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The career satisfaction, future plans, and personal characteristics of Tennessee public school science and mathematics teachers in 2001

Delisa K. Dismukes

To the Graduate Council:

I am submitting herewith a dissertation written by Delisa K. Dismukes entitled "The career satisfaction, future plans, and personal characteristics of Tennessee public school science and mathematics teachers in 2001." I have examined the final electronic 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 Teacher Education.

Mary Jane Connelly, Major Professor

We have read this dissertation and recommend its acceptance:

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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We have read this dissertation
and recommend its acceptance:

Lloyd Dale Davis

Thomas W. Mays

C. Glenton Rowell

Accepted for the Council:

Vice Provost and Dean of
Graduate Studies

THE CAREER SATISFACTION, FUTURE PLANS, AND PERSONAL CHARACTERISTICS OF TENNESSEE PUBLIC SCHOOL SCIENCE AND MATHEMATICS TEACHERS IN 2001

A Dissertation

Presented for the

Doctor of Education

Degree

The University of Tennessee, Knoxville

Delisa K. Dismukes

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DEDICATION

This dissertation is dedicated to my parents, Reverend Kenneth Dismukes and Martha Dismukes, and to my sister, Andrea Dismukes, for their inspiration and encouragement.

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ABSTRACT

The effect of state mandates on the supply and demand of science and mathematics teachers in Tennessee is dependent upon the composition of the population of science and mathematics teachers. The purpose of this study was to replicate a study conducted in 1985 by Smith which determined the demographic profile of the general population of secondary school science and mathematics teachers in Tennessee; their general level of job satisfaction; their future plans; and their perceptions of the extent to which they possess job-related skills and abilities, the extent to which they value job-related variables, and the extent to which they have achieved in the teaching profession. Like the previous study, this study also was designed to determine if any relationships existed between the variables. The population of this study consisted of licensed secondary science and mathematics teachers employed in Tennessee during 2001. A survey questionnaire was mailed to a sample of 320 science teachers and 325 mathematics teachers in order to obtain the information described above. Findings of this study included: 1) The typical teacher has over a decade of teaching experience and holds a graduate degree, 2) The highest rated ability for both subgroups was "Cooperating with a team." The highest rated value and extent of achievement for both groups was "An inner sense of knowing you are doing well," 3) The typical science and mathematics teacher can us computers and educational technology to a moderate or large extent, 4) The typical science and mathematics teacher indicated they were very satisfied with their current employment and their personal growth in their career, and would be extremely likely to choose an education career again, 5) Approximately one-half of the science and

mathematics teachers indicated that they plan to leave the public school classroom in five years, and 6) Science teachers related job satisfaction with recognition from supervisors, obtaining professional growth, a chance to contribute to decisions, and using technology in the classroom. Mathematics teachers related job satisfaction with knowing that you are doing well, high salary, recognition by students, and having a chance to contribute to decisions. Recommendations for further research included investigating the gender ratio to identify factors that determine a career choice in education versus a career in other mathematical fields, since the number of female mathematics teachers is twice the number of males.

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CHAPTER I

INTRODUCTION

In the last two decades, many publications concerning the state of education in the United States have focused on the increasing demand for competent teachers, particularly in the areas of science and mathematics. Recruiting and retaining quality teachers has become a challenge for colleges of education and school systems.

The teacher-student interaction is basic to the educational process. Therefore, attracting and retaining skilled teachers is a primary necessity for education in the United States. Understanding the factors associated with teaching quality and retention is one step in developing a high-quality faculty. Job satisfaction, which has been linked to organizational commitment and organizational performance, is one of these factors (Mathieu, 1991 and Ostroff, 1992).

The 1993 report, *America's Teachers: Profile of a Profession* (Choy et al., 1997), contains data on teachers' demographics, characteristics of their students and schools, their teaching experiences, and satisfaction with their working conditions. The report contends that a teacher's job satisfaction with his or her career may affect quality and stability of instruction, thus having strong implications for student learning.

Job Satisfaction Among America's Teachers: Effects of Workplace Conditions, Background Characteristics, and Teacher Compensation, produced by the National Center for Education Statistics (NCES) in 1997, identified workplace conditions and compensation factors that may be manipulated to influence job satisfaction with teaching. By manipulating such factors, schools and school districts may be able to increase long-

term satisfaction among educators.

Statement of the Problem

The effect of state mandates on the supply and demand of science and mathematics teachers in Tennessee is dependent upon the composition of the then current population of science and mathematics teachers. If job satisfaction suggests that career changes are anticipated or if large numbers of science and mathematics teachers are near retirement, then an additional demand could emerge which would cause an imbalance in the supply of these teachers. Therefore, demographic characteristics, career satisfaction, future plans, and self-perceptions related to skills and abilities, values, and achievements of Tennessee science and mathematics teachers were needed to provide a better understanding of the current population.

Purposes of the Study

The purposes of this study were to replicate a study conducted in 1985 by Smith which determined the demographic profile of the general population of secondary school science and mathematics teachers in Tennessee; their general level of job satisfaction; their future plans; and their perceptions of the extent to which they possess job-related skills and abilities, the extent to which they value job-related variables, and the extent to which they have achieved in the teaching profession. Like the previous study, this study also was designed to determine if any relationships existed between job satisfaction and the self-perceived skills and abilities, self-perceived job-related values, and self-perceived professional achievement of the participants.

Significance of the Study

Policymakers have been increasingly concerned about the quality and quantity of science and mathematics education. In 1996, the Tennessee State Board of Education mandated an increase in graduation requirements in these areas. This necessitated hiring additional science and mathematics teachers.

The results of this study provide information to post-secondary educational institutions to help in recruiting efforts for future science and mathematics teachers. An analysis of the demographics, career satisfaction, and future plans of these teachers would establish a more definitive profile of the future demand for them. This study serves as a needs assessment instrument for staff development, enabling school systems to adapt their staff development programs to focus on retention of science and mathematics teachers. Additionally, state education officials could use the results to devise appropriate incentives to attract new teachers and retain the present qualified teachers. This study provides a replication of the findings of the Smith (1986) study, increasing the generalizability of the results.

Research Questions

Six questions are important areas of concern in this study. They are the following:

1. What were the demographic characteristics of the population of Tennessee science and mathematics teachers in 2001?

2. What were the self-perceived skills and abilities, job-related values, and career achievement of Tennessee science and mathematics teachers in 2001?

3. What levels of ability in using educational technology did current Tennessee

science and mathematics teachers possess?

4. What levels of career satisfaction did current Tennessee science and mathematics teachers experience?

5. What future career plans did Tennessee science and mathematics teachers foresee in one year, five years, and ten years from the time of the study?

6. What relationships existed between the satisfaction of Tennessee science and mathematics teachers and

a. self-perceived skills and abilities,

b. self-perceived job-related values,

c. self-perceived achievement in the profession

d. their future career plans?

Limitations and Delimitations

The limitations and delimitations are the following:

1. The population of this study was delimited to a random sample of all licensed secondary school mathematics teachers and all licensed secondary school science teachers employed in Tennessee during the 2001-2002 school year or their replacements.

2. The population from which the random sample was drawn was limited to the Tennessee State Department of Education's list of secondary school science and mathematics teachers during 2000-2001.

3. This study was limited to the responses provided by the participants on the Science and Mathematics Teacher Questionnaire (Appendix A).

4. This study was limited to those teachers who returned the questionnaire with usable responses (69.92 percent).

5. Analysis of relationships was limited to data obtained from questionnaires completed by teachers who taught at least 50 percent of their classes in secondary school science and mathematics.

6. This study was limited by the inherent limitations of survey instruments.

7. The applicability of the results of this study is limited to the science and mathematics teachers employed in the state of Tennessee during the 2001-2002 school year.

Assumptions

The following assumptions were necessary to give direction and structure to this study:

1. Items on the questionnaire accurately measured differences in science and mathematics teachers' perceptions of career satisfaction, skills and abilities, criteria used to evaluate professional success, and professional accomplishments.

2. The participants responded truthfully to the survey questions.

3. Participants selected through the sampling procedure for this study were representative of their respective populations and the condition of randomness of the sample was met.

4. The questionnaire rating scales were of equal interval and continuous.

Definition of Terms

Advanced Placement (AP) course is a course designed to prepare students to take the College Board-sponsored Advanced Placement (AP) exam.

Career satisfaction is the sum of an individual's affective reactions and attitudes to their past, current, and future employment.

Elementary school teacher is a teacher who is employed in a school serving students in kindergarten through grade six.

Extrinsic rewards are rewards that are controlled or administered by some external agent and that may be awarded to the individual.

Honors course is a course developed locally by district teachers to meet the needs of talented students.

Intrinsic rewards are rewards that are controlled or administered by the individual and awarded to himself/herself.

Job satisfaction is the sum of an individual's affective reactions to his/her current work role and work environment.

Mathematics teacher is a secondary school teacher who teaches at least 50 percent of the daily schedule in mathematics or educational technology courses to students in grades nine through twelve.

Middle school teacher is a teacher who is employed in a school serving students in grades six through eight.

Science teacher is a secondary school teacher who teaches students in grades nine through twelve at least 50 percent of the daily schedule in one of the following courses: general science, earth/space science, biology, chemistry, physics, or other related courses.

Secondary school teacher is a teacher who is employed in a school serving students in grades nine through twelve.

Organization of the Study

The study is organized into five chapters. They are as follows:

Chapter I provides a background of the problem, the problem statement, the

research questions, the significance of the study, limitations and delimitations, assumptions, and definitions.

Chapter II contains a review of the literature.

Chapter III contains the methodology, including information on the subjects, procedures, instrumentation, and statistical analysis.

Chapter IV contains the findings and the analysis of the data.

Chapter V contains summaries, conclusions, and implications for further research.

CHAPTER II

A REVIEW OF RELATED LITERATURE AND RESEARCH

Research in job satisfaction, motivation, and job dissatisfaction of employees has been conducted extensively in business and industries (Gibson and Hodgetts, 1991). Management literature is replete with data of what does and does not motivate employees. Social science researchers have expanded their understanding of these concepts by conducting studies in educational settings. As in the previous study, three areas will be explored in this chapter: the historical roots of job satisfaction, the theoretical basis of job satisfaction, and current research in job satisfaction in educational settings.

Historical Roots of Job Satisfaction Research

Interest in job satisfaction has been influenced by the belief that satisfied employees perform at higher levels. However, debate exists over whether productivity causes job satisfaction or job satisfaction causes productivity (Iaffaldano & Muchinsky, 1985).

Harvard Business School professor Elton Mayo examined productivity and work conditions in the Hawthorne Studies, which were conducted from 1927 to 1932 at the Western Electric Hawthorne Works in Chicago. The studies grew out of preliminary experiments at the plant on the effect of illumination on productivity. The experiments showed no clear connection between productivity and the amount of light, but researchers became interested in what types of changes would influence output.

Mayo wanted to determine what effect fatigue and monotony had on job

productivity and how productivity might be controlled. In the process, he inadvertently identified a principle of human motivation that would help revolutionize the practice of management (Sherman, et al., 1988).

Research in job satisfaction was initiated when Hoppock (1935) created a definition as any combination of psychological, environmental, and physiological circumstances that cause a person to state that s/he is satisfied with his/her job. Implications for job satisfaction for individuals and organizations have been studied extensively since that time. Attempts have been made to link job satisfaction with variables such as: (1) work environment, (Conley, Bacharach, & Bauer, 1989), (2) absenteeism (Bridges, 1980), (3) morale and commitment (Reyes & Timber, 1992), (4) motivation (Frase & Sorenson, 1993), (5) gender (Cano & Miller, 1992), (6) school structure (Miskel, Fevurly, & Stewart, 1979), and (7) principal communication (Whaley & Hegstrom, 1992). These studies provide useful information about job satisfaction and dissatisfaction in educational environments. Four theories of motivation/job satisfaction upon which this research was based will be discussed in the next section.

Theoretical Basis of Job Satisfaction

Many theorists have developed motivational theory, which includes the study of job satisfaction. Researchers have studied motivational theory from a variety of perspectives, providing new insights concerning human behavior.

Maslow contended that all individuals are motivated by one of five needs: Physiological, safety, social, esteem, and self-actualization. These needs can be presented in the form of a hierarchy. Maslow proposed that when an individual is basically satisfied at one level, s/he will move on the next level. As one moves up the

hierarchy, there tends to be less satisfaction of that need than there was at the lower levels. Therefore, upper-level need satisfaction is not as complete as lower-level need satisfaction.

Herzberg (1959) proposed several characteristics consistently related to job satisfaction and dissatisfaction in his motivator-hygiene theory. Intrinsic factors—achievement, responsibility, recognition, and the work itself—were frequently named by respondents as sources of satisfaction. Extrinsic factors—supervision, salary, company policy, status, peer relationships, and security—were frequently mentioned as causes of job dissatisfaction. Herzberg concluded "job satisfaction and dissatisfaction were separate dimensions. Satisfaction depends on motivators that promote growth needs; dissatisfaction depends on hygiene factors that serve lower-order needs" (Knoop, 1994, p. 1).

Reber and Terry (1975, p. 68) analyzed the relationship between Maslow's Need Hierarchy and Herzberg's Motivation-Hygiene theory. The two highest levels of Maslow's Need Hierarchy (esteem and self-actualization) parallel the motivators of Herzberg's theory (i.e., the work itself, growth, advancement), while the lower three levels of Maslow's hierarchy parallel the hygiene factors (i.e., interpersonal relations, salary).

Lyman Porter (1961) modified Maslow's hierarchy, placing autonomy needs between esteem and self-actualization needs. Further, Porter asserted that job satisfaction depended on the extent to which a worker's needs were being satisfied compared to the extent to which the worker believed his/her needs should be satisfied.

Porter and Lawler (1968) created a general model of motivation based on

instrumentality theory. Landy and Trumbo (1980, pp. 344-347) summarized the model's various components. Value of Reward describes how desirable specific outcomes are to an individual. Perceived Effort-Reward Probability is the individual's estimate of the probability that increased effort will help obtain the desired reward. Effort indicates how hard the individual works to obtain the reward, compared with how effectively he works. Abilities and Traits are the individual's characteristics which provide the upper limits for performance. Role Perceptions indicate the way an individual defines a successful job performance. Performance is the degree of accomplishment in the job. Rewards are divided into extrinsic and intrinsic rewards. There is a direct relationship between performance and intrinsic rewards—which satisfy the higher order Maslow needs—only if the individual is challenged in the achievement of the job tasks. The extrinsic rewards may be infrequent since they may not be awarded when a task is successfully completed. Perceived Equitable Rewards are rewards the individual considers equitable for successful task completion. Satisfaction is determined by the individual's comparison of the perceived equitable reward and the actual reward. Satisfaction will occur when the actual reward is greater than the perceived equitable reward, while dissatisfaction occurs if the perceived equitable reward is greater than the actual reward. The degree of satisfaction or dissatisfaction increases as the difference increases between these rewards.

Herzberg's theory emphasized how the task variables of the Porter-Lawler model would affect intrinsic rewards. The theory suggested that extrinsic rewards would affect the level of dissatisfaction while intrinsic rewards would affect the level of job satisfaction. However, the Porter-Lawler model suggests that both intrinsic and extrinsic rewards can lead to job satisfaction. Additionally, Herzberg's theory emphasized that

attitudes caused behaviors, while the Porter-Lawler model emphasized that behaviors caused attitudes (Norton, 1970, p. 28).

John Holland (1973) developed an extensive theory of careers based on an individual's behaviors, interests, traits, and work environment. He suggested that an individual's personality may be classified into six model types: (1) realistic, (2) investigative, (3) artistic, (4) social, (5) enterprising, and (6) conventional. Environments may be classified into these same six types according to the predominate personality type of the individuals who occupy positions in that environment. Holland operationalized the six personality types by the differences in an individual's abilities, skills, and values. Predictions concerning "vocational choice, vocational stability and achievement, educational choice and achievement, personal competence, social behavior, and susceptibility to influence" may be made from the knowledge and comparison of personality types and environmental types (p. 2).

Chapman and Lowther (1982) used Holland's theory to develop a conceptual scheme to depict the influences which impact the career satisfaction of teachers. They proposed that a teacher's career satisfaction may be influenced by skills and abilities in organizing time/activities and communicating effectively, personal demographics, the teacher's perceived professional achievement, and the criteria used to ensure professional success.

In summary, the theories of job satisfaction presented may be categorized into three typologies: (1) the need theories (e.g., Herzberg's Motivator-Hygiene Theory), (2) discrepancy theories (e.g., Porter-Lawler Theory), and (3) trait theories (e.g., Holland-Chapman-Lowther Vocational Choice Theory) (Smith, 1986, p. 26). The studies

reviewed in the next section are founded on these theories.

Review of Current Research in Job Satisfaction

Recent studies in elementary and secondary education will be discussed in this section. Public education will be the primary emphasis. The focus will be on specific factors that influence general job satisfaction and the degree of general job satisfaction.

Tutor (1986) raised questions about the applicability of Maslow's and Herzberg's theories to elementary and secondary school teachers. His research with the Tennessee Career Ladder Program found evidence that the teachers in the program do not reflect the behavior of business employees. The findings disagree with Maslow concerning the position of esteem in a person's need hierarchy and with Herzberg in relation to the importance of monetary motivation. Bellott and Tutor (1990) state that the problems with Herzberg's research are that is did not include teachers and that it occurred in 1959—too long ago to be applicable.

Intrinsic factors may motivate individuals to become teachers. However, extrinsic conditions can influence their job satisfaction and their desire to remain in a teaching career (NCES, 1997). Approximately five percent of public school teachers left the teaching profession after both the 1987-88 and the 1990-91 school years (Bobbitt et al., 1994). Twenty percent of those who left public school teaching left to pursue other career opportunities, they desired better salaries, or because they were dissatisfied with the profession.

Marlow, Inman, and Betancourt-Smith (1995) studied areas of teacher satisfaction related to environmental factors which would impact retention. They found that the "congruence of ideology between teacher and pupils and the congruence of

culture with other teachers and with the school are indicative of a predisposition to remain in the profession."

Rinehart and Short (1994) found that teachers who have a leadership role or have decision-making responsibilities in areas such as curriculum development, scheduling, and budgeting perceive a greater sense of job satisfaction. These teacher leaders perceived more impact, self-efficacy, status, and autonomy, which may be associated with elements of job satisfaction.

Wu and Short (1996) found that self-efficacy and professional growth significantly predicted job satisfaction and commitment. Status was also a significant predictor of commitment. The authors stated that it might be that teachers, who found a greater sense of empowerment in their work and perceived a greater status, perceived that the values and goals of the organization more closely aligned with their own expectations. Additionally, teachers who see themselves as having status in the organization may have greater commitment because of feelings of greater personal importance and investment (Mowday, et al., 1982).

Marlow and Hierlmeier (1991) and Natale (1993) found that many teachers believe that teachers are not accorded the prestige that they have earned and that two-thirds of teachers or former teachers cite this as a reason for leaving the profession. This lack of respect includes societal attitudes toward teaching, low status, lack of respect from students, parents, and the community, and not being considered as a professional.

Burrows and Munday (1996) studied the predictive effects of leadership substitutes on the degree of organizational commitment and job satisfaction in secondary

schools. Professional orientation, the substitute for leadership, was found to be statistically significant as a predictor of organizational commitment. Additional substitutes for leadership-intrinsic satisfaction, organizational inflexibility, and spatial distance-were found to be significant predictors of job satisfaction.

Borg and Riding (1991) found that British teachers who reported greater stress at work were less satisfied with teaching, had a greater frequency of absences, were more likely to leave teaching, and were less likely to begin a teaching career again. In all age groups, male teachers reported greater stress than female teachers. Klecker and Loadman (1999) found that male elementary school teachers rated their job satisfaction lower than female teachers on satisfaction with interaction with colleagues and challenge of the job.

Clark (2000) stated that the expectations and requirements concerning the integration of technology into the classroom could be stressful for many teachers. Research by Bosche and Cardinale (1993) revealed that both new and veteran teachers feel inadequately prepared to use computers in their classroom. Despite the increased expectations of educational leaders and the community, the National Education Goals Panel (1995) indicated that only half of all teachers reported any professional development opportunities in educational technology.

Lobosco and Newman (1992) found that special education teachers' perceptions of their jobs are directly related to their perceptions of their students. Working with students with learning difficulties negatively predicts job satisfaction, whereas working with academically talented students has a positive effect.

Billingsley and Cross (1992) identified predictors of job satisfaction and commitment among both general and special educators. They found that work-related

variables are better predictors of job satisfaction and commitment for teachers than are demographic variables. The results suggest that the behavioral and attitudinal measures of commitment are significant predictors of intent to stay in teaching. Job satisfaction across special and general educators is associated with greater work involvement and greater leadership support and lower levels of stress and role conflict. Organizational commitment is also associated with lower levels of role conflict and greater leadership support. Overall, special educators reported significantly greater levels of role ambiguity and role conflict than general educators. In contrast, general educators reported significantly higher levels of stress.

Singh and Billingsley (1996) surveyed teachers of students with emotional disorders and educators from other special education areas. The most important determinant of intent to stay in teaching was workplace conditions. For both groups, role-related problems had negative effects on intent to stay and job satisfaction had the strongest direct positive effect on intent to stay. Principal support influenced intent indirectly through job satisfaction and role-related problems. Additionally, stress had an adverse indirect effect on intent to stay through professional commitment and job satisfaction.

Derlin and Schneider (1994) found that teachers and administrators perceive their jobs differently and that differences exist within these groups when urban and suburban factors are considered. The major finding of the study is that job satisfaction is determined by both role and context.

Graham and West (1992) found a significant association between the relational teaching approach (RTA)—comprised of behaviors indicative of immediacy,

competence, and humor—and job satisfaction of teachers. Immediacy includes verbal and nonverbal behaviors of accessibility, willingness to communicate with students, and personableness (Gorham, 1988). Teachers who reported these qualities were shown to derive greater satisfaction from teaching. Interpersonal competence and humor also contributed significantly to job satisfaction.

Ma and MacMillan (1999) examined how teacher professional satisfaction is related to background characteristics and workplace conditions measured through teaching competence, organizational culture, and administration control. Results show that female teachers were more satisfied than their male counterparts. Teachers with more years in the profession were less satisfied with their professional role. Workplace conditions positively affected satisfaction. Administrative control was the most important condition, followed by teaching competence and organizational culture. The gender gap in satisfaction grew with increased teaching competence and significant interactions occurred between workplace measures of organizational culture, administration control, and teaching competence and teacher background variables of gender and years of experience.

Littrell and Billingsley (1994) studied the effects of principal support on special and general educators' job satisfaction, stress and personal health, school commitment, and intent to stay in teaching. The researchers found that principals who provide informational support and are emotionally supportive are more likely to have teachers with greater job satisfaction. Both emotional and instrumental support were significant predictors of school commitment for special and general educators. Teachers who reported more emotional support reported fewer health problems. Further, the results of

the study suggest that teachers perceive higher levels of principal support when there is a high degree of optimism and collegiality in their schools and when teachers interact frequently with their principals.

Shann (1998) examined professional commitment and job satisfaction among teachers in urban middle schools in the United States. Teacher-pupil relationships ranked highest in terms of satisfaction and importance. The respondents' highest concern was parent-teacher relationships. Teachers in lower-achieving schools were more dissatisfied with their school's curriculum and with teacher-teacher relationships than individuals in higher-achieving schools.

Scott and Dinham (1999) studied English schoolteachers to determine teachers' occupational motivation, satisfaction, and health and to test a teacher satisfaction model developed in Australia in a previous research phase (Dinham and Scott, 1997). Like their Australian counterparts, English teachers were found to be motivated by altruism, personal growth, and affiliation. Both groups reported greatest satisfaction with facilitating students' learning and achievement, working with other staff, and developing as a professional. The groups were least satisfied with the nature and pace of educational change and the status and image of teaching.

Ninomiya and Okato (1990) conducted a critical analysis of Japanese teachers with high levels of job satisfaction. Japanese teachers reported working conditions as most important for their job satisfaction, followed by classroom practices. The factors identified as contributing to working conditions were morale, reasonable workload, and material rewards. The greatest significant difference between those who were satisfied with the job and those who were not satisfied is found in their perceptions of their

working conditions, professional life, and teaching practices. The highly satisfied teachers reported enough recognition for their work, pleasant physical surroundings, principal support, and being regarded with respect. Male teachers were significantly more likely to be satisfied with their current job than female teachers. Younger teachers were less likely to be satisfied. Teachers whose salary is 100% of the total household annual income were more likely to have greater job satisfaction than those whose salary was only 50% of the total income.

Research by Knoop (1994 and 1991) suggests that Herzberg's theory is still very relevant. Knoop assessed five facets of job satisfaction: work itself, opportunities for promotion, salary, supervision, and coworkers. Knoop states that the only variable that did not fully support Herzberg's model was opportunities for promotion. Conversely, Gawel (1997) asserts that although Maslow's hierarchy of needs and Herzberg's theories of hygiene and motivation factors may still have broad applicability in the business world, at least one aspect of each, esteem as a lower order need than self-actualization (Maslow) and salary as a hygiene factor (Herzberg), may not be applicable in elementary and secondary education. He states that the findings in his study may help explain why teachers are choosing other higher paying careers.

Summary of Chapter II

The current research in job satisfaction shows that both intrinsic and extrinsic rewards were shown to be factors of teachers' job satisfaction. As in the previous literature review conducted by Smith, the level of job satisfaction seemed to be gender dependent, with females showing more satisfaction than males and job dissatisfaction and intention to change careers were associated with factors outside the teacher's immediate

CHAPTER III

METHODS AND PROCEDURES

Introduction

The purposes of this study were to replicate a study conducted in 1985 by Smith that determined the demographic profile of the general population of secondary school science and mathematics teachers in Tennessee; their general level of job satisfaction; their future plans; and their perceptions of the extent to which they possess job-related skills and abilities, the extent to which they value job-related variables, and the extent to which they have achieved in the teaching profession. Like the first study, this study also was designed to determine if any relationships existed between job satisfaction and the self-perceived skills and abilities, self-perceived job-related values, and self-perceived professional achievement of the participants. The design of this research study was descriptive. The researcher described the current status of the sample being studied.

Participants

The subjects for the current study, as in the first study, were selected by random sample from the total population of licensed science and mathematics teachers employed in those fields in Tennessee during the 2001-2002 school year. Each teacher in the population was assigned a consecutive number beginning with the number one. Four digit numbers were used to select the sample, since there were 1812 science teachers and 2071 mathematics teachers. Starting at an arbitrary point in a table of random numbers (Bureau of Transport Economics, 1965, pp. 251-257), successive entries were recorded until the sample size of 320 (population of 1812) science teachers and 325 (population of

2071) mathematics teachers was reached. The first study had a sample size of 292 science teachers and 297 mathematics teachers randomly selected from a population of 1138 science teachers and 1226 mathematics teachers. Sample size for the current study was determined by using a table created by Krejcie and Morgan (1970) based on a formula originally developed by the United States Office of Education. Hauskens' (1963) formula was used in determining the sample size in Smith's study.

The list of numbered entries was then used to designate the corresponding names in the population. These names constituted the sample of science and mathematics teachers who were asked to participate in the study. If, after mailing the questionnaire, it was determined that a selected teacher was not employed as a mathematics or science teacher during the 2001-2002 school year, the teacher filling the vacated position replaced the original selected teacher.

Survey Instrument

Chapman and his colleagues designed and administered questionnaires to teacher education graduates of several Midwestern universities (Hutcheson & Chapman, 1978; Chapman & Hutcheson, 1980; Chapman & Hutcheson, 1982; Chapman & Lowther, 1982; Chapman, 1983a). The career satisfaction of teachers was one of the many topics addressed in their surveys. Chapman and Lowther (1982) developed a conceptual scheme relating to self-perceived professional achievement, self-perceived skills and abilities, and job-related values to a teacher's career satisfaction. The conceptual scheme was supported by research conducted by Chapman and Hutcheson (1982), Chapman and Lowther (1982), and Chapman (1983a). Chapman (1983b) expanded this model to include influences that impacted retention of teachers. Chapman (1984) tested this

expanded model and found meaningful differences between career teachers, teachers who left teaching within five years, and those who prepared for teaching but never taught. These differences supported the expanded model. Chapman's questionnaire was considered to have construct and content validity since the results of each of the studies by Chapman and his colleagues supported the model.

The Science and Mathematics Teacher Questionnaire (Appendix A) was developed by Smith (1986) by isolating the items from Chapman and Hutcheson's (1980) instrument, which measured career satisfaction, perceived skills and abilities, criteria for personal success, and perceived career achievement. The internal consistency reliability for each of the latter three scales was estimated to be .75, .77, and .81 respectively (Chapman, 1984). These items were placed verbatim in section II of the questionnaire with permission of Chapman. The professional data (section I), future career plans (section III), and demographic data (section IV) parts of the questionnaire were developed by Smith or adapted by Smith for use from various sources. Permission letters from Chapman and Smith are found in Appendix B.

The questionnaire was placed on a website to provide respondents with an easier option for completion and to provide easier data analysis for the researcher, since the data were fed into an online database. A copy of the web version of the questionnaire is found in Appendix C.

Method of Data Collection

Permission to conduct the study was obtained from the directors of each selected science and mathematics teacher's school district by sending a letter (Appendix D). If permission was declined, additional letters/e-mails and telephone conversations were

used in an effort to gain permission. Of 105 districts containing the selected teachers, 82 directors gave permission to contact teachers within their district, sixteen declined to participate, and seven did not respond. A second random sampling was made to replace the teachers from nonapproved districts. Permission was obtained from the directors whose school districts had not been approved in the first sample.

The questionnaires and cover letters (Appendix E) were mailed to the randomly selected subjects at their school address on October 2, 2001. Approximately three weeks after the first mailing, a postcard reminder (Appendix F) was mailed to those subjects not responding to the first solicitation. Additionally, e-mails (Appendix G) were sent to the 67 nonrespondents with school e-mail addresses. E-mail addresses were obtained from the district and school websites. The district and school websites were found on the Tennessee Department of Education's website or by using Internet search engines for schools not found on the State Department website. At the time of the second mailing, 109 (34.06 percent) of the science teachers and 116 (35.69 percent) of the mathematics teachers had returned the questionnaire. Because of a low response rate, questionnaires and cover letters were sent in a third mailing seven weeks later at the beginning of the spring semester on January 8, 2002. Additionally, e-mails were sent to the 39 nonrespondents with school e-mail addresses. At the time of the third mailing, 148 (46.25 percent) of the science teachers and 149 (45.85 percent) of the mathematics teachers had returned the questionnaire. Two weeks after the third mailing, 196 (61.25 percent) of the science teachers and 194 (59.69 percent) of the mathematics teachers had returned the questionnaire. Because of the low return rate, questionnaires and cover letters (Appendix H) were sent in a fourth mailing on January 21, 2002. Additionally, e-

mails were sent to the seventeen nonrespondents with school e-mail addresses and a random sample of 60 science teacher nonrespondents and 60 math teacher nonrespondents were contacted by phone and asked to respond to the survey. At the end of data collection, 230 (71.88 percent) of the science teachers and 231 (71.08 percent) of the mathematics teachers had returned the questionnaire.

Of the 320 science teachers who received questionnaires, 230 responded for a 71.88 percent return rate. Three declined to participate, giving 227 (70.94 percent) usable responses. Of the 325 mathematics teachers who received questionnaires, 231 responded for a 71.08 percent return rate. Seven declined to participate, giving 224 (68.92 percent) usable responses. The net usable responses for the combined sample was 451 (69.92 percent). The first study had 413 (70.12 percent) net usable responses for the combined sample. Table I is a summary of the number and percent of responses to the questionnaire.

To check for nonrespondent bias, twenty science teachers and twenty mathematics teachers within the sample of nonrespondents were randomly selected and asked to respond by telephone to four questions from the survey. The data analysis of these responses was compared to the analysis of earlier responses to determine whether the responses of those teachers telephoned were significantly different from those who responded without being telephoned. The comparison identified, at most, three significant differences among the 57 variables. It was assumed that no significant differences existed between the respondents and nonrespondents.

The data were analyzed to determine the specific teaching distribution of the teachers, since the science teacher or mathematics teacher designation label was defined

TABLE I

RETURNED AND USABLE QUESTIONNAIRES OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001

	Returned Responses of Solicitation*				
Mailings	One	Two	Three	Four	Total
Number of Questionnaires Mailed					
Science Teachers	320	211	172	120	—
Mathematics Teachers	325	209	176	120	—
Number of Questionnaires Returned					
Science Teachers	109	39	48	34	230
Mathematics Teachers	116	33	45	37	231
Cumulative Percent of Returns					
Science Teachers	34.06	46.25	61.25	71.88	71.88
Mathematics Teachers	35.69	45.85	59.69	71.08	71.08
Unusable Returns					
Science Teachers	—	2	0	1	3
Mathematics Teachers	—	3	1	3	7
Usable Returns					
Science Teachers	109	37	48	33	227
Mathematics Teachers	116	30	44	34	224
Cumulative Percent of Usable Returns					
Science Teachers	34.06	45.63	60.63	70.94	70.94
Mathematics Teachers	35.69	44.92	58.46	68.92	68.92

* Solicitation dates were October 2, 2001, October 22, 2001, January 8, 2002, and January 21, 2002.

as one who taught at least one science or mathematics class in 2000-2001. The major teaching assignments were determined by sorting teachers by the type of class taught for 50 percent or more of the daily teaching schedule. Minor assignments were defined by the type(s) of class taught for less than 50 percent of the schedule. Some teachers had teaching assignments that included non-science and non-mathematics courses, therefore three class categories were identified for sorting purposes: science classes, mathematics classes, and other classes. A total of nine possible categories of major/minor assignments were created.

Two hundred twenty-two (49.22 percent of combined respondents) respondents had some area of science as their major assignment. As their minor assignment, 176 (79.28 percent of science subsample) of these teachers taught only science courses, twelve (5.41 percent) taught mathematics courses, and 34 (15.32 percent) taught non-science or non-mathematics courses. Two hundred twenty-one (49.00 percent of combined respondents) respondents had some area of mathematics as their major assignment. As their minor assignment, 169 (76.47 percent of mathematics subsample) of these teachers taught only mathematics courses, 31 (14.03 percent) taught science courses, and 21 (9.50 percent) taught non-science or non-mathematics courses. The major assignment for eight (1.77 percent) of the teachers was non-science or non-mathematics courses. Of these teachers, one taught science classes and three taught mathematics classes as their minor assignment, two had become administrators, and two had become guidance counselors. These eight respondents were deleted from the total sample since they were not science or mathematics teachers as defined by the study, leaving six identified groups categorized by major/minor assignment. Table II is a

TABLE II

TEACHING ASSIGNMENT DISTRIBUTION OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)			Dismukes (2001)		
Assignment Major/Minor	Frequency	Percent of Subsample	Percent of Sample	Frequency	Percent of Subsample	Percent of Sample
Science/None	161	(84.74)	(38.98)	176	(79.28)	(39.02)
Science/ Mathematics	13	(6.84)	(3.15)	12	(5.41)	(2.66)
Science/Other	16	(8.42)	(3.87)	34	(15.32)	(7.54)
Science Subsample Total	190	(100.00)	(46.00)	222	(100.01)	(49.22)
Mathematics/ None	173	(80.84)	(41.89)	169	76.47)	(37.47)
Mathematics/ Science	27	(12.62)	(6.54)	31	(14.03)	(6.87)
Mathematics/ Other	14	(6.54)	(3.39)	21	(9.50)	(4.66)
Mathematics Subsample Total	214	(100.00)	(51.82)	221	(100.00)	(49.00)
Other/None	2	(22.22)	(0.48)	4	(50.00)	(0.89)
Other/Science	3	(33.33)	(0.73)	1	(12.50)	(0.22)
Other/ Mathematics	4	(44.44)	(0.97)	3	(37.50)	(0.67)
Other Subsample Total	9	(99.99)	(2.18)	8	(100.00)	(1.78)
GRAND TOTAL	413	—	(100.00)	451	—	(100.00)

summary of these results for both studies.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) for Windows was used to analyze the data. The tests made on the data were the same as in Smith's study. Much of the information gathered would be considered ordinal-level data. Smith stated that there were citations in the literature (Abelson & Tukey, 1959, Labovitz, 1967; Labovitz, 1970) which suggested that interval-level statistics would be appropriate to use with ordinal-level data; therefore the Analysis of Variance (ANOVA) and regression procedures were used. Smith (1986) stated

> To substantiate this point, Labovitz utilized existing ordinal level data to construct nineteen additional scoring systems to compare the intercorrelations among ordinal scoring systems of varying score differentials. One system was linear, while the remaining eighteen were computer generated by random selection of the response scores with the constraint that the scores maintain the monotonicity of the rankings of ordinal level data. The scoring systems varied widely among themselves, some being "logarithmic, exponential or higher order curves (two or more inflection points)" (p. 517). Each scoring system was in turn assumed to be the "true" system and a matrix of intercorrelation was determined. Of 190 correlation coefficients, 157 were .97 and above with none below .90. Labovitz (1970) concluded
>
> Although some small error may accompany the treatment of ordinal variables as interval, this is offset by the use of more powerful, more sensitive, better developed, and more clearly interpretable statistics with know sampling error (p. 515).

The Analysis of Variance (ANOVA) procedure was used to analyze the responses to 50 variables (three satisfaction items, nineteen skills/abilities items, fourteen value items, and fourteen achievement items) to determine if any significant differences existed among the responses from individuals from six identified groups:

1. individuals teaching mathematics classes all day,

2. individuals teaching mathematics classes the majority of the school day and teaching science classes the balance of the school day,

3. individuals teaching mathematics classes the majority of the school day and teaching non-mathematics or non-science classes the balance of the day,

4. individuals teaching science classes all day,

5. individuals teaching science classes the majority of the school day and teaching mathematics classes the balance of the day,

6. individuals teaching science classes the majority of the school day and teaching non-mathematics or non-science classes the balance of the day.

If the ANOVA produced a significant F-value with $p < .05$, a post hoc procedure was used to compare the means of the six groups to determine which groups were significantly different. The Scheffe' procedure was used with the significance level for acceptance set at .05. The preceding analysis was repeated using mathematics teachers only (groups 1-3) and science teachers only (groups 4-6) to determine if there were any significant differences among the sample of mathematics teachers and among the sample of science teachers.

A regression analysis was used to determine which, if any, of the 47 independent variables (skills and abilities, values, and achievement items) were related to the three dependent variables (the satisfaction items) using three methods: individually, the mean of two satisfaction items, and the mean of three satisfaction items. The significance level of $p < .05$ was required for an independent variable to enter the regression equation. Regression analyses were performed for science teachers only (groups 1-3), mathematics teachers only (groups 4-6), and science and mathematics teachers together (total sample).

Chi-square analyses were performed to determine if there were any significant relationships between ability and satisfaction statements and selected demographic variables. Descriptive statistics (mean, median, mode, and range) were also compiled.

Summary of Chapter III

This chapter presented information on the participant database, the method of random selection, the survey instrument, the return rate, and the research procedures. In summary, this study involved participants from the total population of licensed science and mathematics teachers. A random sample of 320 science teachers and 325 mathematics teachers was selected for participation in the study. Usable returns were completed by 222 (69.38 percent of the subsample of science teachers; 49.22 percent of the total sample of respondent science and mathematics teachers) of the science teachers and 221 (68.00 percent of the subsample of mathematics teachers; 49.00 percent of the total sample of respondent science and mathematics teachers) of the mathematics teachers. Data were gathered using the Science and Mathematics Teacher Questionnaire developed by Chapman (1980) and Smith (1986). Data were analyzed using SPSS for Windows. The primary analyses were descriptive statistics (mean, median, mode, and range), analyses of variance (ANOVA), regression analyses, and chi-square analyses.

CHAPTER IV

FINDINGS AND ANALYSIS OF THE DATA

Introduction

The findings and analysis section consists of summarizing and analyzing the data collected from the Science and Math Teacher Questionnaire (Appendix A). The section is organized by the six research questions posed in Chapter I.

Findings and Analysis

Of the 230 science teachers who responded to the questionnaire, 222 (49.22 percent of the total sample of respondent science and mathematics teachers) responses were usable as defined by this study, since three respondents declined to participate in the study and five respondents' major assignment was non-science or non-mathematics courses. Of the 231 math teachers who responded, 221(49.00 percent of the total sample of respondent science and mathematics teachers) responses were usable, since seven respondents declined to participate in the study and three respondents' major assignment was non-science or non-mathematics courses. The data from their responses can be used to answer the six research questions. In this chapter, tables will be used to summarize and present the data from the 1985 study and the current study.

Research Question 1

Research question 1 asked, "What were the demographic characteristics of the population of Tennessee science and mathematics teachers in 2001?"

Thirteen demographic variables concerning personal and school data were collected. The gender distribution of science teachers was almost equal, with 113 female

(50.90 percent) and 109 male (49.10 percent). The number of female mathematics teachers was nearly twice the number of male mathematics teachers. There were 143 (64.71 percent) female mathematics teachers and 78 (35.29 percent) male mathematics teachers. Data are summarized and presented in Table III.

Science and mathematics teachers had similar racial origin distributions with blacks numbering six (2.70 percent) and seven (3.17 percent) respectively, whites numbering 199 (89.64 percent) and 198 (89.59 percent) respectively, and other racial origins numbering three (1.35 percent) and four (1.81 percent) respectively. Science and mathematics teachers giving no response numbered 14 (6.31 percent) and 12 (5.43 percent) respectively. The small percentages of respondents of minority racial origins should be noted. A possible explanation is that three urban school districts, Shelby County Schools, Knox County Schools, and Memphis City Schools, declined to participate in the study. Data are summarized and presented in Table IV.

The mean age of respondent science teachers was 40.78 years with a standard deviation of 10.25 and median age of 41. The mean age of mathematics teachers was 41.62 with a standard deviation of 10.79 and median age of 43. The ages of science teachers ranged from 23 to 72 years old, while the ages of mathematics teachers ranged from 23 to 74 years old. When grouped into age categories, the largest number of science teachers was in the "30-34" age group (17.57 percent) and the largest number of mathematics teachers was in the "50-54" age group (19.00 percent). Almost twenty-five percent of the science teachers and thirty percent of the mathematics teachers were 50 years old or older. Assuming a retirement age of 65, these data indicate that one-fourth to one-third of the

TABLE III

GENDER DISTRIBUTION OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Gender	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Female	84	(44.21)	131	(61.21)	113	(50.90)	143	(64.71)
Male	106	(55.79)	83	(38.79)	109	(49.10)	78	(35.29)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)

TABLE IV

RACIAL ORIGIN DISTRIBUTION OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Racial Origin	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Black	15	(7.90)	24	(11.22)	6	(2.70)	7	(3.17)
White	173	(91.05)	184	(85.98)	199	(89.64)	198	(89.59)
Other	2	(1.05)	6	(2.80)	3	(1.35)	4	(1.81)
No Response	0	(0.00)	0	(0.00)	14	(6.31)	12	(5.43)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)

current teachers will have to be replaced in the next 15 years. The results are summarized and presented in Table V. Table VI contains a summary of the total years of teaching experience of respondents. Years of experience of science teachers ranged from zero to 42, while years of experience of math teachers ranged from zero to 40. For science teachers, the mean and median years of experience were 13.87 and 12, respectively. For mathematics teachers, the mean and median years of experience were 14.93 and 13, respectively. When total years of experience were grouped into categories, the largest number of science teachers were in the "5-9" years group (22.52 percent) and the "0-4" years group (18.02 percent). The largest number of mathematics teachers were in the "5-9" years group (19.01 percent) followed by the "10-14" years group (17.19 percent) and the "0-4" years group (16.74 percent). Approximately 40 percent of science teachers and 36 percent of mathematics teachers had less than ten years experience.

The teaching experience of the respondents within the state of Tennessee and outside the state of Tennessee are summarized and presented in Tables VII and VIII, respectively. The mean years of Tennessee experience was 12.54 for science teachers and 13.59 for mathematics teachers. The median years of Tennessee teaching experience were nine years for science teachers and eleven years for mathematics teachers. The range of experience within Tennessee for science teachers was zero through 38 years, while the range of experience for mathematics teachers was zero through 40 years. When years of experience within Tennessee was grouped into categories, the largest number of science teachers were in the "5-9" years group (25.23 percent) followed by the "0-4" years group (22.07 percent) and the "25 or more" years group (14.41 percent). The largest number of mathematics teachers were in the "0-4" years group (20.81 percent) followed by the

TABLE V

AGE GROUP OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Age Group	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
20 – 24	5	(2.63)	4	(1.87)	4	(1.80)	9	(4.07)
25 – 29	11	(5.79)	13	(6.07)	29	(13.06)	24	(10.86)
30 – 34	25	(13.16)	28	(13.08)	39	(17.57)	33	(14.93)
35 – 39	58	(30.52)	52	(24.30)	22	(9.91)	27	(12.22)
40 – 44	33	(17.37)	41	(19.16)	26	(11.71)	21	(9.50)
45 – 49	22	(11.58)	23	(10.75)	31	(13.96)	24	(10.86)
50 – 54	14	(7.37)	20	(9.35)	30	(13.51)	42	(19.00)
55 - 59	9	(4.74)	15	(7.01)	19	(8.56)	23	(10.41)
60 or older	7	(3.68)	8	(3.74)	3	(1.35)	2	(0.90)
No response	6	(3.16)	10	(4.67)	19	(8.56)	16	(7.24)
Total	190	(100.00)	221	(100.00)	222	(99.99)	221	(99.99)

TABLE VI

TOTAL YEARS OF EXPERIENCE OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Years Experience	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
0 – 4	17	(8.95)	21	(9.81)	40	(18.02)	37	(16.74)
5 – 9	25	(13.16)	25	(11.68)	50	(22.52)	42	(19.01)
10 – 14	52	(27.37)	56	(26.17)	24	(10.81)	38	(17.19)
15 – 19	41	(21.58)	55	(25.70)	29	(13.06)	22	(9.95)
20 – 24	33	(17.37)	22	(10.28)	24	(10.81)	20	(9.05)
25 – 29	13	(6.84)	23	(10.75)	20	(9.01)	32	(14.48)
30 or more	9	(4.73)	12	(5.61)	17	(7.66)	18	(8.14)
No response	0	(0.00)	0	(0.00)	18	(8.12)	12	(5.43)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(99.99)

TABLE VII

YEARS OF EXPERIENCE WITHIN TENNESSEE OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Years Experience in Tennessee	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
0 – 4	21	(11.05)	31	(14.49)	49	(22.07)	46	(20.81)
5 – 9	31	(16.32)	33	(15.42)	56	(25.23)	43	(19.46)
10 – 14	53	(27.89)	60	(28.04)	21	(9.46)	38	(17.19)
15 – 19	41	(21.58)	43	(20.09)	24	(10.81)	20	(9.05)
20 – 24	*44	*(23.16)	*47	*(21.96)	22	(9.91)	19	(8.60)
25 or more					32	(14.41)	43	(19.46)
No response					18	(8.11)	12	(5.43)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)

* Numbers and percents were categorized by Smith as "Above 20" Years Experience in Tennessee.

TABLE VIII

YEARS OF EXPERIENCE OUTSIDE TENNESSEE OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Years Experience Outside Tennessee	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
0 – 4	168	(88.42)	185	(86.45)	188	(84.68)	191	(86.43)
5 – 9	*22	*(11.58)	*29	*(13.55)	8	(3.60)	7	(3.17)
10 or more					32	(14.41)	43	8
No response					18	(8.11)	12	18
Total	190	(100.00)	214	(100.00)	222	(99.99)	221	(100.00)

* Numbers and percents were categorized by Smith as "Above 4" Years Experience Outside Tennessee

"5-9" years group and the "25 or more" years group (each 19.46 percent). Years of experience outside the state of Tennessee ranged from zero to 30 years for science teachers and zero to 31 years for mathematics teachers. One hundred eighty-eight (84.68 percent) of the science teachers had four or fewer years of experience outside Tennessee, while one hundred ninety-one (86.43 percent) of the mathematics teachers had four or fewer years of experience outside Tennessee.

The distribution of highest educational degree obtained by the science and mathematics teacher respondents is depicted in Table IX. One hundred thirty-five (60.81 percent) of the science teachers and one hundred thirty-eight (62.44 percent) of the mathematics teachers had obtained graduate degrees. For both science and mathematics teachers, the predominantly highest academic degree was a master's degree (47.75 percent and 42.53 percent, respectively). The bachelor's degree was the second highest frequency level (39.19 percent and 37.56 percent, respectively) followed by the master's plus 45 hours (8.56 percent and 10.86 percent, respectively). Only 3.60 percent of the science teachers had obtained an education specialist's degree and 0.90 percent had obtained a doctorate, while 8.60 percent of the mathematics teachers had obtained an education specialist's degree and 0.45 percent had obtained a doctorate.

Table X contains the distribution of the major area of study for those teachers who had obtained graduate degrees. The largest group of science teachers obtained degrees in administration (31.11 percent), followed by other majors (20.74 percent), and biology (15.56 percent). The largest group of mathematics teachers obtained degrees in mathematics (33.33 percent), followed by administration (28.26 percent), and other majors (11.59 percent).

TABLE IX

HIGHEST ACADEMIC DEGREE EARNED OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Highest Degree	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
BA/BS	68	(35.79)	83	(38.78)	87	(39.19)	83	(37.56)
MA/MS	73	(38.42)	90	(42.06)	106	(47.75)	94	(42.53)
MA + 45	36	(18.95)	30	(14.02)	19	(8.56)	24	(10.86)
EdS	9	(4.74)	9	(4.21)	8	(3.60)	19	(8.60)
EdD/PhD	4	(2.10)	2	(0.93)	2	(0.90)	1	(0.45)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)

TABLE X

HIGHEST GRADUATE DEGREE MAJOR FIELD OF STUDY OF RESPONDENT
TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Major Field of Study	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Administration	30	(24.59)	26	(19.85)	42	(31.11)	39	(28.26)
Biology	38	(31.15)	2	(1.53)	21	(15.56)	--	--
Chemistry	10	(8.20)	1	(0.76)	2	(1.48)	1	(0.72)
Curriculum and Instruction	--	--	--	--	7	(5.19)	12	(8.70)
Earth/Space Science	3	(2.46)	1	(0.76)	2	(1.48)	--	--
Ecology	1	(0.82)	--	--	2	(1.48)	--	--
Education – General	6	(4.92)	14	(10.69)	5	(3.70)	7	(5.07)
Education – Mathematics	--	--	5	(3.82)	--	--	--	--
Education – Science	13	(10.65)	5	(3.82)	4	(2.96)	--	--
Educational Technology	--	--	--	--	5	(3.70)	4	(2.90)
Elementary	--	--	2	(1.53)	2	(1.48)	6	(4.35)
Environmental Science	--	--	--	--	5	(3.70)	--	--
General Science	2	(1.64)	1	(0.76)	--	--	--	--
Health	6	(4.92)	--	--	5	(3.70)	2	(1.45)
Mathematics	--	--	54	(41.22)	2	(1.48)	46	(33.33)
Secondary Education	--	--	--	--	3	(2.22)	5	(3.62)
Other Majors	13	(10.65)	20	(15.26)	28	(20.74)	16	(11.59)
Total	122	(100.00)	131	(100.00)	135	(99.98)	138	(99.99)

Table XI contains the distribution of the major teaching assignments of the respondents. One hundred one (45.49 percent) science teachers were assigned to teach biology, followed by 51 (22.98 percent) teaching chemistry and 36 (16.22 percent) teaching general science. Two hundred twelve (95.93 percent) mathematics teachers were assigned to teach mathematics, while the remaining nine (4.07 percent) respondents taught educational technology.

The minor teaching assignments of the respondents are presented in Table XII. Sixty-eight (30.63 percent) of the science teachers continued teaching the same subject during the entire school day while 26 (11.71 percent) had minor teaching assignments in general science, and 23 (10.36 percent) in biology, 15 (6.76 percent) in other subjects, 14 (6.31 percent) in earth/space science, and 13 (5.86 percent) in physics. One hundred seventy-seven (80.09 percent) mathematics teachers continued to teach mathematics for the full day while nine (4.07 percent) had minor assignments in administration and nine (4.07 percent) in physics.

The distribution of science and mathematics teacher respondents according to the region of their residence is presented in Table XIII. The eastern region had the largest number of respondents for both science (42.34 percent) and mathematics (44.80 percent), followed by the middle region (39.19 percent and 39.37 percent, respectively), and the western region (18.47 percent and 15.84 percent, respectively). The small percentages of respondents from the western region reflect the complications in mail delivery after the events of September 11, 2001. Phone calls to nonrespondent directors of schools and nonrespondent teachers indicated that questionnaires were never delivered or were

TABLE XI

DISTRIBUTION OF MAJOR TEACHING ASSIGNMENTS OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

Major Teaching Assignment	Smith (1986) Number and Percent Responding				Dismukes (2001) Number and Percent Responding			
	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Biology	92	(48.42)	--	--	101	(45.49)	--	--
Chemistry	33	(17.37)	--	--	51	(22.98)	--	--
Earth/Space Science	5	(2.63)	--	--	13	(5.86)	--	--
Ecology	--	--	--	--	1	(0.45)	--	--
Educational Technology*	--	--	6	(2.80)	--	--	9	(4.07)
General Science	47	(24.74)	--	--	36	(16.22)		
Mathematics	--	--	208	(97.20)	--	--	212	(95.93)
Physical Science	7	(3.68)	--	--	15	(6.76)	--	--
Physics	6	(3.16)	--	--	5	(2.25)	--	--
Total	190	(100.00)	214	(100.00)	222	(100.01)	221	(100.00)

*Categorized as "Computer Programming" in Smith study.

TABLE XII

DISTRIBUTION OF MINOR TEACHING ASSIGNMENTS OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

Minor Teaching Assignment	Smith (1986) Number and Percent Responding				Dismukes (2001) Number and Percent Responding			
	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Administration	1	(0.53)	2	(0.93)	3	(1.35)	9	(4.07)
Biology	18	(9.47)	3	(1.40)	23	(10.36)	1	(0.45)
Business Mathematics	--	--	3	(1.40)	--	--	4	(1.81)
Chemistry	22	(11.58)	4	(1.87)	6	(2.70)	4	(1.81)
Earth/Space Science	6	(3.16)	1	(0.47)	14	(6.31)	--	--
Ecology	1	(0.53)	--	--	3	(1.35)	--	--
Educational Technology*	1	(0.53)	7	(3.27)	--	--	1	(0.45)
Elementary	--	--	1	(0.47)	--	--	--	--
General Science	27	(14.21)	7	(3.27)	26	(11.71)	3	(1.36)
Health	5	(2.63)	5	(2.34)	2	(0.90)	4	(1.81)
Mathematics	12	(6.31)	**		11	(4.95)	**	
Physical Science	3	(1.58)	--	--	1	(0.45)	--	--
Physics	14	(7.37)	12	(5.61)	13	(5.86)	9	(4.07)
Same as Major Assignment	70	(36.84)	163	(76.17)	68	(30.63)	177	(80.09)
Other Subjects	10	(5.26)	6	(2.80)	15	(6.76)	--	--
Total	190	(100.00)	214	(100.00)	222	(99.99)	221	(99.99)

* Categorized as "Computer Programming" in Smith study.
** Included in Same as Major Assignment category.

TABLE XIII

REGION OF RESIDENCE OF RESPONDENT TENNESSEE
SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Region	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Eastern	86	(45.26)	90	(42.06)	94	(42.34)	99	(44.80)
Middle	56	(29.48)	65	(30.37)	87	(39.19)	87	(39.37)
Western	48	(25.26)	59	(27.57)	41	(18.47)	35	(15.84)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.01)

delivered after the return date suggested in the cover letter. Postal service personnel stated that mail west of the state capital had been severely delayed because of filtering safety precautions.

The distribution of science and mathematics teacher respondents according to the type of community served by the school district is presented in Table XIV. Most science and mathematics teachers taught in rural schools (58.56 percent and 61.54, respectively), followed by suburban (32.43 percent and 28.96 percent, respectively), and urban (9.01 percent and 9.50 percent, respectively).

Table XV contains the distribution of science and mathematics teacher respondents according to the size of the school in which they taught. For both science and mathematics teachers, the largest number of teachers were assigned to schools with 501-1000 students (32.43 percent and 37.10 percent, respectively), followed by schools with 1001-1500 students (29.28 percent and 24.43 percent, respectively). For science teachers, the next highest percentages were for schools with 1501-2000 students and 500 or fewer students (17.57 percent and 13.96 percent, respectively). For mathematics teachers, the next highest percentages were for schools with 500 or fewer students and 1501-2000 students (17.20 percent and 16.74 percent, respectively).

Research Question 2

Research question 2 asked, "What were the self-perceived skills and abilities, job-related values, and career achievement of Tennessee science and mathematics teachers in 2001?"

Mean scores were calculated for the ratings assigned to each of the fifty job

TABLE XIV

TYPE OF COMMUNITY SERVED BY THE SCHOOL DISTRICT OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Community Served	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Rural	72	(37.90)	81	(37.85)	130	(58.56)	136	(61.54)
Suburban	75	(39.47)	74	(34.58)	72	(32.43)	64	(28.96)
Urban	43	(22.63)	59	(27.57)	20	(9.01)	21	(9.50)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)

TABLE XV

SIZE OF SCHOOL IN WHICH TENNESSEE SCIENCE AND MATHEMATICS TEACHERS TAUGHT

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Size of School	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
500 or less	22	(11.58)	29	(13.55)	31	(13.96)	38	(17.20)
501 – 1000	66	(34.74)	71	(33.18)	72	(32.43)	82	(37.10)
1001 – 1500	69	(36.31)	80	(37.38)	65	(29.28)	54	(24.43)
1501 – 2000	23	(12.10)	28	(13.08)	39	(17.57)	37	(16.74)
2001 – 2500	9	(4.74)	5	(2.34)	13	(5.86)	9	(4.07)
Over 2500	1	(0.53)	1	(0.47)	2	(0.90)	1	(0.45)
Total	190	(100.00)	214	(100.00)	222	(99.99)	221	(99.99)

satisfaction, skills and abilities, values, and extent of achievement statements. Table XVI contains the mean scores of each statement contained in these four sections.

Science teachers' mean scores ranged from a high of 3.656 to a low of 1.363. The highest overall score was "Cooperating with a team" from Area II (Skills and Abilities). The lowest overall score was "Publication in journals" from Area IV (Extent of Achievement). The lowest mean score in Area II was 2.840 for "Using research facilities." The highest mean scores for Area III (Values) and Area IV (Extent of Achievement) had the same descriptor, "An inner sense of knowing you are doing well." The highest mean scores for Areas III and IV were 3.604 and 3.157, respectively. The lowest mean scores for Area III (Values) and Area IV (Extent of Achievement) had the same descriptor, "Publication in journals." The lowest mean scores for Areas III and IV were 1.441 and 1.363, respectively. Area I contained three satisfactions questions. The highest mean score (3.033) was for Statement 3, concerning choosing the same career, followed by Statement 2 (mean of 2.944) concerning personal growth, and Statement 1 (mean of 2.869) concerning satisfaction with current employment. Statement 3 was negatively worded and was recoded (1=4, 2=3, 3=2, 4=1) before calculating the mean. In summary, respondent science teachers indicated they had the ability to cooperate with a team, they valued and had achieved an inner sense of knowing they were doing well, they were likely to choose the same career, and they were satisfied with the personal growth they had made in their professional career.

For mathematics teachers, mean scores ranged from a high of 3.641 to a low of 1.284. Like science teachers, the highest overall score was "Cooperating with a team" from Area II (Skills and Abilities) and the lowest overall score was "Publication in

TABLE XVI

MEAN RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS BY TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Mean and Standard Deviation				Mean and Standard Deviation			
Statements*	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Area I: Satisfaction								
Current Job	2.757	.768	2.720	.735	2.869	.782	2.899	.779
Career Growth	2.674	.789	2.671	.780	2.944	.716	2.894	.724
Likely to Choose Educ. Career Again**	2.450	1.074	2.584	1.021	3.033	.961	3.033	.995
Area II: Skills and Abilities								
Writing	3.411	.608	3.379	.599	3.444	.552	3.468	.601
Speaking	3.466	.541	3.425	.566	3.545	.536	3.514	.545
Problem Solving	3.261	.586	3.294	.607	3.358	.594	3.470	.578
Evaluating Ideas	3.396	.552	3.418	.614	3.465	.578	3.548	.552
Library Use	3.163	.797	2.855	.795	3.037	.754	2.830	.796
Supervision	3.479	.597	3.449	.631	3.623	.574	3.551	.568
Teamwork	3.558	.567	3.665	.512	3.656	.549	3.641	.544
Persuasion	3.105	.642	3.103	.565	3.173	.623	3.128	.667
Public Relations	3.258	.660	3.290	.565	3.266	.620	3.294	.573
Organizing Time	3.247	.680	3.304	.662	3.294	.644	3.335	.674
Planning Work	3.251	.669	3.136	.670	3.164	.761	3.093	.743
Organizing Work	3.225	.690	3.117	.701	3.127	.788	3.102	.760
Long-Term Projects	3.112	.734	3.103	.724	3.085	.779	3.097	.750
Interpreting Data	3.180	.691	3.556	.601	3.192	.754	3.611	.568
Using Computers	2.139	.893	2.634	.970	3.089	.756	3.184	.716
Using Educational Technology+					3.014	.728	3.101	.706
Using Research Facilities	2.636	.840	2.634	.799	2.840	.814	2.692	.746
Leading a Group	3.245	.649	3.136	.697	3.373	.680	3.225	.712
Resolving Conflicts	3.069	.686	3.014	.688	3.056	.690	3.032	.710

TABLE XVI. Continued

Statements*	Smith (1986) Mean and Standard Deviation				Dismukes (2001) Mean and Standard Deviation			
	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Area III: Values								
Salary	3.011	.816	2.836	.793	2.618	.788	2.566	.795
Decision Making	2.947	.696	2.893	.701	2.901	.732	2.834	.776
Leadership	2.735	.747	2.615	.722	2.692	.818	2.541	.786
Job Responsibility	2.660	.754	2.538	.756	2.563	.815	2.436	.841
Job Autonomy	2.883	.788	2.797	.716	2.834	.797	2.656	.772
Sense of Doing Well	3.534	.579	3.568	.592	3.604	.567	3.633	.610
Student Recognition	2.937	.748	3.005	.735	2.856	.817	2.835	.820
Peer Recognition	2.942	.686	2.939	.693	2.756	.828	2.771	.811
Supervisor Recognition	2.910	.763	2.977	.708	2.923	.795	2.835	.815
Parent/Com. Recognition+					2.738	.789	2.794	.808
Approval from Family	3.149	.759	3.084	.777	2.991	.824	3.023	.887
Opportunity for Professional Growth	3.418	.627	3.280	.640	3.054	.741	2.890	.790
Publication in Journals	1.636	.731	1.548	.656	1.441	.623	1.353	.567
Professional Presentations	1.665	.709	1.757	.683	1.707	.829	1.628	.728
Area IV: Achievement								
Salary	2.312	.641	2.276	.603	2.363	.642	2.308	.693
Decision Making	2.316	.657	2.414	.709	2.561	.721	2.519	.744
Leadership	2.463	.727	2.440	.712	2.507	.760	2.382	.754
Job Responsibility	2.565	.749	2.667	.673	2.732	.755	2.592	.790
Job Autonomy	2.483	.736	2.488	.690	2.630	.778	2.546	.788
Sense of Doing Well	3.133	.645	3.118	.675	3.157	.704	3.194	.694
Student Recognition	2.984	.659	2.967	.647	2.833	.730	2.810	.738
Peer Recognition	2.802	.716	2.849	.643	2.682	.720	2.673	.692
Supervisor Recognition	2.672	.840	2.802	.708	2.688	.774	2.626	.760
Parent/Com. Recognition+					2.565	.795	2.512	.758
Approval from Family	3.099	.739	3.122	.647	2.949	.827	3.019	.768
Opportunity for Prof. Growth	2.951	.713	2.967	.703	2.698	.747	2.583	.715

TABLE XVI. Continued

Statements*	Smith (1986) Mean and Standard Deviation				Dismukes (2001) Mean and Standard Deviation			
	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Area IV: Achievement								
Publication in Journals	1.376	.637	1.329	.628	1.363	.610	1.284	.621
Professional Presentations	1.536	.697	1.770	.758	1.647	.824	1.670	.857

*Statements were shortened.
** Responses for Statement 3 were recoded (1 = 4, 2 = 3, 3 = 2, 4 = 1) to give a positive statement.
+Statement not included in Smith (1986) study.

journals" from Area IV (Extent of Achievement). Like science teachers, the lowest mean score in Area II was 2.692 for "Using research facilities". The highest and lowest mean scores for Areas III and IV were the same categories as science teachers. The highest mean scores for Area III (Values) and Area IV (Extent of Achievement) were 3.633 and 3.194, respectively, and had the same descriptor, "An inner sense of knowing you are doing well". The lowest mean scores for Area III (Values) and Area IV (Extent of Achievement) were 1.353 and 1.284, respectively, and had the same descriptor, "Publication in journals". Area I contained three satisfactions questions. The highest mean score (3.033) was for Statement 3, concerning choosing the same career, followed by Statement 1 (mean of 2.899) concerning satisfaction with current employment, and Statement 2 (mean of 2.894) concerning personal growth. In summary, respondent mathematics teachers indicated they had the ability to cooperate with a team, they valued and had achieved an inner sense of knowing they were doing well, they were likely to choose the same career, and they were satisfied with their current employment.

A one-way Analysis of Variance (ANOVA) procedure was used to determine if group membership could affect the process of rating each of the satisfaction, self-perceived skills and abilities, job-related values, and career achievement statements. A Scheffe' procedure was performed post hoc on significant variables.

Six subgroups were compared, since there were three subgroups of science teachers and three subgroups of mathematics teachers. The subgroups were determined by the combination of major teaching assignments and minor teaching assignments. These subgroups were defined as teaching only science courses, science and mathematics courses, science and other courses, teaching only mathematics courses, mathematics and

science courses, and mathematics and other courses.

For the six subgroups, the analysis determined that group membership in at least two of the six subgroups was a significant factor in the ratings for four of the 50 statements. Only two statements continued to be significant after using the Scheffe' procedure. For Statement 14, "Interpreting numerical data" from Area II (Skills and Abilities), teachers who taught only mathematics courses and science teachers who taught other courses were more positive than teachers who taught only science courses, $F_{(5,437)} = 7.885$. For Statement 11, "Approval from family or close friends" from Area IV (Achievement), teachers who taught mathematics and science courses and teachers who taught only mathematics were more positive than teachers who taught mathematics and other courses, $F_{(5,437)} = 3.370$. Table XVII contains the data that were found to be significant. The complete analysis results are summarized in Appendix I.

The Analysis of Variance (ANOVA) and Scheffe' procedures were repeated to determine if any differences existed among the responses of the three subgroups of science teachers. The analysis determined that no statements were significant. The complete analysis results are summarized in Appendix J.

The procedures were repeated for the three subgroups of mathematics teachers. Two of the 50 statements were identified as being significant in the assignment of ratings and continued to be significant after using the Scheffe' procedure. For Statement 6, "An inner sense of knowing you are doing well" from Area III (Values), teachers who taught mathematics and science courses and teachers who taught only mathematics were more positive than teachers who taught mathematics and other courses, $F_{(2,218)} = 4.757$. For Statement 11, "Approval from family or close friends" from Area IV (Achievement),

TABLE XVII

ONE WAY ANALYSIS OF VARIANCE FOR THE RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS BY SIX SUBGROUPS OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001 (SUMMARY)

Statements	Sum of Squares	df	Mean Square	F	Sig.
Area II: Skills and Abilities					
5. Using library facilities					
Between Groups	9.936	5	1.987	2.905	.014**
Within Groups	298.954	437	.684		
Total	308.889	442			
14. Interpreting numerical data					
Between Groups	19.994	5	3.999	7.885	.000*
Within Groups	221.613	437	.507		
Total	241.607	442			
Area III: Values					
6. An inner sense of knowing you are doing well					
Between Groups	3.922	5	.784	2.231	.050**
Within Groups	153.622	437	.352		
Total	157.544	442			
Area IV: Achievement					
11. Approval from family or close friends					
Between Groups	12.524	5	2.505	3.370	.005*
Within Groups	324.831	427	.743		
Total	337.354	442			

*Significant at the .05 level.
**F ratios were significant at the .05 level, but not significant after Scheffe' procedure.

teachers who taught mathematics and science courses were more positive than teachers who taught only mathematics courses, $F_{(2,218)} = 8.110$. Table XVIII contains the data that were found to be significant. The complete results are summarized in Appendix K.

A final Analysis of Variance (ANOVA) procedure was performed to determine if any differences in ratings existed among the responses of science teachers as a group and mathematics teachers as a group. Three of the 50 statements were identified as being significant. Each of the three statements was in Area II (Skills and Abilities). Science teachers rated themselves higher on Statement 5, "Using library facilities," and Statement 18, "Leading a group," $F_{(1,441)} = 8.550$ and $F_{(1,441)} = 7.833$, respectively. Not surprisingly, mathematics teachers rated themselves higher on Statement 14, "Interpreting numerical data," $F_{(1,441)} = 32.287$. Table XIX contains the data that were found to be significant. The complete results of the analyses are summarized in Appendix L.

Research Question 3

Research question 3 asked, "What levels of ability in using educational technology did current Tennessee science and mathematics teachers possess?"

The distribution of the responses to the two technological ability statements is presented in Table XX. The data suggest that most science and mathematics teachers are computer literate and are competent at using technology in their teaching. For the first variable, "Using computers," most science and mathematics teachers indicated "To a moderate extent" (44.59 percent and 46.15 percent, respectively), followed by a smaller percentage who marked "To a large extent" (30.63 percent and 35.29 percent, respectively). Forty-three science teachers and thirty-six mathematics teachers selected

TABLE XVIII

ONE WAY ANALYSIS OF VARIANCE FOR THE RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS BY THREE SUBGROUPS OF TENNESSEE MATHEMATICS TEACHERS, 2001 (SUMMARY)

Statements	Sum of Squares	df	Mean Square	F	Sig.
Area III: Values					
6. An inner sense of knowing you are doing well					
Between Groups	3.604	2	1.802	4.757	.009*
Within Groups	82.568	218	.379		
Total	86.172	220			
Area IV: Achievement					
11. Approval from family or close friends					
Between Groups	11.177	2	5.589	8.110	.000*
Within Groups	150.216	218	.689		
Total	161.394	220			

*Significant at the .05 level.

TABLE XIX

ONE WAY ANALYSIS OF VARIANCE FOR THE RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS BY TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001 (SUMMARY)

Statements	Sum of Squares	df	Mean Square	F	Sig.
Area II: Skills and Abilities					
5. Using library facilities					
Between Groups	5.875	1	5.875	8.550	.004*
Within Groups	303.014	441	.687		
Total	308.889	442			
14. Interpreting numerical data					
Between Groups	16.482	1	16.482	32.287	.000*
Within Groups	225.125	441	.510		
Total	241.607	442			
6. Leading a group					
Between Groups	4.301	1	4.301	7.833	.005*
Within Groups	242.164	441	.549		
Total	246.465	442			

*Significant at the .05 level.

TABLE XX

DISTRIBUTION OF RESPONSES TO EDUCATIONAL TECHNOLOGY STATEMENTS BY RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001

	*Dismukes, 2001			
	Number and Percent Responding			
Technology Statement	Science Teachers		Mathematics Teachers	
Using Computers				
Not at all	3	(1.35)	1	(0.45)
To a small extent	43	(19.37)	36	(16.29)
To a moderate extent	99	(44.59)	102	(46.15)
To a large extent	68	(30.63)	78	(35.29)
Missing	9	(4.05)	4	(1.81)
TOTAL	222	(99.99)	221	(99.99)
Using Educational Technology				
Not at all	2	(0.90)	2	(0.90)
To a small extent	49	(22.07)	38	(17.19)
To a moderate extent	107	(48.20)	113	(51.13)
To a large extent	56	(25.23)	64	(28.96)
Missing	8	(3.60)	4	(1.81)
TOTAL	222	(100.00)	221	(99.99)

* Data not available from "Computer Programming" statement in Smith (1986) study.

"To a small extent" (19.37 percent and 16.29 percent, respectively). Only three science teachers and one mathematics teacher marked "Not at all" as their extent of ability (1.35 percent and 0.45 percent, respectively).

For the second variable, "Using educational technology," most science and mathematics teachers indicated that they possessed the ability "To a moderate extent" (48.20 percent and 51.13 percent, respectively), followed by a smaller percent who marked "To a large extent" (25.23 percent and 28.96 percent, respectively). Forty-nine science teachers and thirty-eight mathematics teachers selected "To a small extent" (22.07 percent and 17.19 percent, respectively). Only two science teachers and two mathematics teachers marked "Not at all" as their extent of ability (0.90 percent, each).

A chi-square analysis between the two technological ability statements and selected demographic variables was performed for science teachers, mathematics teachers, and the combined sample. The demographic variables analyzed were gender, racial origin, age group, total years teaching experience, highest earned degree, school size, region of Tennessee, and classification of community (rural/suburban/urban).

"Using educational technology" was significantly related to age group for science teachers ($X^2 = 62.879$; df = 24), mathematics teachers ($X^2 = 34.807$; df = 24), and the combined sample ($X^2 = 61.911$; df = 24). For science teachers, "Using educational technology" also was significantly related to gender ($X^2 = 8.887$; df = 3), and total years of experience ($X^2 = 30.682$; df = 18). For mathematics teachers, "Using computers" was significantly related to gender ($X^2 = 8.509$; df = 3). The significant relationships found in the analysis are shown in Table XXI.

TABLE XXI

SIGNIFICANT CHI-SQUARE ANALYSES OF EDUCATIONAL TECHNOLOGY STATEMENTS WITH SELECTED DEMOGRAPHIC VARIABLES OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001

Factors	Value	df
Science Teachers		
Using Educational Technology * Gender	8.887	3
Using Educational Technology * Age Group	62.879	24
Using Educational Technology * Total Years Experience	30.682	18
Mathematics Teachers		
Using Computers * Gender	8.509	3
Using Educational Technology * Age Group	34.807	24
Combined Sample		
Using Educational Technology * Age Group	61.911	24

Research Question 4

Research question 4 asked, "What levels of career satisfaction did current Tennessee science and mathematics teachers experience?"

The distribution of the responses to the three satisfaction statements is presented in Table XXII. For the first satisfaction variable, "How satisfied are you with your current employment?," most science and mathematics teachers indicated "Very" satisfied (46.85 percent and 44.80 percent, respectively), followed by a smaller percentage who marked "Somewhat" satisfied (25.68 percent and 28.51 percent, respectively). In response to the second variable, "Overall, how satisfied are you with the personal growth you have made in your professional career," most science and mathematics teachers indicated "Very" satisfied (54.95 percent and 53.85 percent, respectively). Science teachers indicated "Extremely" satisfied (19.37 percent) and "Somewhat" satisfied (19.37 percent) as their next highest percentages. Mathematics teachers marked "Somewhat" satisfied (23.08 percent) as their next highest percentage, followed by "Extremely" satisfied (18.10 percent). Since the third satisfaction variable, "Knowing what you know now, if you had your life to relive, how likely would you be to choose a different job?," was negatively stated, responses were recoded so that 1=4, 2=3, 3=2, and 4=1. Most science and mathematics teachers indicated "Extremely" likely to choose education again (36.49 percent and 38.91 percent, respectively), followed by a slightly smaller percentage who marked "Very" likely (36.04 percent and 32.58 percent, respectively), "Somewhat" likely (14.41 percent and 14.93 percent, respectively), and "Not at all" likely to choose education again (9.46 percent and 10.41 percent, respectively).

In summary, approximately 70 percent of the science and mathematics teachers

TABLE XXII

DISTRIBUTION OF RESPONSES TO THREE SATISFACTION STATEMENTS BY RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Satisfaction Statement	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Current Job								
Not at all	7	(3.68)	8	(3.74)	8	(3.60)	5	(2.26)
Somewhat	63	(33.16)	72	(33.65)	57	(25.68)	63	(28.51)
Very	88	(46.32)	106	(49.53)	104	(46.85)	99	(44.80)
Extremely	31	(16.31)	28	(13.08)	45	(20.27)	51	(23.08)
Missing	1	(0.53)	0	(0.00)	8	(3.60)	3	(1.36)
TOTAL	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)
Career Growth								
Not at all	15	(7.89)	12	(5.61)	6	(2.70)	6	(2.71)
Somewhat	55	(28.95)	75	(35.05)	43	(19.37)	51	(23.08)
Very	97	(51.05)	97	(45.32)	122	(54.95)	119	(53.85)
Extremely	23	(12.11)	29	(13.55)	43	(19.37)	40	(18.10)
Missing	0	(0.00)	1	(0.47)	8	(3.60)	5	(2.26)
TOTAL	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)
Likely to Choose Education Career Again								
Not at all	47	(24.74)	40	(18.69)	21	(9.46)	23	(10.41)
Somewhat	48	(25.26)	54	(25.23)	32	(14.41)	33	(14.93)
Very	56	(29.47)	75	(35.05)	80	(36.04)	72	(32.58)
Extremely	38	(20.00)	45	(21.03)	81	(36.49)	86	(38.91)
Missing	1	(0.53)	0	(0.00)	8	(3.60)	7	(3.17)
TOTAL	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)

*Statement 3 was recoded (1 = 4, 2 = 3, 3 = 2, 4 = 1) to give a positive statement.

expressed satisfaction with their current employment. Approximately 75 percent of the respondents indicated that they were pleased with their personal growth in their career. Over 70 percent of all respondents indicated they would choose a career in education again. It should be noted that it is possible that teachers who were dissatisfied may already have chosen a different employment situation. Nevertheless, the percentage of teachers with high career satisfaction is encouraging.

A chi-square analysis among the three satisfaction statements and selected demographic variables was performed for science teachers, mathematics teachers, and the combined sample. The demographic variables analyzed were gender, racial origin, age group, total years teaching experience, highest earned degree, school size, region of Tennessee, and classification of community (rural/suburban/urban).

The first satisfaction variable, "How satisfied are you with your current employment?" (Area I/Statement 1) was significantly related to age group for science teachers ($X^2 = 42.353$; df = 24), mathematics teachers ($X^2 = 44.048$; df = 24), and the combined sample ($X^2 = 50.438$; df = 24). The second satisfaction variable, "How satisfied are you with the personal growth you have made in you professional career?" (Area I/Statement 2) was significantly related to gender ($X^2 = 8.473$; df = 3) for science teachers, to highest academic degree ($X^2 = 41.620$; df = 12) for mathematics teachers, and to gender ($X^2 = 8.871$; df = 3) for the combined group. The third satisfaction variable, "Knowing what you know now, if you had your life to relive, how likely would you be to choose a different job?", (Area I/Statement 3) was significantly related to racial origin for science teachers ($X^2 = 15.992$; df = 12), mathematics teachers ($X^2 = 22.799$; df = 12), and the combined sample ($X^2 = 37.086$; df = 12). The significant relationships

found in this analysis are shown in Table XXIII.

Research Question 5

Research question 5 asked, "What future career plans did Tennessee science and mathematics teachers foresee in one year, five years, and ten years from the time of the study?"

Both science and mathematics teachers indicated that they would probably be teaching in a public school one year from the date the questionnaire was completed (89.64 percent and 82.80 percent, respectively). Only 5.85 percent of science teachers and 10.86 percent of mathematics teachers planned to leave or retire from education within one year. However, this percentage increased greatly for the five-year interval with 22.07 percent of science teachers and 27.60 percent of mathematics teachers planning to leave or retire from education within five years. Only 50.45 percent of science teachers and 43.89 percent of mathematics teachers planned to remain in public school teaching. Much movement to other areas of education was anticipated with 2.25 percent of science teachers and 4.07 percent of mathematics teachers believing they would change to administration, 1.35 percent of science teachers and 4.98 percent of mathematics teachers indicating they would move to college teaching, and 13.96 percent of science teachers and 15.38 percent of mathematics teachers marking multiple items within education as desirable options within the next five years. The responses for future plans in one and five years are depicted in Table XXIV and Table XXV, respectively.

More pronounced changes were projected for the ten-year interval. Only 27.48 percent of the science teachers and 25.79 percent of the mathematics teachers indicated

TABLE XXIII

SIGNIFICANT CHI-SQUARE ANALYSES OF JOB SATISFACTION STATEMENTS WITH SELECTED DEMOGRAPHIC VARIABLES OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001

Factors	Value	df
Science Teachers		
Statement 1 (current job) and age group	42.353	24
Statement 2 (personal growth) and gender	8.473	3
Statement 3 (different career) and racial origin	15.992	12
Mathematics Teachers		
Statement 1 (current job) and age group	44.048	24
Statement 2 (personal growth) and highest degree	41.620	12
Statement 3 (different career) and racial origin	22.799	12
Combined Sample		
Statement 1 (current job) and age group	50.438	24
Statement 2 (personal growth) and gender	8.871	3
Statement 3 (different career) and racial origin	37.086	12

TABLE XXIV

DISTRIBUTION OF RESPONSES CONCERNING THE FUTURE PLANS IN ONE YEAR OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

Future Plans	Smith (1986) Number and Percent Responding				Dismukes (2001) Number and Percent Responding			
	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Public school teaching	166	(87.37)	193	(90.19)	199	(89.64)	183	(82.80)
Public college teaching	--	--	--	--	1	(0.45)	--	--
Private school teaching	--	--	--	--	1	(0.45)	--	--
Private college teaching	--	--	--	--	--	--	--	--
Change to administration	--	--	3	(1.40)	6	(2.70)	3	(1.36)
Change to outside education	7	(3.68)	6	(2.80)	4	(1.80)	10	(4.52)
Multiple—outside education	7	(3.68)	5	(2.34)	3	(1.35)	3	(1.36)
Multiple—within education	3	(1.58)	3	(1.40)	1	(0.45)	8	(3.62)
Retire	6	(3.16)	4	(1.87)	6	(2.70)	11	(4.98)
Missing	1	(0.53)	--	--	1	(0.45)	3	(1.36)
Total	190	(100.00)	214	(100.00)	222	(99.99)	221	(100.00)

TABLE XXV

DISTRIBUTION OF RESPONSES CONCERNING THE FUTURE PLANS IN FIVE YEARS OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

Future Plans	Smith (1986) Number and Percent Responding				Dismukes (2001) Number and Percent Responding			
	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Public school teaching	115	(60.53)	138	(64.49)	112	(50.45)	97	(43.89)
Public college teaching	5	(2.63)	4	(1.87)	3	(1.35)	11	(4.98)
Private school teaching	1	(0.53)	2	(0.93)	1	(0.45)	--	--
Private college teaching	1	(0.53)	1	(0.47)	1	(0.45)	--	--
Change to administration	8	(4.21)	11	(5.14)	5	(2.25)	9	(4.07)
Change to outside education	26	(13.68)	24	(11.22)	12	(5.41)	16	(7.24)
Multiple—outside education	7	(3.68)	8	(3.74)	28	(12.61)	28	(12.67)
Multiple—within education	6	(3.16)	3	(1.40)	31	(13.96)	34	(15.38)
Retire	17	(8.95)	21	(9.81)	9	(4.05)	17	(7.69)
Missing	4	(2.10)	2	(0.93)	20	(9.01)	9	(4.07)
Total	190	(100.00)	214	(100.00)	222	(99.99)	221	(99.99)

that they would remain in public school teaching, while 42.79 percent of science teachers and 50.68 percent of mathematics teachers indicated that they would change to jobs outside education or retire. Movement to other areas of education was anticipated within the next ten years with 5.86 percent of science teachers and 4.07 percent of mathematics teachers believing they would change to administration, and 16.67 percent of science teachers and 12.67 percent of mathematics teachers marking multiple items within education. The responses for future plans in ten years are depicted in Table XXVI.

Research Question 6

Research question 6 asked, "What relationships existed between the satisfaction of Tennessee science and mathematics teachers and

a. self-perceived skills and abilities,
b. self-perceived job-related values,
c. self-perceived achievement in the profession,
d. their future career plans?"

A multiple regression analysis, with stepwise entry, was constructed to describe the relationship between each of the satisfaction statements in Area I and the skills and abilities (Area II), values (Area III), and extent of achievement (Area IV) statements. Similar studies (Chapman & Lowther, 1982; Chapman, 1983) have used the mean response of multiple satisfaction variables as the dependent variable, therefore Smith (1986) suggested creating two additional satisfaction variables. Thus, the fourth dependent variable was defined as the mean of the first two statements in Area I and the fifth dependent variable was defined as the mean of all three statements in Area I. The

TABLE XXVI

DISTRIBUTION OF RESPONSES CONCERNING THE FUTURE PLANS IN TEN YEARS OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

Future Plans	Smith (1986) Number and Percent Responding				Dismukes (2001) Number and Percent Responding			
	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
Public school teaching	71	(37.37)	87	(40.65)	61	(27.48)	57	(25.79)
Public college teaching	4	(2.10)	4	(1.87)	6	(2.70)	1	(0.45)
Private school teaching	1	(0.53)	2	(0.93)	1	(0.45)	1	(0.45)
Private college teaching	2	(1.06)	1	(0.47)	1	(0.45)	2	(0.91)
Change to administration	11	(5.79)	15	(7.01)	13	(5.86)	9	(4.07)
Change to outside education	44	(23.16)	32	(14.95)	22	(9.91)	29	(13.12)
Multiple—outside education	8	(4.21)	11	(5.14)	30	(13.51)	38	(17.20)
Multiple—within education	6	(3.16)	5	(2.34)	37	(16.67)	28	(12.67)
Retire	32	(16.84)	45	(21.03)	43	(19.37)	45	(20.36)
Missing	11	(5.79)	12	(5.61)	8	(3.60)	11	(4.98)
Total	190	(100.00)	214	(100.00)	222	(100.00)	221	(100.00)

regression analysis was performed for science teachers, mathematics teachers, and the combined sample of teachers.

Science Teachers

Table XXVII contains a partial listing of the questionnaire statements and identifies significant statements from science teachers. Science teachers related the first satisfaction variable from Area I, "How satisfied are you with your current employment?", to four independent variables from Area II (Skills and Abilities) and Area IV (Achievement), $F_{(4,181)} = 10.769$, with the statements accounting for 19.2 percent of the variance. Statements entered the regression equation in the following order: "Opportunity for professional growth" (Area IV/Statement 12), "Using educational technology" (Area II/Statement 16), "Chance to contribute to important decisions" (Area IV/Statement 2), and "Organizing job-related activities" (Area II/Statement 12).

Science teachers related the second statement from Area I, "Overall, how satisfied are you with the personal growth you have made in your professional career?", to five independent variables from Area II (Skills and Abilities) and Area IV (Achievement), $F_{(5,180)} = 13.879$, with the statements accounting for 27.8 percent of the variance. Statements entered the regression equation in the following order: "Recognition by supervisors or administrators" (Area IV/Statement 9), "Opportunity for professional growth" (Area IV/Statement 12), "Using research facilities" (Area II/Statement 17), "Chance to contribute to important decisions" (Area IV/Statement 2), and "Persuading others to accept your ideas" (Area II/Statement 8).

Science teachers related the third statement from Area I, "Knowing what you know now, if you had your life to relive, how likely would you be to choose a different job?", to five

TABLE XXVII

SIGNIFICANT STATEMENTS THAT ENTERED THE REGRESSION EQUATION OF TENNESSEE SCIENCE TEACHERS, 2001

Independent Variables	Dependent Variables				
	1	2	3	4	5
Area II: Skills and Abilities					
1. Writing effectively					
2. Speaking effectively					
3. Developing new approaches to problems			*		*
8. Persuading others to accept your ideas		*			
12. Organizing job-related activities	*				*
13. Working on long-term projects			*		
14. Interpreting numerical data					
16. Using educational technology	*			*	*
17. Using research facilities		*			
Area III: Values					
1. Salary			*		
6. An inner sense of knowing you are doing well					
7. Recognition by students					
9. Recognition by supervisors or administrators					
13. Publication in journals					
Area IV: Achievement					
1. Salary					
2. Chance to contribute to important decisions	*	*		*	
3. Leadership activities in your field					
5. Increased job autonomy					
6. An inner sense of knowing you are doing well					
7. Recognition by students					
9. Recognition by supervisors or administration		*	*	*	*
11. Approval from family or close friends			*		
12. Opportunity for professional growth	*	*		*	*
14. Presentation at professional meetings					*

*Statement entered the regression equation for indicated variable.

independent variables from Areas II, III, and IV, $F_{(5,180)} = 8.894$, with the statements accounting for 19.8 percent of the variance. Statements entered the regression equation in the following order: "Recognition by supervisors or administrators" (Area IV/Statement 9), "Salary" (Area III/Statement 1), "Approval from family or close friends" (Area IV/Statement 11), "Developing new approaches" (Area II/Statement 3), and "Working on long-term projects" (Area II/Statement 13). Although it seems unusual that teachers would relate choosing a different job with the statement, "Recognition by supervisors or administrators", it is possible that a career choice can be affected by the teacher-administrator relationship.

For the fourth dependent variable, the mean of Statements 1 and 2 in Area I, was related to four independent variables from Areas II and IV, $F_{(4, 181)} = 16.749$, with the statements accounting for 27.0 percent of the variance. Statements entered the regression equation in the following order: "Opportunity for professional growth" (Area IV/Statement 12), "Recognition by supervisors or administrators" (Area IV/Statement 9), "Using educational technology" (Area II/Statement 16), and "Chance to contribute to important decisions" (Area IV/Statement 2).

The fifth dependent variable, the mean of Statements 1, 2, and 3 in Area I, was related to six independent variables from Areas II and IV, $F_{(6, 180)} = 12.178$, with the statements accounting for 28.9 percent of the variance. Statements entered the regression equation in the following order: "Recognition by supervisors or administrators" (Area IV/Statement 9), "Opportunity for professional growth" (Area IV/Statement 12), "Developing new approaches to problems" (Area II/Statement 3), "Organizing job-related activities" (Area II/Statement 12), "Using educational technology" (Area

II/Statement 16), and "Presentation at professional meetings" (Area IV/Statement 14).

Mathematics Teachers

Table XXVIII contains a partial listing of the questionnaire statements and identifies significant statements from mathematics teachers. Mathematics teachers related the first satisfaction variable from Area I, "How satisfied are you with your current employment?", to three independent variables from Area III (Values) and Area IV (Achievement), $F_{(3,189)} = 11.440$, with the statements accounting for 15.4 percent of the variance. Statements entered the regression equation in the following order: "Recognition by students" (Area III/Statement 7), "Salary" (Area III/Statement 1), and "Chance to contribute to important decisions" (Area IV/Statement 2).

Mathematics teachers related the second statement from Area I, "Overall, how satisfied are you with the personal growth you have made in your professional career?", to six independent variables from Area III (Values) and Area IV (Achievement), $F_{(6,185)} = 13.367$, with the statements accounting for 30.2 percent of the variance. Statements entered the regression equation in the following order: "Opportunity for professional growth" (Area IV/Statement 12), "Presentation at professional meetings" (Area IV/Statement 14), "An inner sense of knowing you are doing well" (Area IV/Statement 6), "Recognition by supervisors and administrators" (Area III/Statement 9), "Salary" (Area IV/Statement 1), and "Publication in journals" (Area III/Statement 13). It seems unusual that teachers would relate personal growth in their professional career with the statement, "Recognition by supervisors or administrators." However, it may be possible that the teacher-administrator relationship can affect one's view of their personal growth.

Mathematics teachers related the third statement from Area I, "Knowing what you

TABLE XXVIII

SIGNIFICANT STATEMENTS THAT ENTERED THE REGRESSION EQUATION OF TENNESSEE MATHEMATICS TEACHERS, 2001

Independent Variables	Dependent Variables				
	1	2	3	4	5
Area II: Skills and Abilities					
1. Writing effectively			*		
2. Speaking effectively			*		
3. Developing new approaches to problems					
8. Persuading others to accept your ideas					
12. Organizing job-related activities					
13. Working on long-term projects					
14. Interpreting numerical data			*		
16. Using educational technology					
17. Using research facilities					
Area III: Values					
1. Salary	*		*	*	*
6. An inner sense of knowing you are doing well					
7. Recognition by students	*			*	*
9. Recognition by supervisors or administrators		*			
13. Publication in journals		*			
Area IV: Achievement					
1. Salary		*	*		*
2. Chance to contribute to important decisions	*			*	*
3. Leadership activities in your field					
5. Increased job autonomy					
6. An inner sense of knowing you are doing well		*	*	*	*
7. Recognition by students			*		
9. Recognition by supervisors or administration					
11. Approval from family or close friends				*	
12. Opportunity for professional growth		*			
14. Presentation at professional meetings		*		*	

*Statement entered the regression equation for indicated variable.

know now, if you had your life to relive, how likely would you be to choose a different job?", to seven independent variables from Areas II, III, and IV, $F_{(7,183)} = 12.193$, with the statements accounting for 31.8 percent of the variance. Statements entered the regression equation in the following order: "An inner sense of knowing you are doing well" (Area IV/Statement 6), valuing "Salary" (Area III/Statement 1), "Writing effectively" (Area II/Statement 1), "Recognition by students" (Area IV/Statement 7), achieving satisfactory "Salary" (Area IV/Statement 1), "Interpreting numerical data" (Area II/Statement 14), and "Speaking effectively" (Area II/Statement 2). Relating choosing a different job with the statements, "Writing effectively," "Interpreting numerical data," and "Speaking effectively" seems unusual, however it may be possible that competence gained by possessing necessary job skills and abilities can influence a job choice.

For the fourth dependent variable, the mean of Statements 1 and 2 in Area I, six independent variables from Areas III and IV were significant, $F_{(6,186)} = 9.779$, with the statements accounting for 24.0 percent of the variance. Statements entered the regression equation in the following order: "Chance to contribute to important decisions" (Area IV/Statement 2), "Recognition by students" (Area III/Statement 7), "An inner sense of knowing you are doing well" (Area IV/Statement 6), "Salary" (Area III/Statement 1), "Approval from family or close friends" (Area IV/Statement 11), and "Presentation at professional meetings" (Area IV/Statement 14).

The fifth dependent variable, the mean of Statements 1, 2, and 3 in Area I, was related to five independent variables from Areas III and IV, $F_{(5,187)} = 13.951$, with the statements accounting for 27.2 percent of the variance. Statements entered the regression equation in the following order: "An inner sense of knowing you are doing well" (Area

IV/Statement 6), "Salary" (Area III/Statement 1), "Chance to contribute to important decisions" (Area IV/Statement 2), "Salary" (Area IV/Statement 1), and "Recognition by students" (Area III/Statement 7).

Combined Sample

The analysis was repeated on the combined subsamples of science and mathematics teachers to identify additional independent variables that may be significant in a large database. Table XXIX contains a partial listing of the questionnaire statements and identifies significant statements from the combined sample. No additional statements were significant for the first satisfaction variable from Area I, "How satisfied are you with your current employment?" All significant statements had been identified in at least one of the earlier science or mathematics teacher regressions. Approximately 16.4 percent of the variance could be explained with $F_{(5,373)} = 14.685$.

The second satisfaction variable had two independent variables enter the regression equation that had not been significant for science or mathematics teachers. The additional variables were "Increased job autonomy" (Area IV/Statement 5) and "An inner sense of knowing you are doing well" (Area III/Statement 6). Approximately 24.5 percent of the variance could be explained with $F_{(5,372)} = 24.156$.

For the third satisfaction variable, all independent variables had been identified in the earlier regressions. Approximately 20.4 percent of the variance could be explained with $F_{(6,370)} = 15.775$.

The fourth satisfaction variable, the mean of Statements 1 and 2, also had no additional independent variables enter the regression equation. Approximately 25.3 percent of the variance could be explained with $F_{(8,370)} = 15.652$.

TABLE XXIX

SIGNIFICANT STATEMENTS THAT ENTERED THE REGRESSION EQUATION OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001

Independent Variables	Dependent Variables				
	1	2	3	4	5
Area II: Skills and Abilities					
1. Writing effectively					
2. Speaking effectively					
3. Developing new approaches to problems				*	*
8. Persuading others to accept your ideas					
12. Organizing job-related activities					
13. Working on long-term projects			*		
14. Interpreting numerical data					
16. Using educational technology	*			*	
17. Using research facilities					
Area III: Values					
1. Salary	*		*	*	*
6. An inner sense of knowing you are doing well		*			
7. Recognition by students	*			*	*
9. Recognition by supervisors or administrators					
13. Publication in journals					
Area IV: Achievement					
1. Salary	*		*	*	*
2. Chance to contribute to important decisions	*			*	
3. Leadership activities in your field					*
5. Increased job autonomy		*			
6. An inner sense of knowing you are doing well			*		*
7. Recognition by students			*		
9. Recognition by supervisors or administration		*	*	*	*
11. Approval from family or close friends					
12. Opportunity for professional growth		*		*	
14. Presentation at professional meetings		*			

*Statement entered the regression equation for indicated variable.

The fifth satisfaction variable, the mean of Statements 1, 2, and 3, had one independent variable enter the regression equation that had not entered at least one of the subgroups. The statement was "Leadership activities in your field" (Area IV/Statement 3). Approximately 25.4 percent of the variance could be explained with $F_{(7,372)} = 18.073$.

Comments from Respondents

Teachers were given one section of the questionnaire in which they could offer voluntary comments concerning any changes in education that might increase their job satisfaction. Table XXX is a summary of the comments. An increase in salary or benefits was the most frequent comment by both science and mathematics teachers (36.94 percent and 33.03 percent, respectively). The next most frequent comments for science teachers were increased respect for teaching and professional treatment (12.61 percent), more parental support and accountability (9.46 percent), and more support and respect from administrators (6.76 percent). The next most frequent comments for mathematics teachers were more student responsibility (8.60 percent), more parental support and accountability (7.69 percent), less paperwork and nonteaching duties (7.69 percent), and more public support for education (7.24 percent). There were no comments from 31.08 percent of the science teachers and 35.29 percent of the mathematics teachers. Many teachers in both groups made multiple comments.

Summary of Chapter IV

This chapter presented the research questions and the data from the survey questions used to answer them. The following was found:

TABLE XXX

DISTRIBUTION OF COMMENTS OF RESPONDENT TENNESSEE SCIENCE AND MATHEMATICS TEACHERS

	Smith (1986)				Dismukes (2001)			
	Number and Percent Responding				Number and Percent Responding			
Comments	Science Teachers		Mathematics Teachers		Science Teachers		Mathematics Teachers	
More salary/benefits	70	(36.84)	60	(28.04)	82	(36.94)	73	(33.03)
Increased respect for teaching/ professional treatment	25	(13.16)	25	(11.68)	28	(12.61)	12	(5.43)
More parental support/ accountability	--	--	--	--	21	(9.46)	17	(7.69)
More support/respect from administrators	13	(6.84)	12	(5.61)	15	(6.76)	8	(3.62)
Better student discipline	8	(4.21)	13	(6.07)	14	(6.31)	10	(4.52)
More and better materials/ equipment/technology	16	(8.42)	6	(2.80)	14	(6.31)	6	(2.71)
Less paperwork/nonteaching duties	19	(10.00)	34	(15.89)	13	(5.86)	17	(7.69)
More public support for education	11	(5.79)	16	(7.48)	13	(5.86)	16	(7.24)
Reduce pupil-teacher ratio	17	(8.95)	21	(9.81)	13	(5.86)	8	(3.62)
Dissatisfaction with state mandates	13	(6.84)	30	(14.02)	12	(5.41)	14	(6.33)
More student responsibility	--	--	--	--	11	(4.95)	19	(8.60)
More planning time	14	(7.37)	13	(6.07)	7	(3.15)	9	(4.07)
More job autonomy	15	(7.89)	13	(6.07)	7	(3.15)	6	(2.71)
More input into decisions	9	(4.74)	4	(1.87)	6	(2.70)	5	(2.26)
More professional development	--	--	--	--	5	(2.25)	6	(2.71)
Better leadership in local district	5	(2.63)	9	(4.21)	5	(2.25)	4	(1.81)
Other comments (frequency of 5 or less)	42	(22.11)	37	(17.29)	24	(10.81)	18	(8.14)
No comments	49	(25.79)	54	(25.23)	68	(30.63)	79	(35.75)
Better conditions for teaching	10	(5.26)	16	(7.48)	--	--	--	--
Total frustration	6	(3.16)	5	(2.34)	--	--	--	--

*Most respondents gave multiple comments. Percentages for the Smith study were calculated using N = 190 for science teachers and N = 214 for mathematics teachers and percentages for the Dismukes study were calculated using N = 222 for science teachers and N = 221 for mathematics teachers. Comments were categorized by major emphasis.

1. The typical respondent was 40-45 years old with a master's degree and fourteen years of teaching experience, mostly within Tennessee. Science teachers were equally divided by gender, while the number of female mathematics teachers was nearly twice the number of males. The typical participant taught in a rural school with 501-1000 students located in the eastern region of the state.

2. The highest rated ability of science and mathematics teachers was "Cooperating with a team." The highest rated value and extent of achievement for both groups was "An inner sense of knowing you are doing well."

3. The typical science and mathematics respondent can use computers and educational technology to a moderate or large extent. For science teachers, mathematics teachers, and the combined group, "Using educational technology" had a significant relationship with age group.

4. The typical science and mathematics participant indicated that s/he was very satisfied with his/her current employment. Most teachers indicated they were very satisfied with the personal growth they have made in their professional career and, if given the opportunity, would be extremely likely to choose an education career again. Satisfaction with the current job was significantly related to age group for science teachers, mathematics teachers, and the combined group.

5. Both science and mathematics teachers indicated that they would probably be teaching in a public school one year from the date the questionnaire was completed. Only half of the science and mathematics teachers indicated that they plan to remain in the public school classroom in five years. Further, one-fourth of the respondents indicated that they were planning to leave or retire from education during the same time

period. In ten years, only one-fourth of the respondents indicated that they plan to remain in the public school classroom. Almost half of the respondents anticipated that they would change to jobs outside education or retire within ten years.

6. Science teachers related job satisfaction with achieving recognition from supervisors, obtaining opportunity for professional growth, having a chance to contribute to important decisions, and using educational technology. Mathematics teachers related job satisfaction with having an inner sense of knowing you are doing well, high salary, recognition by students, and having a chance to contribute to important decisions.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter contains a summary of the purpose of the study, literature review, methods and procedures, and findings and analyses. Conclusions and implications gathered from the findings, comparisons to the first study, and recommendations for further research are also presented.

Summary

Purpose

The purposes of this study were to replicate a study conducted in 1985 by Smith that determined the demographic profile of the general population of secondary school science and mathematics teachers in Tennessee; their general level of job satisfaction; their future plans; and their perceptions of the extent to which they possess job-related skills and abilities, the extent to which they value job-related variables, and the extent to which they have achieved in the teaching profession. Like the previous study, this study also was designed to determine if any relationships existed between job satisfaction and the self-perceived skills and abilities, self-perceived job-related values, and self-perceived professional achievement of the participants. Six research questions guided the data collection and subsequent analyses.

Methods and Procedures

The population for this study consisted of licensed secondary science and mathematics teachers in Tennessee. A random sample of 320 science teachers and 325 mathematics teachers was selected and mailed a questionnaire containing demographic

questions and statements concerning their job satisfaction, selected skills and abilities, job and career values, and job and career achievements. Respondents were given four opportunities to respond by mail or by an online website. Data were collected and analyzed from 451 usable responses, representing a 69.92 percent return rate.

Findings and Analysis

Descriptive and inferential statistics were used for data analysis including frequencies, percentages, means, ranges, chi-squares, one way Analyses of Variance, the Scheffe' procedure, and multiple regression. The Statistical Package for the Social Sciences (SPSS) for Windows was used for statistical analyses. The data provided answers to the six research questions. Comparisons were made to the original study conducted by Smith in 1985.

Research Question 1. "What were the demographic characteristics of the population of Tennessee science and mathematics teachers in 2001?"

1. The gender distribution of science teachers in the current study was almost equal, with 50.90 percent female and 49.10 percent male. The number of female mathematics teachers was nearly twice the number of male mathematics teachers (64.71 percent and 35.29 percent, respectively). Although the researcher found this ratio interesting, there was no plausible explanation for it. In the original study by Smith (1986), male science teachers outnumbered female science teachers (55.79 percent and 44.21 percent, respectively) while the gender distribution of mathematics teachers is similar to the current study, with female mathematics teachers outnumbering male mathematics teachers (61.21 percent and 38.79 percent, respectively).

2. The racial origin of science and mathematics teachers in the current study was

overwhelmingly white (89.64 percent and 89.59 percent, respectively) with the remaining teachers being from other racial groups or choosing to not respond. The small percentages of respondents of minority racial origins possibly could be explained by the lack of participation in the study by three urban school districts, Shelby County Schools, Knox County Schools, and Memphis City Schools. However, the first study yielded similar data with science and mathematics teachers indicating white as their racial origin (91.05 percent and 85.98 percent, respectively) and the remaining teachers being from other racial groups.

3. The mean age of science teachers in the current study was 40.78 and the mean age of mathematics teachers was 41.62. The largest number of science teachers was in the "30-34" age group and the largest number of mathematics teachers was in the "50-54" age group. It was found that 23.42 percent of the science teachers and 30.31 percent of the mathematics teachers were 50 years or older. Assuming a retirement age of 65, these data indicate that one-fourth to one-third of the current teachers will have to be replaced in the next 15 years. The mean age of science teachers in the first study was 40.58 years and the mean age of mathematics teachers was 41.29 years. The "35-39" age group was the largest grouping for both science and mathematics followed by the "40-44" age group. Only 15.79 percent of the science teachers and 20.10 percent of the mathematics teachers were 50 years or older.

4. Years of teaching experience of science teachers in the current study ranged from zero to 42, while years of teaching experience of mathematics teachers ranged from zero to 40. The largest category of teaching experience for both science and mathematics teachers was the "5-9" years group, accounting for 22.52 percent and 19.01 percent,

respectively. This means that approximately one-fifth of the current teachers need not be replaced during the next twenty years if measures are taken to ensure that they remain in education. In the first study, years of teaching experience of science teachers ranged from one to 38, while years of teaching experience of mathematics teachers ranged from one to 39. The largest categories of teaching experience, "10-14" years and "15-19" years, accounted for approximately one-half of the science and mathematics respondents.

5. Science and mathematics teachers in the current study are highly educated with 60.81 percent of the science teachers and 62.44 percent of the mathematics teachers having obtained graduate degrees. For both science and mathematics teachers, the predominant highest academic degree was a master's degree (47.75 percent and 42.53 percent, respectively). The bachelor's degree was the second highest frequency level (39.19 percent and 37.56 percent, respectively). In the first study, 64.21 percent of he science teachers and 61.22 percent of the mathematics teachers had obtained graduate degrees. For both science and mathematics teachers, the predominant highest academic degree was a master's degree (38.42 percent and 42.06 percent, respectively). The bachelor's degree was the second highest frequency level (35.79 percent and 38.78 percent, respectively).

6. For science teachers in the current study who obtained graduate degrees, the largest group majored in administration (31.11 percent), followed by other majors (20.74 percent), and biology (15.56 percent). For mathematics teachers who obtained graduate degrees, the largest group majored in mathematics (33.33 percent), followed by administration (28.26 percent), and other majors (11.59 percent). For science teachers in the original study who obtained graduate degrees, the largest group majored in biology

(31.15 percent), followed by administration (24.59 percent), and science education (10.65 percent). For mathematics teachers who obtained graduate degrees, the largest group majored in mathematics (41.22 percent), followed by administration (19.85 percent).

7. The major teaching assignments of science teachers in the current study were biology (45.49 percent), chemistry (22.98 percent), and general science (16.22 percent). The majority of mathematics teachers were assigned to teach mathematics (95.93 percent). The major teaching assignments of science teachers in the first study were biology (48.42 percent), general science (24.74 percent), and chemistry (17.37 percent). The majority of mathematics teachers were assigned to teach mathematics (97.20 percent).

8. It was found that 30.63 percent of science teachers in the current study continued teaching the same subject during the entire school day, while other science teachers had minor teaching assignments in general science (11.71 percent), biology (10.36 percent), other subjects (6.76 percent), earth/space science (6.31 percent), and physics (5.86 percent). The majority of mathematics teachers continued to teach mathematics classes (80.09 percent) for the full day, while other mathematics teachers had minor assignments in administration (4.07 percent) and physics (4.07 percent). In the first study, 36.84 percent of science teachers continued teaching the same subject during the entire school day, while other science teachers had minor teaching assignments in general science (14.21 percent), chemistry (11.58 percent), biology (9.47 percent), physics (7.37 percent), and mathematics (6.31 percent). The majority of mathematics teachers continued to teach mathematics classes (76.17 percent) for the full day, while other mathematics teachers had minor assignments in physics (5.61 percent), computer

programming (3.27 percent), and general science (3.27 percent).

9. In the current study, the eastern region of Tennessee had the largest number of respondents for both science (42.34 percent) and mathematics (44.80 percent), followed by the middle Tennessee region (39.19 percent and 39.37 percent, respectively), and the western region of Tennessee (18.47 percent and 15.84 percent, respectively). It should be noted that delivery of the questionnaire to school districts in the western region was hindered by postal service controls after the events of September 11, 2001. In the first study, the eastern region had the largest number of respondents for both science (45.26 percent) and mathematics (42.06 percent), followed by the middle region (29.48 percent and 30.37 percent, respectively), and the western region (25.26 percent and 27.57 percent, respectively).

10. Most science and mathematics teachers in the current study taught in rural schools (58.56 percent and 61.54, respectively), followed by suburban (32.43 percent and 28.96 percent, respectively), and urban (9.01 percent and 9.50 percent, respectively). In the first study, most science teachers taught in suburban schools (39.47 percent), followed by rural (37.90 percent), and urban (22.63 percent). Mathematics teachers taught in rural school (37.85 percent), followed by suburban (34.58 percent), and urban (27.57 percent).

11. In the current study, the distribution of science and mathematics teachers according to school size was 501-1000 students (32.43 percent and 37.10 percent, respectively), 1001-1500 students (29.28 percent and 24.43 percent, respectively), 1501-2000 students (17.57 percent and 16.74 percent, respectively), and 500 or fewer students (13.96 percent and 17.20 percent, respectively). In the first study, the distribution of

science and mathematics teachers according to school size was 1001-1500 students (36.31 percent and 37.38 percent, respectively), 501-1000 students (34.74 percent and 33.18 percent, respectively), 500 and fewer students (11.58 percent and 13.55 percent, respectively), and 1501-2000 students (12.10 percent and 13.08 percent, respectively).

Research Question 2. "What were the self-perceived skills and abilities, job-related values, and career achievement of Tennessee science and mathematics teachers in 2001?"

1. Skills and abilities were rated on a four-point scale from "Not at all" (1) to "To a large extent" (4). For science teachers in the current study, the highest ratings were "Cooperating with a team" (mean of 3.656) and "Supervising a group" (mean of 3.623), while the lowest rating was "Using research facilities" (mean of 2.840). The ratings of mathematics teachers in the current study followed the same pattern, except for the second highest rating, which was "Interpreting numerical data" (mean of 3.611). Mathematics highest rating was "Cooperating with a team" (mean of 3.641), while the lowest rating was "Using research facilities" (mean of 2.692). In the first study, science teachers rated "Cooperating with a team" (mean of 3.558) and "Supervising a group" (mean of 3.479) most highly, while the lowest mean score was for "Using computers and analyzing computer printouts" (mean of 2.139). Mathematics teachers rated "Cooperating with a team" (mean of 3.665) and "Interpreting numerical data" (mean of 3.556) most highly. The lowest mean score was for "Using computers and analyzing computer printouts" and "Using research facilities" (mean of 2.634).

2. Job-related values were rated on a four-point scale from "Not at all" (1) to "To a large extent" (4). The highest rated value for both science and mathematics teachers

was "An inner sense of knowing you are doing well" (mean of 3.604 and 3.633, respectively). The next highest rating for science teachers was "Opportunity for professional growth" (mean of 3.054), while mathematics teachers' next highest rating was "Approval from family/close friends" (mean of 3.023). The lowest mean score for science and mathematics teachers was "Publication in journals" (mean of 1.441 and 1.353, respectively). In the first study, the highest rated value for both science and mathematics teachers was "An inner sense of knowing you are doing well" (mean of 3.6034 and 3.633, respectively). The next highest rating for science teachers was "Opportunity for professional growth" (mean of 3.054), while mathematics teachers' next highest rating was "Approval from family/close friends" (mean of 3.023). The lowest mean score for science and mathematics teachers was "Publication in journals" (mean of 1.441 and 1.353, respectively).

3. Career achievement was rated on a four-point scale from "Not at all" (1) to "To a large extent" (4). The greatest areas of success for science and mathematics teachers in the current study were "An inner sense of knowing you are doing well" (mean of 3.157 and 3.194, respectively) and "Approval from family/close friends" (mean of 2.949 and 3.019, respectively). The lowest rating of achievement for science and mathematics teachers was "Publication in journals" (mean of 1.363 and 1.284, respectively). In the first study, science and mathematics teachers indicated the same statements as those in the current study.

4. Of the six subgroups identified from the respondents, teachers in the current study who taught only mathematics courses and science teachers who taught other courses were significantly more positive than teachers who taught only science courses

for the statement, "Interpreting numerical data". For the statement, "Approval from family or close friends", teachers who taught mathematics and science courses and teachers who taught only mathematics were more positive than teachers who taught mathematics and other courses. The only similar result between the studies is that those teachers who taught only mathematics were significantly more positive than other teachers for the statement, "Interpreting numerical data."

5. Of the three science teacher subgroups, the analysis determined that no satisfaction statements were significant. In the first study, science teachers who also taught other courses were more positive than those who also taught mathematics for the statement, "Dealing with the public."

6. Of the three mathematics teacher subgroups, teachers in the current study who taught mathematics and science courses and teachers who taught only mathematics were more positive than teachers who taught mathematics and other courses for the statement, "An inner sense of knowing you are doing well." In the first study, teachers who also taught science courses were more positive than those who taught other courses for the statement, "Writing effectively."

7. In the current study, science teachers as a group were significantly more positive than mathematics teachers as a group in their ratings of "Using library facilities," and "Leading a group," while mathematics teachers were significantly more positive than science teachers as a group in their ratings of "Interpreting numerical data." As in the current study, science teachers as a group were significantly more positive than mathematics teachers in their ratings of "Using library facilities" while mathematics teachers were more positive for "Interpreting numerical data."

Research Question 3. "What levels of ability in using educational technology did current Tennessee science and mathematics teachers possess?"

1. Each satisfaction variable was rated on a four-point scale from "Not at all" (1) to "To a large extent" (4). For the first satisfaction variable, "Using computers," most science and mathematics teachers indicated they have a moderate amount of ability (44.59 percent and 46.15 percent, respectively) followed by a smaller percentage who indicated they had a large amount of ability (30.63 percent and 35.29 percent, respectively). Over three-fourths of the science and mathematics teachers indicated that they were skilled in using computers. These results seem reasonable since the technical skills required in science and mathematics can be translated to various aspects of computer science. Information concerning this question was unavailable from the first study.

2. For "Using educational technology," most science and mathematics teachers indicated they have either a moderate (48.20 percent and 51.13 percent, respectively) or a large (25.23 percent and 28.96 percent, respectively) amount of ability. As in the previous question about using computers, over three-fourths of the science and mathematics teachers indicated that they were skilled in using educational technology. These results seem reasonable because of the possible translation of technical skills from science and mathematics to educational technology.

3. The variable, "Using educational technology" was significantly related to age group for both science and mathematics teachers. The variable was significantly related to gender for both groups and related to total years of experience for science teachers.

4. The comments stated in the section asking, "Can you think of any changes that

might increase your satisfaction with teaching as a profession?" showed that some teachers need and desire training in using computers and in classroom application of educational technology.

Research Question 4. "What levels of career satisfaction did current Tennessee science and mathematics teachers experience?"

1. Each satisfaction variable was rated on a four-point scale from "Not at all" (1) to "To a large extent" (4). For the first satisfaction variable, "How satisfied are you with your current employment?," most science and mathematics teachers indicated "Very" satisfied (46.85 percent and 44.80 percent, respectively), followed by a smaller percentage who marked "Somewhat" satisfied (25.68 percent and 28.51 percent, respectively), and "Extremely" satisfied (20.27 percent and 23.08 percent, respectively). Approximately 70 percent of the teachers expressed satisfaction with their current employment. It should be noted, however, that it is possible that teachers who were dissatisfied may already have chosen a different employment situation. In the first study, 46.32 percent of the science teacher and 49.53 percent of the mathematics teachers marked "Very" satisfied, followed by a smaller percentage who indicated "Somewhat" satisfied (33.16 percent and 33.65 percent, respectively), and "Extremely" satisfied (16.31 percent and 13.08 percent, respectively). Approximately 7 percent more teachers indicated they were "Extremely" satisfied in the current study than did in the first study.

2. In response to the second variable, "Overall, how satisfied are you with the personal growth you have made in your professional career," 54.95 percent of the science teachers and 53.85 percent of the mathematics teachers indicated they were "Very" satisfied. Science teachers indicated "Extremely" satisfied (19.37 percent) as their next

highest percentage, while mathematics teachers marked "Somewhat" satisfied (23.08 percent). Approximately 75 percent of the teachers indicated that they were pleased with their personal growth. As noted above, however, teachers who were dissatisfied already may have chosen another career. In the first study, 51.05 percent of the science teachers and 45.32 percent of the mathematics teachers indicated that they were "Very" satisfied, followed by "Somewhat" satisfied (28.95 percent and 35.05 percent, respectively), and "Extremely" satisfied (12.11 percent and 13.55 percent, respectively). Approximately 60 percent of the teachers in the first study indicated that they were pleased with their personal growth.

3. After recoding the third variable, "Knowing what you know now, if you had your life to relive, how likely would you be to choose a different job?" to be a positive statement, it was found that most science and mathematics teachers would be "Extremely" likely to choose an education career again (36.49 percent and 38.91 percent, respectively), followed by a slightly smaller percentage who indicated they would be "Very" likely to choose the same career (36.04 percent and 32.58 percent, respectively). Over 70 percent of all respondents indicated that they would choose a career in education again. In the first study, the highest percentage of science and mathematics teachers indicated "Very" likely to choose education again (29.47 percent and 35.05 percent, respectively), while the lowest percentages were for "Extremely" likely to choose education again (20.00 percent and 18.69 percent, respectively). Approximately 50 percent of all respondents in the first study indicated that they would choose a career in education again. That percentage has increased almost 20 percent in the last 16 years. This is an encouraging statistic, but again it must be noted that teachers who were

unsatisfied with their career already may have chosen to leave education, thus inflating the satisfaction ratings of those who remain.

4. In the current study, the first variable, "How satisfied are you with your current employment" was significantly related to age group for both science and mathematics teachers. For science teachers, the second variable concerning personal growth was significantly related to gender, while the third variable concerning choosing the same career was significantly related to racial origin. For mathematics teachers, the second variable was significantly related to highest academic degree, while the third variable was related to racial origin. In the first study, the third satisfaction variable concerning choosing the same career was significantly related to the classification of the community for science teachers. The third satisfaction variable was significantly related with gender for mathematics teachers. The second satisfaction variable concerning personal growth was significantly related with gender and region for mathematics teachers.

5. The comments volunteered in the section asking, "Can you think of any changes that might increase your satisfaction with teaching as a profession?" showed that many teachers from both science and mathematics believe that increased salary and/or benefits, increased respect for teaching, and more parental support and accountability would help increase their job satisfaction. Mathematics teachers also felt that increased student responsibility and less paperwork and/or nonteaching duties would increase their satisfaction. Comments from the first study indicated that a sizable group of science and mathematics teachers felt that their job satisfaction would increase with higher salary and/or fringe benefits, increased respect or teaching, less paperwork and/or nonteaching duties, and reduced pupil-teacher ratio.

Research Question 5. "What future career plans did Tennessee science and mathematics teachers foresee in 1 year, 5 years, and 10 years from the time of the study?"

1. In the current study, by the end of one year of completing the questionnaire, 89.64 percent of the science teachers and 82.80 of the mathematics teachers planned to remain in public school teaching. Only 5.85 percent of science teachers and 10.86 percent of mathematics teachers planned to leave or retire from education within one year. In the original study, 87.37 percent of the science teachers and 90.19 percent of the mathematics teachers indicated that they planned to remain in public school teaching after the current year, while 3.16 percent of science teachers and 1.84 percent of mathematics teachers planned to retire. Data were not available concerning teachers who planned to leave other than retirement.

2. In the current study, by the end of five years of completing the questionnaire, 50.45 percent of science teachers and 43.89 percent of mathematics teachers indicated they would remain in public school teaching, while 22.07 percent and 27.60 percent, respectively, planned to leave education or retire. In the first study, a substantially higher percentage of science and mathematics teachers (60.53 percent and 64.49 percent, respectively) indicated they would remain in public education for the next five years, while 8.95 percent and 9.81 percent, respectively planned to retire.

3. By the end of ten years of completing the questionnaire, only 27.48 percent of the science teachers and 25.79 percent of the mathematics teachers in the current study indicated that they would remain in public school teaching, while 42.79 percent and 50.68 percent, respectively, planned to change to jobs outside education or retire. In the first study, 37.37 percent of science teachers and 40.65 percent of mathematics teachers

believed they would remain in public school teaching, while 16.84 percent and 21.03 percent, respectively, planned to change jobs or retire. In the current study, approximately 45 percent of the respondents indicated they would change jobs within ten years.

Research Question 6. "What relationships existed between the satisfaction of Tennessee science and mathematics teachers and

a. self-perceived skills and abilities,

b. self-perceived job-related values,

c. self-perceived achievement in the profession,

d. their future career plans?"

1. A multiple regression was used to describe the relationship between the dependent variables (the three original satisfaction statements and the two newly created variables) and the independent variables. For science teachers, the first satisfaction variable concerning satisfaction with current employment was related to achieving an opportunity for professional growth, using technology, achieving a chance to contribute to important decisions, and organizing job-related activities. Mathematics teachers related the variable to valuing recognition by students, valuing salary, and achieving a chance to contribute to important decisions. In the Smith study, science teachers related the first satisfaction variable to achieving a chance to contribute to important decisions, as did the science teachers from the current study. Mathematics teachers in the first study related the variables to different independent variables than the mathematics teachers in the current study.

2. Science teachers related the second variable concerning personal growth to

achieving recognition by supervisors, achieving an opportunity for professional growth, using research facilities, achieving a chance to contribute to important decisions, and persuading others to accept their ideas. Mathematics teachers related the second variable to achieving an opportunity for professional growth, success in presentation at professional meetings, achieving an inner sense of knowing you are doing well, valued recognition by supervisors and administrators, success in salary, and importance of publication in journals. As in the current study, science teachers in the first study related personal growth to achieving recognition by supervisors and mathematics teachers related personal growth to achieving an inner sense of knowing you are doing well.

3. Science teachers related the third variable concerning choosing the same career in education to achieving recognition by supervisors, valued salary, achieving approval from family or close friends, developing new approaches to problems, and working on long-term projects. Mathematics teachers related the third variable to achieving an inner sense of knowing you are doing well, valued salary, writing effectively, achieving recognition by students, achieving salary, interpreting numerical data, and speaking effectively. As in the first study, both groups of science teachers and mathematics teachers in the current study related choosing the same career again to valuing salary.

4. For the fourth independent variable, the mean of the first two satisfaction statements, science teachers related it to achieving an opportunity for professional growth, achieving recognition by supervisors or administrators, using educational technology, and achieving a chance to contribute to important decisions. Mathematics teachers related the variable to achieving a chance to contribute to important decisions, valuing recognition by students, achieving an inner sense of knowing you are doing well,

valued salary, achieving approval from family or close friends, and success in presentation at professional meetings. As in the current study, science teachers in the first study related the mean of the first two satisfaction variables to achieving a chance to contribute to important decisions. Mathematics teachers in the first study related this variable to achieving an inner sense of knowing you are doing well.

5. Science teachers related the fifth dependent variable, the mean of Statements 1, 2, and 3 in Area I, to achieving recognition by supervisors and administrators, achieving opportunity for professional growth, developing new approaches to problems, organizing job-related activities, using educational technology, and success in presentation at professional meetings. Mathematics teachers related the variable to achieving an inner sense of knowing you are doing well, valued salary, achieving a chance to contribute to important decisions, achieved salary, and valuing recognition by students. As in the current study, science teachers in the first study related the mean of the three satisfaction variables to achieving recognition by supervisors and administrators. Mathematics teachers in the first study related this variable to achieving an inner sense of knowing you are doing well, valued salary, and achieving a chance to contribute to important decisions.

6. For the combined sample, two statements that had not entered either of the previous regression analyses entered the regression equation for the second satisfaction variable. The additional variables were achieving increased job autonomy and valuing an inner sense of knowing you are doing well. The fifth satisfaction variable had one independent variable enter the regression equation that had not entered at least one of the subgroups: achieving leadership activities in your field. The first, third, and fourth

satisfaction variables had no additional independent variables enter the regression equation. In the first study, two statements that had not entered either of the previous regression analyses entered the regression equation. The additional variables were achieving a chance to contribute to important decisions and achieving approval from family or close friends. Valuing increased job responsibility and achieving approval from family or close friends entered the equation for the third and fourth satisfaction variables, respectively. No additional statements entered the equation for the first and fifth satisfaction variables. For the combined sample, none of the statements relating to job elements in the current study replicated findings of Smith's study.

Conclusions and Implications

Extrinsic and Intrinsic Rewards

A recurring theme throughout the study was the importance of salary, an inner sense of accomplishment, and a chance to contribute to important decisions. It can be argued that the nature of the teaching profession is one in which major contributions can be made to the lives of others and that this, in itself, can add to one's sense of accomplishment. Recruitment of beginning teachers and subsequent professional development should capitalize on the importance of this intrinsic reward. Policymakers and administrators should acknowledge the need of professionals to contribute to decisions concerning their job and workplace and the benefit that can be gained when an organization's employees feel ownership in the decision process. Policymakers should also recognize that external rewards are important and, in the case of salary, sometimes vital to an individual's career choice.

Recruitment and Retention

As stated earlier, the value and accomplishment of intrinsic and extrinsic rewards can impact recruitment and retention of personnel. Five of the respondents were in their first year of teaching, while 17% of the respondents had four or fewer years of teaching experience. The largest age group for both science and mathematics teachers had five to nine years of experience. With 38% of the teachers having less than ten years teaching experience, attention should be given to the job elements that will make the teaching profession attractive and rewarding for them. A mentoring system could provide beginning or returning teachers with additional personal and professional support. Sign-on bonuses and other incentives could attract science and mathematics majors to an education career. Incentives for recruitment and retention might include additional planning time for the Gateway examinations or laboratory preparation, salary supplements, and professional days for science and mathematics enrichment.

While it appears that most teachers indicated they were very satisfied with their current job, their personal growth, and their career choice, it should be noted that the teachers responding to the survey were individuals who had chosen to remain in their job and career. It is quite possible that those individuals who would have demonstrated the least amount of satisfaction have already self-selected out of the job and profession, and that the teachers who remain do not fully represent the overall picture of job satisfaction.

Competition from Industry

Over 60% of the respondent science and mathematics teachers have graduate degrees. This group of technically trained professionals could be highly valuable to industry and organizations outside the field of education. The possibility of higher salary

and opportunity for professional and personal growth could make industry an appealing career change. State and local education officials should recognize the factors that make science and mathematics teachers unique and consider those factors in their decision-making.

Recommendations for Further Research

1. This study determined the general levels of job satisfaction of science and mathematics teachers and the relationships among job-related variables. Further research could determine the nature of the relationship between levels of job satisfaction and organizational climate.

2. Female mathematics teachers outnumbered male mathematics teachers nearly two to one. Future studies should investigate the gender ratio to identify factors that determine a career choice in education versus a career in other mathematical fields.

3. The respondents in the current study are not representative of the racial diversity of the total population of science and mathematics teachers. A follow-up study should be conducted to determine if this underrepresented demographic's level of job satisfaction differs from the satisfaction levels of the racial majority.

4. Almost twenty percent of the respondents had earned graduate degrees in administration and two percent had earned graduate degrees in educational technology. Future studies should investigate the probability of these teachers leaving the classroom for a position in administration or a career in educational technology.

5. Industry and education organizations are competing for professionals with scientific and mathematical skill. Further research is needed to identify the factors that support a career choice in industry and/or inhibit a career choice in education.

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APPENDICES

SCIENCE AND MATHEMATICS TEACHER QUESTIONNAIRE

This questionnaire is designed to determine your perceptions of your job and of your future employment plans. Since all information provided will remain confidential, you have been assigned a code number for follow-up purposes only.

_____

I. PROFESSIONAL DATA

A. Rank a maximum of **three (3)** areas in which you are certified with **1** = your strongest area of certification, **2** = your next strongest, etc.

____a. Mathematics
____b. Business Mathematics
____c. General Science
____d. Earth/Space Science
____e. Biology
____f. Chemistry
____g. Physics
____h. Health
____i. Elementary
____j. Educational Technology
____k. Administration K - 8
____l. Administration 9 - 12
____m. Other _____

B. Highest Degree

____a. BA/BS; ____b. MA/MS; ____c. MA+45; ____d. EdS; ____e. EdD/PhD

C. If you have a graduate degree, from which area listed in part A was it earned? _____

D. If you do <u>not</u> have a graduate degree, in which areas listed in part A have you taken <u>graduate</u> courses? _____ _____ _____ _____ _____

E. In which area(s) listed in part A would additional training be most helpful?

_____

F. List your area of major assignment (fifty percent or more) from part A: _____

G. List your area(s) of minor assignment (less than fifty percent) from the areas listed in part A:

_____ _____ _____ _____

H. If you teach AP/Honors courses, what percent of your day do they fill?
___a. 24% or less; ___b. 25 to 49%; ___c. 50 to 74%; ___d. 75% or more

I. Describe the school in which you work.

1. Approximate number of students:
___a. 500 or less; ___b. 501 – 1,000; ___c. 1,001 – 1,500; ___d. 1,501 – 2,000;
___e. 2,001 – 2,500; ___f. over 2,500

2. Location of school: ___a. rural; ___b. suburban; ___c. urban

3. Section of Tennessee: ___a. eastern; ___b. middle; ___c. western

4. Type of school: ___a. public; ___b. private

II. CAREER DEVELOPMENT

A. Check the appropriate response for each statement.

	Not at all	Somewhat	Very	Extremely
1. How satisfied are you with your current employment?				
2. Overall, how satisfied are you with the personal growth you have made in your professional career?				
3. Knowing what you know now, if you had your life to relive, how likely would you be to choose a <u>different</u> job?				

B. Please rate the extent to which you <u>possess</u> the ability or skill.

	Not at all	To a small extent	To a moderate extent	To a large extent
1. Writing effectively				
2. Speaking effectively				
3. Developing new approaches to problems				
4. Analyzing and evaluating ideas				
5. Using library facilities				
6. Supervising a group				
7. Cooperating with a team				
8. Persuading others to accept your ideas				
9. Dealing with parents/community				
10. Organizing time effectively				
11. Planning job-related activities				
12. Organizing job-related activities				
13. Working on long-term projects				
14. Interpreting numerical data				
15. Using computers				
16. Using educational technology.....				
17. Using research facilities				
18. Leading a group				
19. Resolving conflicts in the work setting				

C. Indicate how important each criterion is to you in judging success in your profession and the extent of your achievement in your profession.

	How Important				Extent of Achievement			
	Not at all	Somewhat	Very	Extremely	None	Little	Much	Extensive
1. Salary								
2. Chance to contribute to important decisions								
3. Leadership activities in your field								
4. Increased job responsibility								
5. Increased job autonomy								
6. An inner sense of knowing you are doing well								
7. Recognition by students								
8. Recognition by peers								
9. Recognition by supervisors or administrators								
10. Recognition by parents/community								
11 Approval from family or close friends								
12 Opportunity for professional growth								
13 Publication in journals								
14 Presentation at professional meetings								
15 Other (Please specify) _____ _____								

III. FUTURE CAREER PLANS

A. Within the next year, I plan to be

____1. teaching in a public school.
____2. teaching in a public college or university.
____3. teaching in a private school.
____4. teaching in a private college or university.
____5. changing from teaching to administration.
____6. changing to a job outside of education.
____7. retiring.

B. Within the next five years, I plan to be _____.
List all numbers from part A above which apply.

C. Within the next ten years, I plan to be _____.
List all numbers from part A above which apply.

D. Can you think of any changes that might increase your satisfaction with teaching as a profession?

_____
_____
_____
_____.

IV. DEMOGRAPHIC DATA

A. Sex: ____1. Male; ____2. Female

B. Racial origin: ____1. Black/Non-Hispanic; ____2. Asian or Pacific Islander;
____3. Native American; ____4. Hispanic;
____5. White/Non-Hispanic; ____6. Other

C. Current age: _____ years

D. Years of teaching experience in Tennessee (not including the current year): ____

E. Years of teaching experience outside of Tennessee (not including the current year):
_____

F. Years remaining in teaching career (including the current year): ____

THANK YOU FOR PARTICIPATING IN THIS STUDY

APPENDIX B

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Department of Educational Policy and Administration
College of Education and Human Development

330 Walling Hall
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Minneapolis, MN 55455-0221
612-624-1006
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http://education.umn.edu/EdPA

September 21, 2001

Ms. Delisa Dismukes
3805 Woodcrest Circle NW
Cleveland, TN 37312

c/o University of Tennessee
FAX: 423 479-9553

Dear Ms. Dismukes:

Thank you for your letter of 21 September 2001 requesting permission to use items from the Survey of Graduates with Teaching Certificates. **You have my permission to use any items that seem appropriate to your study.** I am delighted that the earlier questionnaire can be of assistance to you. I have no guidelines or restrictions to offer on the use of the earlier instrument; use whatever seems relevant. My only request is that you cite the earlier work in your final document.

Thank you for asking. I appreciate the professionalism you displayed in seeking permission.

Sincerely,

David Chapman

David W. Chapman

1851 150 2001

CLEVELAND MIDDLE SCHOOL
3635 Georgetown Road, NW
Cleveland, Tennessee 37312
(423) 479-9641

W. Ashley Smith, Jr.
Principal

Kathy Shankle-Rowan and
Jeff Elliott
Assistant Principals

MEMORANDUM

TO: Delisa Dismukes

FROM: W. Ashley Smith, Jr., Ed. D. W. Ashley Smith, Jr.

DATE: September 20, 2001

SUBJECT: Permission to Use Materials for Dissertation

It is my pleasure to grant permission to you for the use of any materials or methods that were developed while I prepared my dissertation entitled **The Career Satisfaction, Future Plans, and Personal Characteristics of Tennessee Public School Science and Mathematics Teachers in 1985**. The University of Tennessee, Knoxville, accepted this dissertation in August 1986.

The survey used was an adaptation of one published by D. W. Chapman in an article entitled "Career Satisfaction of Teachers" (**Educational Research Quarterly**, 1983, 7(3), 40-49). I received permission from Dr. Chapman to adapt his survey questions for my study.

APPENDIX C

Science and Mathematics Teacher Questionnaire

This questionnaire is designed to determine your perceptions of your job and of your future employment plans. Since all information provided will remain confidential, you have been assigned a code number for follow-up purposes only. At data analysis, there will be no identifying names or codes on existing records and all individual information from the questionnaires will be destroyed upon completion of the study.

The questionnaire will take approximately ten (10) minutes to complete. Thank you for participating in this study.

If you have any difficulties or questions about this questionnaire, contact Delisa Dismukes by e-mail to DelisaDis@aol.com. Hard copies of the questionnaire can be printed as an Acrobat pdf file. 

Enter your Four-digit code number: ⌐¯¯¯¯

I. Professional Data

Rank a maximum of three (3) areas in which you are certified with 1 = your strongest area of certification, 2 = your next strongest, etc.

⌐ Mathematics	⌐ Business Mathematics
⌐ General Science	⌐ Earth/Space Science
⌐ Biology	⌐ Chemistry
⌐ Physics	⌐ Health
⌐ Elementary	⌐ Educational Technology
⌐ Administration K - 8	⌐ Administration 9 - 12
⌐ Other	

Highest Degree

- BA/BS
- MA/MS
- MA+45
- EdS
- PhD

If you have a graduate degree, from which area was it earned?

- Mathematics
- Business Mathematics
- General Science
- Earth/Space Science
- Biology
- Chemistry
- Physics
- Health
- Elementary
- Educational Technology
- Administration K - 8
- Administration 9 - 12
- Other

If you do <u>not</u> have a graduate degree, in which areas have you taken <u>graduate</u> courses?

- Mathematics
- Business Mathematics
- General Science
- Earth/Space Science
- Biology
- Chemistry
- Physics
- Health
- Elementary
- Educational Technology
- Administration K - 8
- Administration 9 - 12
- Other

In which area(s) listed would additional training be most helpful?

- [ ] Mathematics
- [ ] Business Mathematics
- [ ] General Science
- [ ] Earth/Space Science
- [ ] Biology
- [ ] Chemistry
- [ ] Physics
- [ ] Health
- [ ] Elementary
- [ ] Educational Technolo
- [ ] Administration K - 8
- [ ] Administration 9 - 1
- [ ] Other

Which is your area of major assignment (fifty percent or more?)

- ( ) Mathematics
- ( ) Business Mathematics
- ( ) General Science
- ( ) Earth/Space Science
- ( ) Biology
- ( ) Chemistry
- ( ) Physics
- ( ) Health
- ( ) Elementary
- ( ) Educational Technology
- ( ) Administration K - 8
- ( ) Administration 9 - 12
- ( ) Other

Select your area(s) of minor assignment (less that fifty percent.)

- [ ] Mathematics
- [ ] Business Mathematics
- [ ] General Science
- [ ] Earth/Space Science
- [ ] Biology
- [ ] Chemistry
- [ ] Physics
- [ ] Health
- [ ] Elementary
- [ ] Educational Technolo
- [ ] Administration K - 8
- [ ] Administration 9 - 1
- [ ]

If you teach AP/Honors courses, approximately what percent of your day is filled with AP/Honors courses?

- 24% or less
- 25 - 49%
- 50 - 74%
- 75% or more

Describe the school in which you work.

Approximate number of students:

- 500 or less
- 501 - 1000
- 1001 - 1500
- 1501 - 2000
- 2001 - 2500
- over 2500

Location of school:

- rural
- suburban
- urban

Section of Tennessee:

- eastern
- middle
- western

Type of school:

- public
- private

II. Career Development

How satisfied are you with your current employment?

- Not at all
- Somewhat
- Very
- Extremely

Overall, how satisfied are you with the personal growth you have made in your professional career?

- Not at all
- Somewhat
- Very
- Extremely

Knowing what you know now, if you had your life to relive, how likely would you be to choose a different job?

- Not at all
- Somewhat
- Very
- Extremely

Please rate the extent to which you possess the ability or skill.

Writing effectively

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Speaking effectively

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Developing new approaches to problems

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Analyzing and evaluating ideas

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Using library facilities

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Supervising a group

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Cooperating with a team

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Persuading others to accept your ide

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Dealing with parents/community

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Organizing time effectively

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Planning job-related activities

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Organizing job-related activities

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Working on long-term projects

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Interpreting numerical data

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Using computers

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Using educational technology

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Using research facilities

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Leading a group

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Resolving conflicts in the work setting

- Not at all
- To a small extent
- To a moderate extent
- To a large extent

Indicate:

(1) how important each criterion is to *you* in judging success in your profession and

(2) the extent of your achievement in your profession.

Salary

How Important	Extent of Achievement

Chance to contribute to important decisions

How Important	Extent of Achievement

Leadership activities in your field

How Important Extent of Achievement

Increased job responsibility

How Important Extent of Achievement

Increased job autonomy

How Important Extent of Achievement

An inner sense of knowing you are doing well

How Important Extent of Achievement

Recognition by students

How Important Extent of Achievement

Recognition by peers

How Important Extent of Achievement

Recognition by supervisors or administrators

How Important	Extent of Achievement

Recognition by parents/community

How Important	Extent of Achievement

Approval from family or close friends

How Important	Extent of Achievement

Opportunity for professional growth

How Important	Extent of Achievement

Publication in journals

How Important	Extent of Achievement

Presentation at professional meetings

How Important	Extent of Achievement

Other (Please specify)

III. Future Career Plans

Within the next year, I plan to be

- ☐ teaching in a public school.
- ☐ teaching in a public college or university
- ☐ teaching in a private school
- ☐ teaching in a private college or university
- ☐ changing from teaching to administration
- ☐ changing to a job outside of education
- ☐ retiring

Within the next five years, I plan to be

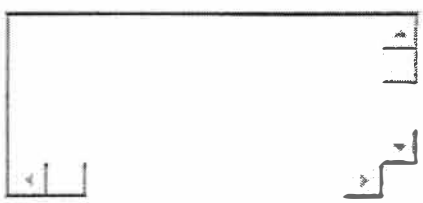
- ☐ teaching in a public school.
- ☐ teaching in a public college or university
- ☐ teaching in a private school
- ☐ teaching in a private college or university
- ☐ changing from teaching to administration
- ☐ changing to a job outside of education
- ☐ retiring

Within the next ten years, I plan to be

- ☐ teaching in a public school.
- ☐ teaching in a public college or university
- ☐ teaching in a private school

- teaching in a private college or university
- changing from teaching to administration
- changing to a job outside of education
- retiring

Can you think of any changes that might increase your satisfaction with teaching as a profession?



IV. Demographic Data

Sex:

- Male
- Female

Race:

Current age:

Years of teaching experience in Tennessee (not including the current year):

Years of teaching experience outside of Tennessee (not including the current year):

Years remaining in teaching career (including the current year):

Submit Form | Reset Form

THANK YOU FOR PARTICIPATING IN THIS STUDY

Delisa Dismukes - University of Tennessee.

APPENDIX D

3805 Woodcrest Circle NW
Cleveland, TN 37312

September 17, 2001

Dear Director of Schools:

I am conducting a survey of current Tennessee science and mathematics teachers as part of my doctoral research at the University of Tennessee. The questionnaire seeks professional, attitudinal, and demographic data, and the future plans of the teacher. The survey should take approximately ten (10) minutes for the teacher to complete. Communication will be by mail or by an online web address.

You may be assured that all responses will be kept confidential. All individual information from these surveys will be destroyed upon completion of the study. No reference in this study will be made to any individual teacher or school.

Before contacting the teacher(s) from your school system, I wanted to inform you of the study's purpose and to request permission for the selected teacher(s) to participate. Please complete the permission form as soon as possible and return it in the prepaid envelope provided. Thank you for your help. Your cooperation is greatly appreciated. If you have any questions, please contact me at (423) 479-5283 or at DelisaDis@aol.com.

Sincerely,

Delisa K. Dismukes

Enclosures: Permission Form
Envelope

To Whom It May Concern:

____ This school system grants permission to Delisa Dismukes to contact teachers within this school system to ask them to complete the Science and Mathematics Teacher Questionnaire and to conduct any follow-up contacts that may be required.

____ This school system denies permission for Delisa Dismukes to contact any teacher within this school system for her research project.

_____ _____

Date Director's Signature

_____

School System

APPENDIX E

3805 Woodcrest Circle NW
Cleveland, TN 37312

October 2, 2001

Dear Educator:

As part of my doctoral research at the University of Tennessee, I am conducting a survey of current Tennessee science and mathematics teachers. The questionnaire seeks to examine each teacher's level of career satisfaction, future career plans, and certain attitudinal and demographic data. Your selection to participate in this study was made at random from a list of science and mathematics teachers from the State Department of Education.

Please take approximately ten (10) minutes to respond to the enclosed questionnaire and return it to me in the prepaid envelope provided by October 12, 2001. Completion of the questionnaire acknowledges your informed consent to participate in this study.

Please note that the questionnaire can be completed online at **http://www.myquickwebsite.com/teachersurvey/index.html**. Enter the **four-digit number** written on the enclosed questionnaire and use the password: ***teach***.

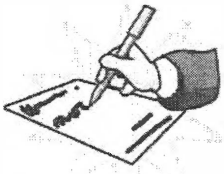
All responses will be kept confidential. For follow-up purposes, your questionnaire has been numbered. No reference in this study will be made to any individual teacher or school and all individual information from these surveys will be destroyed upon completion of the study.If you have any questions, please contact me at (423) 479-5283 or at DelisaDis@aol.com. Have a good year and thank you for your participation in my study.

Sincerely,

Delisa K. Dismukes

Enclosures: Questionnaire
Envelope

APPENDIX F



Help!

You should have received a questionnaire concerning the attitudes of mathematics and science teachers toward their teaching careers.

I desperately need your participation to complete my study.

- Please take about ten (10) minutes to complete the questionnaire and return it no later than Friday, November 30.
- If you need an additional copy of the questionnaire, please notify me and I will get another one to you. The survey is also available online at http://www.myquickwebsite.com/teachersurvey/index.html.
- *Remember that all responses are confidential and individual information will be destroyed when the study is completed.*

Thank you for your time and thank you for helping me complete my study.

Delisa Dismukes - Cleveland City Schools
3805 Woodcrest Circle, Cleveland, TN 37312
423.479.5283
DelisaDis@aol.com

APPENDIX G

Help! I desperately need your participation to complete my doctoral work at UT. You should have received a questionnaire by snail mail concerning the attitudes of math and science teachers toward their teaching careers. To date, I have not received your response.

Please take about ten (10) minutes to complete the survey and return it no later than **Wednesday, October 31**. The survey can be completed online at http://www.myquickwebsite.com/teachersurvey/index.html or you can notify me if you need another printed copy of the questionnaire. Your four-digit code number is .

Like you, I am a classroom teacher, so I know your time is valuable. Thank you for your time and thank you for helping me complete my study.

Remember that all responses are confidential and individual information will be destroyed when the study is completed.

Delisa Dismukes
3805 Woodcrest Circle
Cleveland, TN 37312
423.479.5283

APPENDIX H

3805 Woodcrest Circle NW
Cleveland, TN 37312

January 10, 2002

Dear Educator:

Help! A questionnaire was recently sent to you concerning the attitudes of science and mathematics teachers towards their teaching careers. Unfortunately, security delays of the postal service and demands of the recent Gateway tests have greatly affected my response rate. **I desperately need your participation to complete my study**.

Please take approximately ten (10) minutes to respond to the enclosed questionnaire and return it to me in the prepaid envelope provided by **Friday, January 18**. If you prefer, the questionnaire can be completed online at **http://www.myquickwebsite.com/teachersurvey/index.html**. All responses are confidential and individual information will be destroyed when the study is completed. Your questionnaire has been numbered for follow-up purposes.

If you have any questions, please contact me at (423) 479-5283 or at DelisaDis@aol.com. Have a good year and thank you for your participation in this important study.

Sincerely,

Delisa K. Dismukes

Enclosures: Questionnaire
Envelope

APPENDIX I

ONE WAY ANALYSIS OF VARIANCE FOR THE RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS BY SIX SUBGROUPS OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Satisfaction with Current Job	Between Groups	1.954	5	.391	.554	.735
	Within Groups	308.276	437	.705		
	Total	310.230	442			
Satisfied with Personal Growth	Between Groups	1.239	5	.248	.393	.854
	Within Groups	275.578	437	.631		
	Total	276.817	442			
Likely to Choose Career Again	Between Groups	.576	5	.115	.109	.990
	Within Groups	463.054	437	1.060		
	Total	463.630	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Writing Effectively	Between Groups	2.396	5	.479	1.259	.281
	Within Groups	166.340	437	.381		
	Total	168.736	442			
Speaking Effectively	Between Groups	.981	5	.196	.573	.721
	Within Groups	149.670	437	.342		
	Total	150.650	442			
Developing New Approaches	Between Groups	1.820	5	.364	.914	.472
	Within Groups	173.982	437	.398		
	Total	175.801	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
ıalyzing and ·aluating Ideas	Between Groups	.634	5	.127	.344	.886
	Within Groups	161.258	437	.369		
	Total	161.892	442			
;ing Library Facilities	Between Groups	9.936	5	1.987	2.905	.014
	Within Groups	298.954	437	.684		
	Total	308.889	442			
ıpervising a Group	Between Groups	1.625	5	.325	.894	.485
	Within Groups	158.904	437	.364		
	Total	160.528	442			
›operating with a ·am	Between Groups	.544	5	.109	.322	.900
	Within Groups	147.578	437	.338		
	Total	148.122	442			
·rsuading Others	Between Groups	1.255	5	.251	.511	.768
	Within Groups	214.659	437	.491		
	Total	215.914	442			
;aling with ırents/Community	Between Groups	8.434E-02	5	1.687E-02	.040	.999
	Within Groups	184.755	437	.423		
	Total	184.840	442			
ganizing Time	Between Groups	1.578	5	.316	.638	.670
	Within Groups	216.069	437	.494		
	Total	217.648	442			
ınning Job-Related tivities	Between Groups	3.748	5	.750	1.147	.335
	Within Groups	285.701	437	.654		
	Total	289.449	442			
ganizing b-Related Activities	Between Groups	4.107	5	.821	1.186	.315
	Within Groups	302.805	437	.693		
	Total	306.912	442			
›rking on Long-Term ›jects	Between Groups	1.197	5	.239	.355	.879
	Within Groups	294.244	436	.675		
	Total	295.441	441			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Interpreting Numerical Data	Between Groups	19.994	5	3.999	7.885	.000
	Within Groups	221.613	437	.507		
	Total	241.607	442			
Using Computers	Between Groups	2.789	5	.558	.899	.482
	Within Groups	270.625	436	.621		
	Total	273.414	441			
Using Educational Technology	Between Groups	.832	5	.166	.275	.927
	Within Groups	264.748	437	.606		
	Total	265.580	442			
Using Research Facilities	Between Groups	3.769	5	.754	.953	.447
	Within Groups	345.694	437	.791		
	Total	349.463	442			
Leading a Group	Between Groups	4.429	5	.886	1.599	.159
	Within Groups	242.036	437	.554		
	Total	246.465	442			
Resolving Conflicts	Between Groups	1.286	5	.257	.443	.818
	Within Groups	253.540	437	.580		
	Total	254.826	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Value)	Between Groups	1.187	5	.237	.351	.882
	Within Groups	295.806	437	.677		
	Total	296.993	442			
Chance to Contribute to Decisions (Value)	Between Groups	3.824	5	.765	1.252	.284
	Within Groups	266.975	437	.611		
	Total	270.799	442			
Leadership Activities (Value)	Between Groups	4.025	5	.805	1.164	.326
	Within Groups	302.188	437	.692		
	Total	306.212	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Increased Job Responsibility (Value)	Between Groups	4.014	5	.803	1.108	.355
	Within Groups	316.609	437	.725		
	Total	320.623	442			
Increased Job Autonomy (Value)	Between Groups	4.430	5	.886	1.169	.323
	Within Groups	331.123	437	.758		
	Total	335.553	442			
Inner Sense of Doing Well (Value)	Between Groups	3.922	5	.784	2.231	.050
	Within Groups	153.622	437	.352		
	Total	157.544	442			
Recognition by Students (Value)	Between Groups	3.520	5	.704	1.013	.410
	Within Groups	303.803	437	.695		
	Total	307.323	442			
Recognition by Peers (Value)	Between Groups	2.672	5	.534	.752	.585
	Within Groups	310.524	437	.711		
	Total	313.196	442			
Recognition by Supervisors (Value)	Between Groups	3.316	5	.663	.983	.427
	Within Groups	294.697	437	.674		
	Total	298.014	442			
Recognition by Parents/Community (Value)	Between Groups	3.884	5	.777	1.152	.332
	Within Groups	294.744	437	.674		
	Total	298.628	442			
Approval from Family/Close Friends (Value)	Between Groups	6.160	5	1.232	1.648	.146
	Within Groups	326.657	437	.747		
	Total	332.817	442			
Opportunity for Professional Growth (Value)	Between Groups	4.543	5	.909	1.485	.193
	Within Groups	267.375	437	.612		
	Total	271.919	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Publication in Journals (Value)	Between Groups	.713	5	.143	.319	.902
	Within Groups	195.350	437	.447		
	Total	196.063	442			
Presentation at Professional Meetings (Value)	Between Groups	.880	5	.176	.257	.936
	Within Groups	299.752	437	.686		
	Total	300.632	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Achievement)	Between Groups	.989	5	.198	.268	.931
	Within Groups	322.903	437	.739		
	Total	323.892	442			
Chance to Contribute to Decisions (Achievement)	Between Groups	4.968	5	.994	1.349	.242
	Within Groups	321.790	437	.736		
	Total	326.758	442			
Leadership Activities (Achievement)	Between Groups	3.832	5	.766	.979	.430
	Within Groups	342.303	437	.783		
	Total	346.135	442			
Increased Job Responsibility (Achievement)	Between Groups	4.436	5	.887	1.157	.330
	Within Groups	335.248	437	.767		
	Total	339.684	442			
Increased Job Autonomy (Achievement)	Between Groups	4.019	5	.804	.882	.493
	Within Groups	398.080	437	.911		
	Total	402.099	442			
Inner Sense of Doing Well (Achievement)	Between Groups	3.158	5	.632	1.078	.372
	Within Groups	255.998	437	.586		
	Total	259.156	442			
Recognition by Students (Achievement)	Between Groups	5.005	5	1.001	1.453	.204
	Within Groups	301.013	437	.689		
	Total	306.018	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Recognition by Peers (Achievement)	Between Groups	1.895	5	.379	.548	.740
	Within Groups	302.078	437	.691		
	Total	303.973	442			
Recognition by Supervisors (Achievement)	Between Groups	1.158	5	.232	.299	.913
	Within Groups	338.526	437	.775		
	Total	339.684	442			
Recognition by Parents/Community (Achievement)	Between Groups	4.963	5	.993	1.221	.298
	Within Groups	355.250	437	.813		
	Total	360.212	442			
Approval from Family/Close Friends (Achievement)	Between Groups	12.524	5	2.505	3.370	.005
	Within Groups	324.831	437	.743		
	Total	337.354	442			
Opportunity for Professional Growth (Achievement)	Between Groups	2.690	5	.538	.743	.591
	Within Groups	316.344	437	.724		
	Total	319.034	442			
Publication in Journals (Achievement)	Between Groups	.625	5	.125	.143	.982
	Within Groups	381.582	437	.873		
	Total	382.208	442			
Presentation at Professional Meetings (Achievement)	Between Groups	1.117	5	.223	.207	.959
	Within Groups	471.203	437	1.078		
	Total	472.321	442			

ONE WAY ANALYSIS OF VARIANCE FOR THE RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS BY THREE SUBGROUPS OF TENNESSEE SCIENCE TEACHERS, 2001

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Satisfaction with Current Job	Between Groups	1.276	2	.638	.852	.428
	Within Groups	164.075	219	.749		
	Total	165.351	221			
Satisfied with Personal Growth	Between Groups	.466	2	.233	.361	.698
	Within Groups	141.462	219	.646		
	Total	141.928	221			
Likely to Choose Career Again	Between Groups	.513	2	.256	.248	.780
	Within Groups	226.104	219	1.032		
	Total	226.617	221			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Writing Effectively	Between Groups	1.424	2	.712	1.900	.152
	Within Groups	82.076	219	.375		
	Total	83.500	221			
Speaking Effectively	Between Groups	.139	2	6.942E-02	.192	.825
	Within Groups	78.978	219	.361		
	Total	79.117	221			
Developing New Approaches	Between Groups	.344	2	.172	.404	.668
	Within Groups	93.354	219	.426		
	Total	93.698	221			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Analyzing and Evaluating Ideas	Between Groups	.123	2	6.167E-02	.155	.857
	Within Groups	87.336	219	.399		
	Total	87.459	221			
Using Library Facilities	Between Groups	2.009	2	1.004	1.509	.224
	Within Groups	145.811	219	.666		
	Total	147.820	221			
Supervising a Group	Between Groups	.416	2	.208	.549	.578
	Within Groups	82.918	219	.379		
	Total	83.333	221			
Cooperating with a Team	Between Groups	.372	2	.186	.533	.588
	Within Groups	76.407	219	.349		
	Total	76.779	221			
Persuading Others	Between Groups	.377	2	.189	.382	.683
	Within Groups	107.970	219	.493		
	Total	108.347	221			
Dealing with Parents/Community	Between Groups	1.289E-03	2	6.444E-04	.001	.999
	Within Groups	104.994	219	.479		
	Total	104.995	221			
Organizing Time	Between Groups	.956	2	.478	.952	.387
	Within Groups	109.931	219	.502		
	Total	110.887	221			
Planning Job-Related Activities	Between Groups	.776	2	.388	.572	.565
	Within Groups	148.508	219	.678		
	Total	149.284	221			
Organizing Job-Related Activities	Between Groups	1.045	2	.522	.711	.492
	Within Groups	160.833	219	.734		
	Total	161.878	221			
Working on Long-Term Projects	Between Groups	.798	2	.399	.557	.573
	Within Groups	155.972	218	.715		
	Total	156.769	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Interpreting Numerical Data	Between Groups	3.120	2	1.560	2.385	.095
	Within Groups	143.245	219	.654		
	Total	146.365	221			
Using Computers	Between Groups	1.366	2	.683	1.005	.368
	Within Groups	148.091	218	.679		
	Total	149.457	220			
Using Educational Technology	Between Groups	.364	2	.182	.279	.757
	Within Groups	143.010	219	.653		
	Total	143.374	221			
Using Research Facilities	Between Groups	.954	2	.477	.583	.559
	Within Groups	179.244	219	.818		
	Total	180.198	221			
Leading a Group	Between Groups	.122	2	6.109E-02	.109	.897
	Within Groups	122.729	219	.560		
	Total	122.851	221			
Resolving Conflicts	Between Groups	.277	2	.139	.233	.792
	Within Groups	130.191	219	.594		
	Total	130.468	221			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Value)	Between Groups	.281	2	.141	.210	.811
	Within Groups	146.890	219	.671		
	Total	147.171	221			
Chance to Contribute to Decisions (Value)	Between Groups	.839	2	.420	.757	.470
	Within Groups	121.359	219	.554		
	Total	122.198	221			
Leadership Activities (Value)	Between Groups	.977	2	.489	.707	.494
	Within Groups	151.401	219	.691		
	Total	152.378	221			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig
Increased Job Responsibility (Value)	Between Groups	2.149	2	1.075	1.629	.19
	Within Groups	144.468	219	.660		
	Total	146.617	221			
Increased Job Autonomy (Value)	Between Groups	1.624	2	.812	1.121	.32
	Within Groups	158.561	219	.724		
	Total	160.185	221			
Inner Sense of Doing Well (Value)	Between Groups	6.308E-02	2	3.154E-02	.097	.90
	Within Groups	71.054	219	.324		
	Total	71.117	221			
Recognition by Students (Value)	Between Groups	1.234	2	.617	.926	.39
	Within Groups	146.153	219	.667		
	Total	147.387	221			
Recognition by Peers (Value)	Between Groups	.646	2	.323	.456	.63
	Within Groups	155.173	219	.709		
	Total	155.820	221			
Recognition by Supervisors (Value)	Between Groups	.340	2	.170	.267	.76
	Within Groups	139.358	219	.636		
	Total	139.698	221			
Recognition by Parents/Community (Value)	Between Groups	6.227E-03	2	3.113E-03	.005	.99
	Within Groups	141.868	219	.648		
	Total	141.874	221			
Approval from Family/Close Friends (Value)	Between Groups	2.075	2	1.037	1.536	.21
	Within Groups	147.907	219	.675		
	Total	149.982	221			
Opportunity for Professional Growth (Value)	Between Groups	2.315	2	1.158	2.130	.12
	Within Groups	119.036	219	.544		
	Total	121.351	221			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Publication in Journals (Value)	Between Groups	.200	2	.100	.254	.776
	Within Groups	86.538	219	.395		
	Total	86.739	221			
Presentation at Professional Meetings (Value)	Between Groups	.548	2	.274	.396	.673
	Within Groups	151.420	219	.691		
	Total	151.968	221			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Achievement)	Between Groups	.684	2	.342	.490	.613
	Within Groups	152.744	219	.697		
	Total	153.428	221			
Chance to Contribute to Decisions (Achievement)	Between Groups	1.403	2	.702	.990	.373
	Within Groups	155.191	219	.709		
	Total	156.595	221			
Leadership Activities (Achievement)	Between Groups	1.300	2	.650	.865	.423
	Within Groups	164.574	219	.751		
	Total	165.874	221			
Increased Job Responsibility (Achievement)	Between Groups	.709	2	.354	.511	.600
	Within Groups	151.760	219	.693		
	Total	152.468	221			
Increased Job Autonomy (Achievement)	Between Groups	.737	2	.368	.436	.647
	Within Groups	185.137	219	.845		
	Total	185.874	221			
Inner Sense of Doing Well (Achievement)	Between Groups	.198	2	9.876E-02	.171	.843
	Within Groups	126.271	219	.577		
	Total	126.468	221			
Recognition by Students (Achievement)	Between Groups	2.280	2	1.140	1.739	.178
	Within Groups	143.540	219	.655		
	Total	145.820	221			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Recognition by Peers (Achievement)	Between Groups	.333	2	.167	.241	.786
	Within Groups	151.487	219	.692		
	Total	151.820	221			
Recognition by Supervisors (Achievement)	Between Groups	.767	2	.384	.514	.599
	Within Groups	163.579	219	.747		
	Total	164.347	221			
Recognition by Parents/Community (Achievement)	Between Groups	3.468	2	1.734	2.148	.119
	Within Groups	176.825	219	.807		
	Total	180.293	221			
Approval from Family/Close Friends (Achievement)	Between Groups	.345	2	.172	.216	.806
	Within Groups	174.615	219	.797		
	Total	174.959	221			
Opportunity for Professional Growth (Achievement)	Between Groups	.804	2	.402	.570	.566
	Within Groups	154.480	219	.705		
	Total	155.284	221			
Publication in Journals (Achievement)	Between Groups	.175	2	8.741E-02	.113	.893
	Within Groups	169.213	219	.773		
	Total	169.387	221			
Presentation at Professional Meetings (Achievement)	Between Groups	.450	2	.225	.223	.800
	Within Groups	220.924	219	1.009		
	Total	221.374	221			

APPENDIX K

ONE WAY ANALYSIS OF VARIANCE FOR THE RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS BY THREE SUBGROUPS OF TENNESSEE MATHEMATICS TEACHERS, 2001

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Satisfaction with Current Job	Between Groups	.640	2	.320	.484	.617
	Within Groups	144.201	218	.661		
	Total	144.842	220			
Satisfied with Personal Growth	Between Groups	.120	2	5.981E-02	.097	.907
	Within Groups	134.116	218	.615		
	Total	134.235	220			
Likely to Choose Career Again	Between Groups	5.478E-02	2	2.739E-02	.025	.975
	Within Groups	236.950	218	1.087		
	Total	237.005	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Writing Effectively	Between Groups	.957	2	.479	1.238	.292
	Within Groups	84.264	218	.387		
	Total	85.222	220			
Speaking Effectively	Between Groups	.304	2	.152	.469	.626
	Within Groups	70.691	218	.324		
	Total	70.995	220			
Developing New Approaches	Between Groups	.621	2	.310	.840	.433
	Within Groups	80.628	218	.370		
	Total	81.249	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Analyzing and Evaluating Ideas	Between Groups	9.667E-02	2	4.833E-02	.143	.867
	Within Groups	73.921	218	.339		
	Total	74.018	220			
Using Library Facilities	Between Groups	2.052	2	1.026	1.461	.234
	Within Groups	153.142	218	.702		
	Total	155.195	220			
Supervising a Group	Between Groups	.177	2	8.847E-02	.254	.776
	Within Groups	75.986	218	.349		
	Total	76.163	220			
Cooperating with a Team	Between Groups	5.136E-02	2	2.568E-02	.079	.924
	Within Groups	71.170	218	.326		
	Total	71.222	220			
Persuading Others	Between Groups	7.977E-02	2	3.988E-02	.081	.922
	Within Groups	106.689	218	.489		
	Total	106.769	220			
Dealing with Parents/Community	Between Groups	6.687E-02	2	3.343E-02	.091	.913
	Within Groups	79.761	218	.366		
	Total	79.828	220			
Organizing Time	Between Groups	.622	2	.311	.639	.529
	Within Groups	106.138	218	.487		
	Total	106.760	220			
Planning Job-Related Activities	Between Groups	2.173	2	1.087	1.727	.180
	Within Groups	137.193	218	.629		
	Total	139.367	220			
Organizing Job-Related Activities	Between Groups	2.798	2	1.399	2.148	.119
	Within Groups	141.971	218	.651		
	Total	144.769	220			
Working on Long-Term Projects	Between Groups	.379	2	.190	.299	.742
	Within Groups	138.272	218	.634		
	Total	138.652	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Interpreting Numerical Data	Between Groups	.392	2	.196	.545	.580
	Within Groups	78.368	218	.359		
	Total	78.760	220			
Using Computers	Between Groups	1.041	2	.520	.926	.398
	Within Groups	122.534	218	.562		
	Total	123.575	220			
Using Educational Technology	Between Groups	.190	2	9.479E-02	.170	.844
	Within Groups	121.738	218	.558		
	Total	121.928	220			
Using Research Facilities	Between Groups	1.387	2	.694	.908	.405
	Within Groups	166.450	218	.764		
	Total	167.837	220			
Leading a Group	Between Groups	5.079E-03	2	2.540E-03	.005	.995
	Within Groups	119.307	218	.547		
	Total	119.312	220			
Resolving Conflicts	Between Groups	.633	2	.316	.559	.573
	Within Groups	123.349	218	.566		
	Total	123.982	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Value)	Between Groups	.613	2	.307	.449	.639
	Within Groups	148.916	218	.683		
	Total	149.529	220			
Chance to Contribute to Decisions (Value)	Between Groups	2.836	2	1.418	2.123	.122
	Within Groups	145.616	218	.668		
	Total	148.452	220			
Leadership Activities (Value)	Between Groups	1.232	2	.616	.890	.412
	Within Groups	150.786	218	.692		
	Total	152.018	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Increased Job Responsibility (Value)	Between Groups	.918	2	.459	.581	.560
	Within Groups	172.141	218	.790		
	Total	173.059	220			
Increased Job Autonomy (Value)	Between Groups	.750	2	.375	.474	.623
	Within Groups	172.562	218	.792		
	Total	173.312	220			
Inner Sense of Doing Well (Value)	Between Groups	3.604	2	1.802	4.757	.009
	Within Groups	82.568	218	.379		
	Total	86.172	220			
Recognition by Students (Value)	Between Groups	2.277	2	1.139	1.575	.209
	Within Groups	157.650	218	.723		
	Total	159.928	220			
Recognition by Peers (Value)	Between Groups	1.889	2	.944	1.325	.268
	Within Groups	155.351	218	.713		
	Total	157.240	220			
Recognition by Supervisors (Value)	Between Groups	2.588	2	1.294	1.816	.165
	Within Groups	155.339	218	.713		
	Total	157.928	220			
Recognition by Parents/Community (Value)	Between Groups	3.241	2	1.621	2.311	.102
	Within Groups	152.876	218	.701		
	Total	156.118	220			
Approval from Family/Close Friends (Value)	Between Groups	3.703	2	1.851	2.258	.107
	Within Groups	178.750	218	.820		
	Total	182.452	220			
Opportunity for Professional Growth (Value)	Between Groups	.195	2	9.731E-02	.143	.867
	Within Groups	148.339	218	.680		
	Total	148.534	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Publication in Journals (Value)	Between Groups	.346	2	.173	.347	.707
	Within Groups	108.812	218	.499		
	Total	109.158	220			
Presentation at Professional Meetings (Value)	Between Groups	.211	2	.106	.155	.856
	Within Groups	148.332	218	.680		
	Total	148.543	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Achievement)	Between Groups	4.196E-03	2	2.098E-03	.003	.997
	Within Groups	170.159	218	.781		
	Total	170.163	220			
Chance to Contribute to Decisions (Achievement)	Between Groups	3.473	2	1.737	2.273	.105
	Within Groups	166.599	218	.764		
	Total	170.072	220			
Leadership Activities (Achievement)	Between Groups	1.493	2	.746	.915	.402
	Within Groups	177.729	218	.815		
	Total	179.222	220			
Increased Job Responsibility (Achievement)	Between Groups	2.802	2	1.401	1.664	.192
	Within Groups	183.488	218	.842		
	Total	186.290	220			
Increased Job Autonomy (Achievement)	Between Groups	3.220	2	1.610	1.648	.195
	Within Groups	212.943	218	.977		
	Total	216.163	220			
Inner Sense of Doing Well (Achievement)	Between Groups	2.436	2	1.218	2.047	.132
	Within Groups	129.727	218	.595		
	Total	132.163	220			
Recognition by Students (Achievement)	Between Groups	2.716	2	1.358	1.880	.155
	Within Groups	157.474	218	.722		
	Total	160.190	220			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Recognition by Peers (Achievement)	Between Groups	1.544	2	.772	1.118	.329
	Within Groups	150.592	218	.691		
	Total	152.136	220			
Recognition by Supervisors (Achievement)	Between Groups	.302	2	.151	.188	.829
	Within Groups	174.947	218	.803		
	Total	175.249	220			
Recognition by Parents/Community (Achievement)	Between Groups	1.403	2	.702	.857	.426
	Within Groups	178.425	218	.818		
	Total	179.828	220			
Approval from Family/Close Friends (Achievement)	Between Groups	11.177	2	5.589	8.110	.000
	Within Groups	150.216	218	.689		
	Total	161.394	220			
Opportunity for Professional Growth (Achievement)	Between Groups	1.212	2	.606	.816	.443
	Within Groups	161.865	218	.742		
	Total	163.077	220			
Publication in Journals (Achievement)	Between Groups	.381	2	.191	.196	.822
	Within Groups	212.370	218	.974		
	Total	212.751	220			
Presentation at Professional Meetings (Achievement)	Between Groups	.354	2	.177	.154	.857
	Within Groups	250.279	218	1.148		
	Total	250.633	220			

APPENDIX L

ONE WAY ANALYSIS OF VARIANCE FOR THE RELATIVE IMPORTANCE ASSIGNED TO THE 50 JOB SATISFACTION, SKILLS AND ABILITIES, VALUES, AND ACHIEVEMENT STATEMENTS OF TENNESSEE SCIENCE AND MATHEMATICS TEACHERS, 2001

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Satisfaction with Current Job	Between Groups	3.727E-02	1	3.727E-02	.053	.818
	Within Groups	310.193	441	.703		
	Total	310.230	442			
Satisfied with Personal Growth	Between Groups	.654	1	.654	1.044	.307
	Within Groups	276.163	441	.626		
	Total	276.817	442			
Likely to Choose Career Again	Between Groups	8.155E-03	1	8.155E-03	.008	.930
	Within Groups	463.622	441	1.051		
	Total	463.630	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Writing Effectively	Between Groups	1.417E-02	1	1.417E-02	.037	.847
	Within Groups	168.722	441	.383		
	Total	168.736	442			
Speaking Effectively	Between Groups	.538	1	.538	1.579	.210
	Within Groups	150.113	441	.340		
	Total	150.650	442			
Developing New Approaches	Between Groups	.854	1	.854	2.153	.143
	Within Groups	174.947	441	.397		
	Total	175.801	442			
Analyzing and Evaluating Ideas	Between Groups	.414	1	.414	1.131	.288
	Within Groups	161.478	441	.366		
	Total	161.892	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Using Library Facilities	Between Groups	5.875	1	5.875	8.550	.004
	Within Groups	303.014	441	.687		
	Total	308.889	442			
Supervising a Group	Between Groups	1.032	1	1.032	2.853	.092
	Within Groups	159.496	441	.362		
	Total	160.528	442			
Cooperating with a Team	Between Groups	.121	1	.121	.360	.549
	Within Groups	148.001	441	.336		
	Total	148.122	442			
Persuading Others	Between Groups	.798	1	.798	1.636	.202
	Within Groups	215.116	441	.488		
	Total	215.914	442			
Dealing with Parents/Community	Between Groups	1.618E-02	1	1.618E-02	.039	.844
	Within Groups	184.824	441	.419		
	Total	184.840	442			
Organizing Time	Between Groups	2.871E-04	1	2.871E-04	.001	.981
	Within Groups	217.648	441	.494		
	Total	217.648	442			
Planning Job-Related Activities	Between Groups	.799	1	.799	1.221	.270
	Within Groups	288.650	441	.655		
	Total	289.449	442			
Organizing Job-Related Activities	Between Groups	.264	1	.264	.380	.538
	Within Groups	306.648	441	.695		
	Total	306.912	442			
Working on Long-Term Projects	Between Groups	2.036E-02	1	2.036E-02	.030	.862
	Within Groups	295.421	440	.671		
	Total	295.441	441			
Interpreting Numerical Data	Between Groups	16.482	1	16.482	32.287	.000
	Within Groups	225.125	441	.510		
	Total	241.607	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Using Computers	Between Groups	.382	1	.382	.616	.433
	Within Groups	273.032	440	.621		
	Total	273.414	441			
Using Educational Technology	Between Groups	.279	1	.279	.463	.496
	Within Groups	265.301	441	.602		
	Total	265.580	442			
Using Research Facilities	Between Groups	1.427	1	1.427	1.809	.179
	Within Groups	348.035	441	.789		
	Total	349.463	442			
Leading a Group	Between Groups	4.301	1	4.301	7.833	.005
	Within Groups	242.164	441	.549		
	Total	246.465	442			
Resolving Conflicts	Between Groups	.376	1	.376	.651	.420
	Within Groups	254.450	441	.577		
	Total	254.826	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Value)	Between Groups	.293	1	.293	.435	.510
	Within Groups	296.701	441	.673		
	Total	296.993	442			
Chance to Contribute to Decisions (Value)	Between Groups	.148	1	.148	.242	.623
	Within Groups	270.651	441	.614		
	Total	270.799	442			
Leadership Activities (Value)	Between Groups	1.816	1	1.816	2.631	.106
	Within Groups	304.396	441	.690		
	Total	306.212	442			
Increased Job Responsibility (Value)	Between Groups	.947	1	.947	1.307	.254
	Within Groups	319.676	441	.725		
	Total	320.623	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Increased Job Autonomy (Value)	Between Groups	2.056	1	2.056	2.719	.100
	Within Groups	333.497	441	.756		
	Total	335.553	442			
Inner Sense of Doing Well (Value)	Between Groups	.255	1	.255	.715	.398
	Within Groups	157.289	441	.357		
	Total	157.544	442			
Recognition by Students (Value)	Between Groups	7.810E-03	1	7.810E-03	.011	.916
	Within Groups	307.315	441	.697		
	Total	307.323	442			
Recognition by Peers (Value)	Between Groups	.137	1	.137	.193	.661
	Within Groups	313.060	441	.710		
	Total	313.196	442			
Recognition by Supervisors (Value)	Between Groups	.388	1	.388	.575	.449
	Within Groups	297.626	441	.675		
	Total	298.014	442			
Recognition by Parents/Community (Value)	Between Groups	.636	1	.636	.941	.332
	Within Groups	297.992	441	.676		
	Total	298.628	442			
Approval from Family/Close Friends (Value)	Between Groups	.383	1	.383	.508	.477
	Within Groups	332.434	441	.754		
	Total	332.817	442			
Opportunity for Professional Growth (Value)	Between Groups	2.033	1	2.033	3.323	.069
	Within Groups	269.885	441	.612		
	Total	271.919	442			
Publication in Journals (Value)	Between Groups	.166	1	.166	.374	.541
	Within Groups	195.897	441	.444		
	Total	196.063	442			
Presentation at Professional Meetings (Value)	Between Groups	.121	1	.121	.177	.674
	Within Groups	300.511	441	.681		
	Total	300.632	442			

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Salary (Achievement)	Between Groups	.301	1	.301	.410	.522
	Within Groups	323.591	441	.734		
	Total	323.892	442			
Chance to Contribute to Decisions (Achievement)	Between Groups	9.147E-02	1	9.147E-02	.123	.725
	Within Groups	326.667	441	.741		
	Total	326.758	442			
Leadership Activities (Achievement)	Between Groups	1.040	1	1.040	1.329	.250
	Within Groups	345.096	441	.783		
	Total	346.135	442			
Increased Job Responsibility (Achievement)	Between Groups	.926	1	.926	1.205	.273
	Within Groups	338.758	441	.768		
	Total	339.684	442			
Increased Job Autonomy (Achievement)	Between Groups	6.255E-02	1	6.255E-02	.069	.793
	Within Groups	402.037	441	.912		
	Total	402.099	442			
Inner Sense of Doing Well (Achievement)	Between Groups	.524	1	.524	.894	.345
	Within Groups	258.631	441	.586		
	Total	259.156	442			
Recognition by Students (Achievement)	Between Groups	8.194E-03	1	8.194E-03	.012	.914
	Within Groups	306.010	441	.694		
	Total	306.018	442			
Recognition by Peers (Achievement)	Between Groups	1.735E-02	1	1.735E-02	.025	.874
	Within Groups	303.956	441	.689		
	Total	303.973	442			
Recognition by Supervisors (Achievement)	Between Groups	8.826E-02	1	8.826E-02	.115	.735
	Within Groups	339.596	441	.770		
	Total	339.684	442			
Recognition by Parents/Community (Achievement)	Between Groups	9.134E-02	1	9.134E-02	.112	.738
	Within Groups	360.121	441	.817		
	Total	360.212	442			

VITA

Delisa K. Dismukes was born in Birmingham, Alabama on July 3, 1958. She graduated from Mary G. Montgomery High School in Mobile, Alabama. She received a Bachelor of Science degree in Secondary Education - Mathematics, magna cum laude, from Troy State University in Troy, Alabama in 1981. She earned a Master of Science degree in Industrial/Organizational Psychology from the University of Tennessee at Chattanooga in 1993.

Dismukes taught mathematics and communications at Cleveland Middle School in Cleveland, Tennessee from 1983 to 2002. In 2002, she began teaching at North Whitfield Middle School in Dalton, Georgia.

In July 2003, Dismukes accepted an appointment at Jacksonville State University in Jacksonville, Alabama as an assistant professor of Secondary Education.