Lisa		7: 4-10, 15-16 5: 37-44	6: 29-36 7: 6-10
Stephanie	8: 1-8	11: 36-52; 12: 36-52; 15: 15-19	
Shelly	6: 17-23	2: 1-18; 13: 3-10 14: 1-6, 19-26 27: 40-49; 28: 29+	15: 5-14
Jean	3: 13-18 20: 26-34	2: 42-44 11: 10-33	3: 13-18 9: 30-37

VITA

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