ASSESSMENT

OF

KANSAS STATE UNIVERSITY SCIENCE AND MATHEMATICS EDUCATION GRADUATES IN TERMS OF THEIR UNDERGRADUATE PREPARATION, CAREER CHOICE, AND THE IDENTIFICATION OF FACTORS CONTRIBUTING TO TEACHER SHORTAGE AND RETENTION

BY

ITA G. NASSAR

B.S., LIFE SCIENCE, K.S.U., 1977
B.S., SECONDARY SCIENCE EDUCATION, K.S.U., 1982

A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree

MASTER OF SCIENCE

Department of Curriculum and Instruction
KANSAS STATE UNIVERSITY
Manhattan, Kansas

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OF

KANSAS STATE UNIVERSITY SCIENCE AND MATHEMATICS EDUCATION GRADUATES IN TERMS OF THEIR TEACHER EDUCATION AND TEACHING CAREER TO IDENTIFY FACTORS CONTRIBUTING TO TEACHER SHORTAGE

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Abstract

A survey was conducted with mathematics and science education students that graduated from Kansas State University in the years 1975 through 1988. The purpose of the survey was to determine the reasons that may contribute to teachers remaining in the profession, dropping out, or never entering the profession. In addition, the survey was intended also to gather information on the teacher education program in the Department of Curriculum and Instruction at Kansas State University, in order to help in its evaluation and possible improvement.

Reasons given for leaving the teaching profession were mainly low salaries, too many extracurricular activities that left little time for adequate class preparation and family, discipline problems, lack of support from the administration and poor quality of colleagues in the system.

For those that never entered the teaching profession twenty eight percent of them never went into teaching because they were unable to find a job. Thirty three percent found higher paying jobs outside the profession. Eleven percent wanted to raise a family and twenty eight

percent changed their mind about teaching because of their student teaching experience.

The main factors cited that could enhance teacher retention in the profession were higher salaries, a significant reduction in extracurricular activities, more teacher input in school board decisions regarding the schedule and curriculum, and more teacher control in discipline situations.

Information was also gathered from those surveyed with regard to student teaching experiences, supervising secondary teachers (for student teaching), educational courses offered at Kansas State University, courses that should be emphasized and additional courses that should be offered. These and other suggestions are intended for the evaluation and possible improvement of the teacher education program at Kansas State University.

Chapter I. Introduction

A significant problem for many schools in the United States is the shortage of qualified mathematics and science teachers entering the profession, which in turn is having an adverse effect on the quality of education.

A contributing factor to the shortage is a high drop out rate from the teaching profession. There are diverse reasons given for drop out among which are low salary and dissatisfaction with the profession. This may be due to the lack of public and administrative support. Another reason may be due to inadequate preparation for teaching at the university level.

The specific factors contributing to the science and mathematics teacher shortage need to be determined if progress is to be made in the recruitment and retention of science and mathematics teachers for secondary schools.

Statement of the Problem.

There is a shortage of qualified mathematics and science teachers entering secondary education and a high drop out rate of the same teachers from the profession. The

purpose of this study was to survey the mathematics and science education graduates from Kansas State University, during the years 1975 through 1988, in order to determine the factors that may have contributed to their remaining, leaving or never entering the teaching profession. In addition, the survey provided information for the Department of Curriculum and Instruction at Kansas State University to consider in its efforts to improve the teacher education program.

Significance of the Study.

This study provided important information to educators involved with the preparation and retention of mathematics and science teachers in secondary education. It is hoped that results of this study will help administrators and educators determine the factors contributing to teacher shortage and drop out from the profession. In addition, information was gathered on the teacher education program in the Department of Curriculum and Instruction at Kansas State University in order to help in its evaluation and possible improvement.

Delimitations of the Study.

This study was confined to one sample of science and mathematics education graduates that graduated from Kansas State University during the years 1975 through 1988.

Limitations of the study.

Some bias in the results may have been introduced due to those that did not respond to the questionnaire. In addition, the professional experiences and careers of teachers in this sample may not be representative of the situation at the national level.

Chapter II. Literature review

A problem of concern in secondary education is the shortage and low retention of mathematics and science teachers. In order to determine the studies that were done in this area a computer data base E.R.I.C search was done at Kansas State University Farrell Library. The search was conducted over the years 1955 to 1989.

Science and Mathematics Teacher Shortage.

Various studies early in the decade indicate that there is a significant shortage of science and mathematics teachers in the United States. To recruit and retain qualified mathematics and science teachers is a serious problem for many school districts (Olstad and Beal, 1984; Guthrie and Zusman, 1982; Howe and Gerlovich, 1981; National Science Foundation, 1980; National Education Association, 1978; Walsh and Walsh, 1980; walsh, 1980).

It is apparent that few studies, especially in recent years, have dealt with this important issue of shortage of qualified mathematics and science teachers in secondary education. According to the National Education Association

(1978), 22 percent of all secondary mathematics positions across the United States are not being filled by certified mathematics teachers or are not being filled at all. Graybeal (1984) indicated that the shortage of science and mathematics teachers in the United States exceeds that of other industrialized nations. The NEA (1978) reported that only 41 percent of teachers in science and mathematics who participated in a study in the Boston area planned on staying in the profession. Nationwide more than 17,000 science and mathematics teachers in the United States leave secondary schools each year.

According to Dashiell (1983) teachers who leave the profession do so within the first four years of teaching. Furthermore, the drop out from the teaching profession is 40-65 percent. For instance, Walsh (1980) reported that the National Science Teacher Association lost 10 percent of its members in 1980 alone. The National Science Foundation study in the State of Washington by Olstad and Beal (1981) showed that the number of teacher graduates declined by 30 percent in science and 60 percent in mathematics within a five year period. On the other hand, the demand for science and mathematics teachers increased by 35 percent and 76 percent respectively. Studies in other parts of the country

(Howe and Gelovich 1981; Watkins 1981; Guthrie and Zusman 1982) supported these findings.

The shortage in science and mathematics teachers, besides the adverse effects in education, does also affect the supply of qualified people in high tech industry. A study in California by Guthrie and Zusman (1982) indicated that 40 percent of all new jobs depend on high technology. Ninety million Americans will be working in jobs related to high technology by 1990. These high tech jobs demand skills in mathematics and science.

There are diverse reasons given for the observed shortage of science and mathematics teachers. Industry is drawing qualified mathematics and science teachers away from schools all over the Nation (NEA 1981).

Teachers may be discouraged from staying in or entering the teaching profession as a result of public criticism of teachers and teacher education.

Vance and Schlechty (1982) in a national study concluded that teachers have a relatively low socioeconomic status which might influence their decision to pursue a career in teaching. Science and mathematics graduates tend to prefer higher paying and more respected careers than teaching (Dashiell 1983).

Methods of Survey Research.

Fowler (1980) and Dillman (1978) in discussing survey research methodology pointed out the steps involved in the implementation of a mail survey. These include planning ahead, constructing the questionnaire, pretesting the questionnaire, cover letter and follow-up mailing.

In planning ahead one should consider what data to collect, what population to survey and how to draw the sample, follow-up on nonrespondents, time plan and cost of the study and what to do with the data.

In constructing a questionnaire it is important to determine the type of information that is needed so as to facilitate the writing of the specific questions. The second major decision is to determine question structure. Four types of structure can be identified: (1) open-ended questions in which respondents create their own answers, (2) close-ended with ordered response choices, (3) close-ended questions with unordered response choices, and (4) partially close-ended questions which in addition to providing answer choices respondents have the option of creating their own responses.

Pretesting to identify construction defects is an important part of questionnaire design. Pretesting can be done on colleagues to evaluate the questionnaire in terms

or whether it will accomplish the study objectives. Another group for pretesting the questionnaire is selected from the population to be surveyed. This will provide information on what is wrong with the questionnaire and if all questions were clearly understood by the respondents and will be a starting point for revision.

The cover letter to accompany the questionnaire should communicate the problem to the people being interviewed and the need for their help. The individual importance of the respondent to the study's success and confidentiality should also be stressed. It is important also to identify the questionnaire with the name on the mailing list so that follow-up mailing need be sent only to those that do not respond. A pre-addressed, postage-paid return envelope must be included in the mail-out package. Failure to do so may cause an adverse effect on the response rate.

Follow-up on nonrespondents can increase the response rate. Time and cost should be considered in planning follow-up mailings. Usually a post card follow-up is sent to all nonrespondents reminding them of the first mailing and emphasizing that if the study is to be successful it is important that their answers be also included in the results.

In summary studies in the literature indicate a serious shortage and low retention rate of mathematics and science teachers. This may be due to low socio-economic status of the teaching profession, inadequate teacher preparation and competition from industry. Methods for constructing a questionnaire and for conducting a mail survey were presented. The implementation of these methods will be dealt with in the next chapter.

Chapter III. Methodology

A problem of major concern in secondary schools is the shortage and low retention rate of mathematics and science teachers. Based on the key concepts and concerns that were raised in the literature with regard to this problem, a questionnaire (Appendix A) was formulated for mathematics and science teacher graduates of Kansas State University in each of three groups: 1. currently teaching (CT) 2. have previously taught (PT) and 3. have never taught (NT). These questionnaires were constructed to gather information related to demographic characteristics of participants, academic preparation, professional satisfaction and concerns so as to determine the factors that may have bearing on shortage and low retention.

The questionnaires were first reviewed (by Dr. Emmett Wright, Head, Department of Curriculum and Instruction) and revised. The revised questionnaires were sent to all Manhattan Junior and Senior High School science and mathematics teachers as a pilot study. Based on their response the questions that were misinterpreted were reformulated.

As a third step in the preparation of the questionnaires, they were reviewed by six science and mathematics faculty (panel of experts) of the Department of Curriculum and Instruction, Kansas State University. Based on their review and specific comments the questionnaires were revised for a last time.

The completed questionnaires were mailed to the 320 College of Education science and mathematics graduates from the years 1975 through 1988. The list of names and addresses was obtained from the alumni office at Kansas State University. A follow-up card was mailed, after two weeks from the first mailing, to all those who did not respond.

Out of 320 mailings, a total of 128 were returned, which is a 40% response rate. Of the 128 respondents 10 responded after the second mailing (3.1%). Among the respondents, there were 75 that are currently teaching (CT), 35 that previously taught (PT) and 18 that have never taught (NT)

Data from the returned questionnaires were entered, verified and processed on the main frame computer in Cardwell Hall. Data analysis was done using the SAS software package.

The analysis included frequency and percent distributions for most of the variables by the three groups (CT, PT, NT,). Contingency chi-square analyses was performed, where appropriate, to determine if differences existed among the three groups with regard to certain variables or questions.

In addition to the statistical analysis, questions dealing with opinions and comments were summarized in the text and in Appendix A.

Chapter IV. Results and Discussion

Various studies have indicated a serious shortage and low retention rate of mathematics and science teachers in the United States. In this study a survey of mathematics and science graduates of Kansas State University was undertaken to determine the factors that may be contributing to the shortage and low retention and to assess the teacher preparation program at Kansas State University. Results of the study are presented and discussed in this chapter.

Contingency chi-square analyses revealed that there were significant differences at the .05 level among the three groups (CT, PT and NT) only with regard to age (table 2), number of years taught (table 11) and years in present position (table 11). Only the chi-square values for those analyses that showed significance are presented (tables 2 and 11). Results in table (2) show that 30.6% of CT, 0% of PT and 50% of NT were age 20-25. As expected the PT group was older than the CT or NT group. Those that never taught were the youngest among the three groups. Table (11) indicates that 64% of CT and 85.7% of PT have taught from one to five years. Twenty four percent of CT and 14.3% of

PT taught from 6 to 10 years. Twelve percent of CT and 0% of PT taught between 11 and 14 years. Eighty percent of CT and 54.2% of PT had between one and five years in their present position. On the other hand, 20% of CT and 45.7% of PT had between 6 to 10 years in present position.

Results in table 1 show that of those currently teaching (CT) 22.6% graduated between 1974 and 1978, 16% between 1979 and 1983, and 61.3% between 1984 and 1985. For those that previously taught (PT), the figures were 48.6%, 40% and 11.4%, respectively. Among the respondents that never taught (NT), four did not respond to this question. Of those that responded, 7.1% graduated between 1974 and 1978, 7.1% between 1979 and 1983 and 85.7% between 1984 and 1988. Thus, it is seen that the majority of CT and NT are recent graduates (within the last 5 years). As expected, the majority of those that previously taught graduated more than 10 years ago.

Table 2 shows that 72% of CT, 77.2% of PT and 72% of NT are married. Also, 61.7% of CT, 54.3% of PT and 44.4% of NT are males. It appears that the proportion of males is highest among those currently teaching and lowest among those that never taught. In accord with the time of graduation, the age distribution indicates younger age groups for CT and NT than for PT.

Table 1. Distribution by year graduated for those that are currently teaching (CT), have previously taught (PT) and never taught (NT). P = percent, F = frequency.

	CT		PT		NT	
Year graduated	P	F	P	F	P	F
74-78	22.6	17	48.6	17	7.1	1
79-83	16.0	12	40.0	14	7.1	1
84-88	61.3	46	11.4	4	85.7	12
Total		75		35		14

Table 2. Age distribution, gender and marital status for the currently teaching (CT), previously taugnt (PT) and never taught (NT) groups. P = percent, F = frequency.

	CT		PT		NT	
Age group	P	F	P	F	P	F
20-25	30.6	23	0.0	0	50.0	9
26-30	29.3	22	28.6	10	11.0	2
31-35	28.0	21	48.6	17	22.2	4
36-40	8.0	6	14.3	5	11.0	2
41+	4.0	3	8.6	3	5.6	1
Total		75		35		18
Married	72.0	53	77.2	27	72.0	13
Male	61.7	42	54.3	19	44.4	8

Contingency chi-square for age by group = 21.75 with 8 degrees of freedom. This is significant at the 5% level.

The distributions of respondents by state and county are presented graphically in figures 1 and 2. From these results it is seen that the majority of graduates (64.3%) stayed in Kansas. Colorado and Texas have the next highest numbers with 6 graduates each.

Table 3 presents the areas of certification for each of CT, PT and NT. A contingency chi-square analysis showed no significant differences among the three groups with regard to certification. Hence, considering all three groups, it is seen that 59% were certified in biology, 66% in chemistry, 48.6% in general science, 17.1% in physical science, 62% in mathematics ,37.1% in physics, 10.5% in computer science and 3.8% in language. People were certified in more than one field as evident by the fact that the sum of all percentages exceeds 100% .

Bachelors of science degrees in teaching fields were mostly in biology and mathematics (College of Arts and Science). Of those currently teaching, 6.7% have a B.S. degree in mathematics (College of Arts and Science). On the other hand, 20% of PT and 0.0% of NT have a degree in mathematics (table 4). Of the 128 respondents, a total of 39 (30.5%) have a masters degree and 8 (6.3%) have a Ph.D. or Ed.D degree.

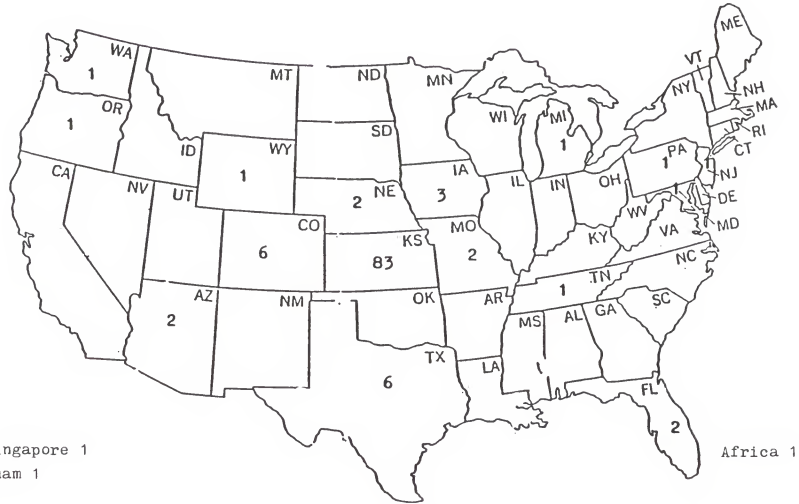

Figure 1: Distribution of mathematics and science teacher education graduates from 1975 through 1988. (Kansas State University).

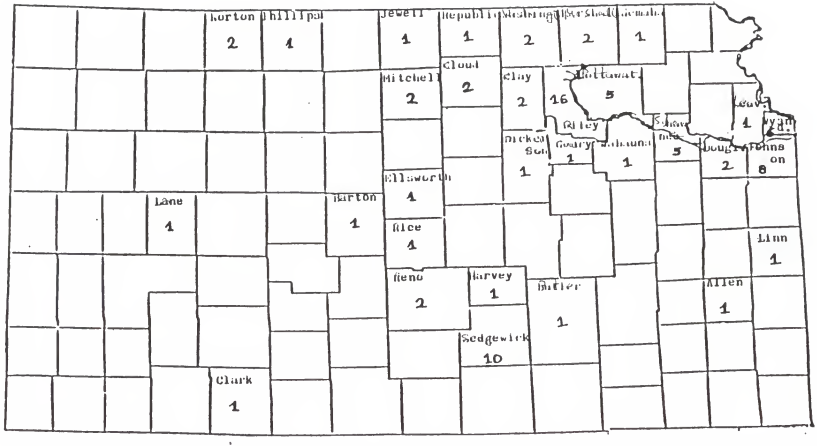

Figure 2: Distribution of mathematics and science teacher education graduates from 1975 through 1988 by county in Kansas. (Kansas State University).

Table 3. Area of certification distribution for the currently teaching (CT), previously taught (PT) and never taught (NT) groups. P = percent, F = frequency.

	CT		PT		NT		Total for CT, PT, NT
Area of Certification	P	F	P	F	P	F	P
Biology	41.3	31	54.3	19	66.7	12	59.0
Chemistry	50.6	38	57.1	20	61.0	11	66.0
General Sci.	38.6	29	42.8	15	38.9	7	48.6
Physical Sci.	13.3	10	8.6	3	27.7	5	17.1
Mathematics	58.6	44	45.7	16	27.7	5	62.0
Language	2.6	2	2.8	1	5.5	1	3.8
Physics	36.0	27	20.0	7	27.7	5	37.1
Computer	13.3	10	2.8	1	0.0	0	10.5
Others	8.0	6	2.8	1	0.0	0	6.6
Total Respondents		75		18		12	105
No response		0		17		6	

Table 4. Distribution of degrees earned in academic field (in the College of Arts and Science) for those currently teaching (CT), previously taught (PT) and never taught (NT). P = percent, F = frequency.

	CT		PT		NT	
Bachelors	P	F	P	F	P	F
Biology	16.0	12	11.4	4	33.3	6
Chemistry	4.0	3	2.9	1	0.0	0
Mathematics	6.7	5	20.0	7	0.0	0
Physics	1.3	1	5.7	2	0.0	0
Others	2.6	2	5.7	2	0.0	0
No degree in Arts and Sci.	69.3	52	54.3	19	66.6	12
Number responded		75		35		18

On a yes or no answer to the question of whether the teacher education program at Kansas State University prepared them well enough for student teaching, 61% of those that never taught thought that Kansas State University prepared them well for teaching. However, 39% (7 out of 18) did not think they were well prepared to teach. Reasons given in this regard were: (1) lack of practical experience such as how to deal with students emotional problems and discipline in the classroom,(2) not enough hands on experience with teaching and (3) not enough illustrations of good secondary school teaching.

On a scale from 1 (poor) to 4 (excellent) about 70% of all respondents gave a rating of 3 or 4 to their student teaching experience. Also, between 78 and 80% gave a rating of 3 or 4 to their supervising high school teacher (Table 5). Reasons given for negative experiences in student teaching were the lack of preparation for classroom management, lack of practical experience and excessive commuting time. Those that considered their student teaching as a positive experience had good guidance and supervision from excellent cooperating teachers. Positive comments about the supervising secondary teachers were good communication, guidance, leadership and good classroom

Table 5. Rating of student teaching experience and supervising secondary teacher by those that are currently teaching (CT), previously taught (PT) or never taught (NT). P = percent, F = frequency.

Teaching experience rating	CT		PT		NT	
	P	F	P	F	P	F
1 (poor)	9.3	7	14.3	5	11.1	2
2	12.0	9	14.3	5	11.1	2
3	44.0	33	20.0	7	38.9	7
4 (excellent)	34.0	26	51.4	18	38.9	7
Secondary supervisor rating						
1 (poor)	10.0	8	11.4	4	5.6	1
2	9.0	7	5.7	2	16.7	3
3	29.0	22	25.7	9	16.7	3
4 (excellent)	49.0	37	57.1	20	61.0	11
Total respondents		75		35		18

management. Negative comments were indifference, poor cooperation and lack of guidance. The majority of respondents felt the need for more cooperation on the part of the secondary teacher and for better communication and guidance. For example, the student teacher needs to spend time with the cooperating teacher to coordinate and obtain information as to the level and type of courses taught before the start of student teaching. It was suggested that secondary teaching experience should start early in college before the senior year so as to gain more exposure to teaching and to be able to make a career change in case teaching is found to be unappealing. Also, a better preparation at the university level through taking more courses in science and mathematics content and more experiences in how to teach were deemed essential by the respondents.

Table 6 indicated that 44% of current teachers, 43% of those that previously taught and 29% of those that never taught first decided on a teaching career in high school. On the other hand, 48% of CT, 57.1% of PT and 65% of NT first decided to become teachers at the university level. This indicates that the majority of those going into teaching tend to make their decision at the university level.

Table 6. Frequency table of time decision first made to become a teacher for those that are currently teaching (CT), have previously taught (PT) or never taught (NT). P = percent, F = Frequency.

Time decision made	CT		PT		NT	
	P	F	P	F	P	F
High school	44.0	33	42.9	15	29.4	5
University	48.0	36	57.1	20	64.7	11
Post university	8.0	6	0.0	0	5.9	1
Total respondents		75		35		17

On the question of higher salaries for science and mathematics teachers, 72% of CT and 60% of PT were concerned that a higher salary might create hostility and discontent among other teachers. A suggested alternative was that science teachers should have more preparation time since science is the most difficult subject to teach. Justifications given for a higher salary were the time involvement with laboratory preparation and the more difficult courses that mathematics and science teachers have to teach. In addition, higher salary was cited as the only way to keep the best teachers in the profession. Mathematics and science teachers are in a highly competitive field and should be justly compensated. Also, a higher salary is particularly justifiable if the teacher has a degree (other than in the college of education) in teaching field.

The most helpful education courses cited by the respondents were methods, laboratory techniques and microteaching. The least helpful course cited was educational psychology (table 7). As to which courses should be emphasized in the curriculum, respondents cited methods, video lessons of master teachers, microteaching, and a course on how schools are administered, laboratory techniques and adolescent psychology (table 8). In

Table 7. Education courses that are most or least helpful (MH, LH) as judged by the three groups, currently teaching (CT), previously taught (PT) and never taught (NT).

	CT		PT		NT	
Courses	MH	LH	MH	LH	MH	LH
	Percent		Percent		Percent	
Sci/Math Curric.	4.0	1.3	11.4	1.3	22.2	0.0
Educ. Psych.	17.3	22.6	25.7	20.0	16.6	33.3
Instr. Media	4.0	9.3	8.6	11.4	11.1	0.0
Psych. of the Except. Child	4.0	5.3	8.6	17.1	16.6	5.5
Methods	30.6	10.6	8.6	2.9	55.5	0.0
Lab. Techniques	29.3	2.6	11.4	2.8	22.2	5.5
Princ. of Educ.	2.6	9.3	0.0	2.8	0.0	27.7
Micro Teaching	17.3	2.6	17.1	0.0	22.2	0.0
Teaching Block	10.6	2.6	8.6	5.7	0.0	0.0
All of them	1.3	2.6	0.0	5.7	0.0	0.0
None	4.0	6.6	20.0	0.0	0.0	0.0
Total respondents		75		35		18

Table 8. Courses which should be emphasized as indicated by each of the three groups, currently teaching (CT), previously taught (PT), and never taught (NT). P = percent, F = frequency.

	CT		PT		NT	
Course	P	F	P	F	P	F
Sci/Math Cur.	2.6	2	2.8	1	0.0	0
Ed. Psych.	4.0	3	0.0	0	0.0	0
Computer	5.3	4	2.8	1	5.5	1
Methods	21.3	16	8.6	3	5.5	1
Lab. Techniques	10.6	8	2.8	1	11.1	2
Adolescent Psych.	10.6	8	0.0	0	27.7	5
A course on how Schools are Administered	16.0	12	2.8	1	5.5	1
Course that Examines the Characteristics Of master teachers	20.0	15	2.8	1	0.0	0
Undecided	9.3	7	77.1	27	44.4	8
Total respondents		75		35		18

addition, it was suggested that courses should emphasize classroom management, discipline and motivating students; lesson preparation skills and self evaluating skills. Also, courses that bring in practicing teachers should be offered. It was mentioned that an honors course in adolescent psychology given at Kansas State was found to be very helpful.

Among those that previously taught or never taught, 28.6% and 55.6% respectively indicated that their future plans include teaching. 60% of those that previously taught were employed as mathematics teachers before leaving the profession. The majority of the PT respondents were employed in white collar jobs or as professionals (lawyer, dentist, M.D, D.V.M and farmer). Of the never taught respondents the majority were also employed in white collar jobs or as professionals (Table 9).

Table 10 shows that all the CT respondents were involved in non-teaching school related duties. Fourty four percent were involved in coaching, 26.3% in club counseling and 11.8% in cheerleading. On the yes and no answer to the question of whether one is required to teach courses in subjects other than those for which one is certified, 13.2% of those currently teaching teach courses in which they are not certified. The same was true among 37.1% of

Table 9. Employment since graduation for those that previously taught (PT), and those that never taught (NT). Note that the percentages do not sum to 100% since some were employed in more than one area since graduation. P = percent, F = frequency.

Type of Employment since graduation	PT		NT	
	P	F	P	F
Math teacher	60.0	21	0.0	0
White collar	25.7	9	27.7	5
Administration	5.7	2	0.0	0
University	5.3	4	0.0	0
Professionals (lawyer, dentist M.D, D.V.M, farmer)	17.3	17	31.4	11
Others	0.0	0	20.0	7
Total respondents		35		18

Table 10. Non-teaching school related duties for those currently teaching (CT).

Non-teaching Duties	Percent	Frequency
Cheerleading	12.0	9
Club, Counseling	26.6	20
Professional develop.	6.7	5
Faculty senate	1.3	1
Hospitality committee	9.3	7
Coaching	44.0	33
Total respondents		75

those that previously taught.

As is shown in table 11, the majority (64%) of those that are currently teaching are in the first 5 years of their teaching career. The majority (80%) have been also in their present position from 1 to 5 years. For the PT respondents, 85.7% were in their teaching profession between 1 and 5 years and 54.5% have been in their present non teaching position from 1 to 5 years.

It is interesting to note (Table 12) that 20% of CT and 48.6% of PT respondents indicated a teacher shortage in mathematics. Twenty four percent of CT and 42.9% of PT indicated a teacher shortage in science in their schools.

Among the various fields of science the shortage (as perceived by CT) ranged from 1.3% in computer science to 9.3% in physics. On the other hand, the range (as perceived by PT) was from 2.8% in computer science and physical science to 25.7% in physics.

Regarding the question of satisfaction with their present position, 80% were satisfied. Those not satisfied (20%) complained about the low intellectual level of students, little support with discipline problems, too little autonomy, lack of incentives to stay in teaching and poor administration. In addition, they felt taken advantage of with the excessive workload . As far as respect is

Table 11. Number of years taught and years in present position for those currently teaching (CT) and those that previously taught (PT). P = percent, F = frequency.

Number of years taught	CT P	CT F	PT P	PT F
1-5	64.0	48	85.7	30
6-10	24.0	18	14.3	5
11-14	12.0	9	0.0	0
Total respondents		75		18
Years in Present Position				
1-5	80.0	60	54.2	19
6-10	20.0	15	45.7	16
Total respondents		75		35

The contigency chi-square for number of years taught by group = 7.42 with 2 degrees of freedom. This value is significant at the 5% level.

The chi-square for years in present position by group = 7.74 with 1 degree of freedom. This chi-square value is significant at the 5% level.

Table 12. Teacher shortage as perceived by those currently teaching (CT) and those that have previously taught (PT). P = percent, F = frequency. Percentages are based on 75 CT and 35 PT respondents.

	CT		PT	
Field	P	F	P	F
Mathematics	20.0	15	48.6	17
Science	24.0	18	42.8	15
Do not know	56.0	42	8.6	3
Total respondents		75		35
Breakdown of science teacher shortage				
1. Biology	4.0	3	11.4	4
2. Chemistry	5.3	4	14.2	5
3. General Sci.	2.6	2	8.6	3
4. Physical Sci.	6.6	5	2.8	1
5. Physics	9.3	7	25.7	9
6. Computer	1.3	1	2.8	1
7. All Sciences	5.3	4	5.7	2

concerned, 70.6% indicated that teachers are respected in their communities. Those that do not think teachers are respected feel that, in general, the knowledge of a teacher is respected, but not the occupation as such. Teachers are often respected for their coaching rather than their teaching. Teachers are perhaps better respected in lower socio-economic areas where parents often want their children to be better educated than they are.

Results in table 13 show that among those currently teaching 21.3% wish to retire from teaching within the next 5 years, 9.3% within the next 10 to 20 years, 5.3% within the next 25 to 32 years, 38% at age 65 and 24% are undecided. This indicates that more than 20% will leave the teaching profession within 5 years. This is a minimum estimate since there is a possibility that some of the 24% undecided will also leave.

Results in the following three paragraphs are not tabulated since they were drawn from open ended questions. Of those currently teaching 89.3% are employed in their major teaching field; and 58.6% did not find lesson preparation time alloted by their schools to be sufficient. Also, 69.3% indicated that additional mathematics and science courses would be valuable. Of the CT respondents 36.3% believe that additional mathematics and science courses should be taken during the college years, while

Table 13. Number of years (starting December 1988) till retirement from teaching.

Years	Percent	Frequency
1-5	21.3	16
10-20	9.3	7
25-32	4.0	3
at age 65	38.6	29
Undecided	24.0	18
No response	2.7	2
Total respondents		73

63.7% prefer more science and mathematics courses after graduation or after having been in the profession for a time.

Thirty percent of the teachers (CT) surveyed feel isolated in their profession. The reasons given were that teachers had very little contact with other teachers in the field, either because they had no time to communicate with peers, or they were the only teachers in their field in their school. Also, they had no contact with the real science world and felt out of touch with the rest of the adult working population.

Regarding the question of opportunities to keep up in their profession, 69.3% felt that they are given such opportunities by their schools. The incentives given by different schools included meetings teachers can attend, pay for all workshops, time out to attend classes, partial pay for education, free education for advanced degrees and pay for one year off to pursue education in return for two years of teaching at the same school.

Results in table 14 indicate that 39.7% of teachers (CT) attended 1 to 3 workshops during the last year and 4.4% attended 4 to 7 workshops. During two years prior to last year, 35.3% of teachers (CT) attended 1 to 3 workshops and 14.7% attended between 4 and 13 workshops.

Table 14. Science related workshops attended by those currently teaching.

Number of workshops	Percent	Frequency
Last year		
1-3	39.7	27
4-7	4.4	3
Two years prior to last year		
1-3	35.3	24
4-7	10.3	7
10-13	4.4	3
Prior to last 3 years		
1-3	19.1	13
4-7	5.8	4
10-18	4.4	3
No reponse		7
Total respondents		68

Prior to the last three years, 19% of teachers (CT) attended 1 to 3 workshops and 10.2% attended 4 to 18 workshops. 61.7% of these workshops were school sponsored.

From table 15 it is seen that 20% of the teachers (CT) are members of the professional society NCTM, 20% of KATM and KATS, 16% of NSTA, 14.6% of NEA and KNEA . The percentage of members actively involved in their professional organizations is less than 7%. Results in table 16 show that 41.2% of teachers subscribe to the Mathematics Teacher, Science Teacher, and NEA and KNEA professional journals. These same journals are also read by 34.6% of the teachers.

What follows is a summary of the consensus of the different answers given to the open-ended questions which was not feasable to present in tabular form. According to the respondents, the teacher education program at Kansas State University can be improved by placing undergraduates into the secondary classroom as early as the freshman year. This would give the students actual teaching experience in all grade levels and in all science and mathematics subjects. As such, the education classes at the university would be more meaningful. There is also a need for more hands on experience outside the classroom as, for example, through Big Brothers and Big Sisters, teacher aiding or coaching. At the university level there is a need for more

Table 15. Membership and involvement in Professional organizations for those currently teaching. P = percent, F = frequency

	Member				Actively involved			
Teacher:	Math.		Science		Math.		Science	
Organization	P	F	P	F	P	F	P	F
NCTM	33.3	11	9.5	4	0.0	0	4.7	2
KATM, KATS	24.2	8	16.7	7	9.1	3	2.4	1
NSTA	9.1	3	21.4	9	3.0	1	9.5	4
NEA, KNEA	33.3	11	0.0	0	3.0	1	7.1	3
Phi-Delta-K	3.0	1	7.1	3	3.0	1	4.7	2
Biol.Teacher	0.0	0	9.5	4	0.0	0	0.0	0
Coach	3.0	1	7.1	3	0.0	0	2.4	1
NATM, KAMLE	6.1	2	0.0	0	0.0	0	0.0	0
Others	30.3	10	19.0	8	0.0	0	9.5	4

1. WFT, AFT
2. PEA
3. KCA
4. NCA
5. AAPT
6. NSAA
7. KAECT
8. ASCD
9. Chem. teachers
10. Voc. Agr.
11. LEA
12. Honors

Total respondents Math: 33 Science: 42

Table 16. Membership in professional journals for those currently teaching. P = percent, F = frequency.

	Received				Read on Regular Basis			
Teacher:	Math.		Science		Math.		Science	
Journal	P	F	P	F	P	F	P	F
Math. Teacher	33.3	11	7.1	3	33.3	11	2.4	1
Science Teacher	9.1	3	14.3	6	9.1	3	14.2	6
Phi-Delta-K.	3.0	1	7.1	3	3.0	1	4.8	2
Computer	3.0	1	4.8	2	3.0	1	0.0	0
American Biology Teacher	3.0	1	4.8	2	3.0	1	4.8	2
Coaching	6.1	2	2.4	1	3.0	1	0.0	0
Chem. Teacher	3.0	1	2.4	1	3.0	1	0.0	0
The Physics Teacher	3.0	1	2.4	1	3.0	1	0.0	0
Scientific American	0.0	0	2.4	1	0.0	0	2.4	1
Discover	0.0	0	2.4	1	0.0	0	2.4	1
Science digest	0.0	0	2.4	1	0.0	0	2.4	1
Total respondents		Math:		33		Science:		42

courses in subject matter content.

Teachers should major in their chosen field (other than education) so that they will be prepared to teach higher level courses such as , for instance, anatomy, physiology and cell biology. Besides, there is a need for more science and mathematics at the university level. More courses should be given at the level pertaining to the masters program in education. The overlap in information and projects in education classes should be eliminated. There should also be an ample opportunity to observe the teaching of actual master teachers perhaps through video.

Instruction in the College of Education according to some is too idealistic. What is needed is practical, realistic situational teaching and teaching techniques with methods to motivate and discipline. Students should be made more aware of outside resources that will bring variety to their classes. More information should be given on the general operation of schools with programs specific to rural, suburban and inner city schools.

Regarding the length of time that would be preferred as a student teacher, 64% of the respondents (CT and PT) expressed the need for a whole semester of student teaching with more than one cooperating teacher and in more than one school at different grade levels. Several

respondents thought that one year would be better, or perhaps even two years with the second year spent as a substitute teacher.

To the question why they left teaching, 46% gave financial reason for leaving the teaching profession. The second reason was too many extra-curricular activities which left little time to prepare for classes or to spend with their families. They were tired of discipline problems and student apathy and of not receiving any appreciation or support from the administration. They were also discouraged with the poor quality of teachers in the system. To many it was simply too much stress, pressure and responsibility for too small a compensation, financial as well as well as emotional.

Of the NT group 27.7% never went into teaching because, so far, they were unable to find a job. 33.3% found higher paying jobs, with no take home work and no extra curricular activities. 11% wanted to raise a family. The rest (28%) had changed their mind about teaching during their time as student teachers. They decided not to battle student disrespect, low standards, lack of support and long hours for little pay.

On the question of why did you want to become a teacher, 11% said that teaching is a family tradition,

their fathers and/or mothers are in the profession, and it was not a hard choice to make. Wanting to combine their interest in people with their interest in science and/or mathematics lead others to become teachers. In addition, others went into teaching because they looked up to and respected their high school teachers, while others thought they could do a better job than their high school teachers explaining mathematics and science. Many went into teaching because they like to coach. Summers off are attractive to some of the teachers, especially mothers with children.

The best thing about teaching is, for many, the interpersonal communication with students. The humor of and the positive feedback from students, and seeing them excited about subject matter makes teaching a never boring challenge. "The freedom to direct one's own class, especially in upper level subjects with upper level students, that's what teaching is all about". For some, the best thing about teaching is coaching and summers off. The least thing liked about teaching is dealing with discipline problems and unmotivated, apathetic and failing students. Besides, there is too much time spent in school on extracurricular activities and all those other little duties and responsibilities. Then there are the constant daily schedule interruptions, the stress caused by lack of

real input by teachers into decision-making, and the poor attitude of students, parents and some teachers with little administrative support. All these factors make it seem that learning is one of the least important goals of public schools.

When asked about the incentive needed to attract new teachers to the profession, 66% of CT and 65.7% of PT said that a higher salary with benefits comparable to industry will attract the best teachers to the profession. Next to salary there must be a supportive administration that let teachers teach and hires para-professional help for the paper work and other non teaching duties. Teachers should not be burdened with other than teaching duties unless justly compensated. Also, the teachers must be given more freedom on how to run his/her own classroom, and be released from the discipline cat and mouse game. There must be smaller and fewer classes taught per day to give teachers more time for in school lesson preparation and less take home work. There is a need for well controlled schools as well as students and desirable classroom situations, because prospective teachers need a positive experience in high school. Furthermore, there should be better recruitment by colleges, better preparation and higher standards in the university and also placement of

teachers by the university. New teachers should have a mentor or partner teacher and continued guidance from the university for at least one year.

To keep teachers in the profession, 56% of CT and 51.4% of PT think that more money will keep most teachers teaching. Also, administrators are very important in keeping teachers in the profession. Extracurricular duties should be eliminated or greatly reduced because preparing for lectures, labs, exams ,and grading papers for 100 to 125 students makes a 12 to 15 hour day. Teachers should be treated as professionals. They should be given the opportunity to have input in school board decisions regarding the schedule and curriculum. Furthermore, teachers should have more control in discipline situations. There must be a better cooperation and communication between school board, administration and fellow teachers. For the purpose of recertification, teachers should have time off, perhaps in the form of a sabbatical especially for teachers in rural areas, and free tuition for continuing education. Last, but not least, tenure should be eliminated to encourage professionalism.

In summary the major reasons given for leaving the profession are low salaries, discipline problems, excessive extra-curricular activities and lack of administrative

support. Factors that could convince teachers to stay in the profession are higher salaries, significant reduction in extra-curricular activities, more teacher input in school board decisions regarding schedule and curriculum and more teacher control in discipline situation.

Chapter V. Conclusions

Many United States school districts are faced with shortages of qualified mathematics and science teachers which is having an adverse effect on the quality of education. Data are needed to identify the major factors responsible for teacher shortage which would help in finding a solution to the problem.

This study reports on a follow-up survey of mathematics and science students that graduated from Kansas State University, in the years 1975 through 1988, to determine the factors that may contribute to students remaininig, leaving or never entering the teaching profession and to provide information that may help in the re-evaluation of the Kansas State University teacher education program.

Results from this study indicate that inadequate salary is a major factor causing mathematics and science teachers to leave or never enter the teaching profession.

Another major factor in this regard is the current structure of the school system in secondary education. Problems of importance in the schools are discipline in the classroom, the lack of administrative support for the

teacher and a heavy load of extra-curricular activities, leaving little time for adequate preparation for teaching.

A third factor is the poor 'quality' of many teachers in the system and a negative student teaching experience. This seems to adversely affect collegial cooperation and the positive attitude towards students.

A fourth factor is the extent and type of preparation at the university. In addition to improving teacher salaries and restructuring the curriculum system to provide for adequate classroom preparation and better teaching and discipline in the classroom, education curricula can be improved in course offering and in student teaching experiences to help students be better prepared for a teaching career.

Negative experiences in student teaching are due to lack of preparation for classroom management, lack of practical experience in teaching, too much commuting time and, above all, lack of guidance and supervision by the supervising secondary teacher. As a result, it was suggested that students need to spend more time with the supervising secondary teacher coordinating classroom teaching. Also, secondary teachers should be carefully selected for supervision of student teachers.

Student teaching experiences should start early in university preparation, before the senior year to gain more exposure to teaching and to be able to make a career change in case teaching does not appeal to a student. This could be then a selection process that may reduce the rate of drop out at a later stage from the teaching profession. It was also considered necessary that more time, like a whole semester, is needed for student teaching, with more than one supervising secondary teacher, at different grade levels and perhaps different schools (rural, suburban and inner city).

A better preparation at the university level was deemed essential by the respondents. This could be accomplished by taking additional courses in subject matter and by conducting teaching labs in order to provide students with more teaching experience. In terms of education courses, the most helpful (as cited by the respondents) were methods, laboratory techniques and microteaching.

In addition, it was suggested that courses should be emphasized that deal with classroom management, discipline and motivation of students; courses in adolescent psychology and the general operation of schools. Also,

courses that bring in practicing teachers, or master teachers through video presentations should be offered.

Recommendations to Kansas State University

Based on my personal assessment of the results of this study (i.e., responses to questions and additional comments made by the respondents) and on my own extrapolation from these findings, the following recommendations are proposed.

To adequately prepare undergraduate science and mathematics students for a teaching career the teacher education program at Kansas State University should consider offering a teaching laboratory (a course where students experiment with and gain experience in teaching and classroom management) for the four years of the curriculum. As part of the teaching laboratory students should visit classes (two to three times per week, an hour each time) at secondary schools as observers and as teacher assistants. This will expose the students from early on to the classroom environment, to the problems encountered in daily teaching and to classroom management. During the second two years (after knowledge in subject matter has been acquired) students should be involved in preparing

lesson plans, for every subject they will be certified to teach, according to the latest secondary school texts being offered. Students should teach from these lesson plans on a regular basis to their peers under the supervision of their university professors.

The last semester of their four year study students should be involved in classroom teaching at secondary schools under supervision of a cooperating secondary teacher. As such the program will be less dependent on finding good supervising secondary teachers willing to take student teachers.

In addition to training students in teaching, the teaching laboratory should offer videos of practicing teachers and master teachers. This would give the students examples of real teaching situations on a wider scale.

In addition to the teaching laboratory students should take more content courses with application to their teaching field. This will make them more knowledgeable and hence more comfortable in teaching any level of subject offered in secondary schools. A course in adolescent psychology is beneficial in understanding students behavior and ways to cope with it. Also, there is a need to be more involved with professional societies as undergraduates.

Certain strategies to improve teacher quality and retention should be followed. These include: (1) recruitment practices that attract capable prospective mathematics and science teachers to the field of teaching (this has to start with creating a favorable public image of the teaching profession); (2) the selection of cooperating secondary teachers for student teaching should be done with care so that the student teacher will have the necessary guidance and support needed for a positive outlook on teaching; (3) a follow-up and academic support of the beginning teacher for at least one year by the Department of Curriculum and Instruction; and (4) there should be good communication between the schools and the Department of Curriculum and Instruction which is essential for evaluation and improvement of the teacher preparation program.

Recommendations for Further Studies.

Further studies of this type could be done first on all institutions in Kansas so as to give a wider data base from which one may improve the teacher education program at Kansas State University and other institutions.

Follow-up surveys on mathematics and science education graduates after their first year of graduation will provide information that would help in a continuous re-evaluation and improvement of the teacher education program at Kansas State University. Such surveys may include in depth interviews with teachers that stay, leave or never enter the profession to determine what factors influenced their decisions. These surveys should also include a rating by administrators of teachers who stay in and who left the profession. One may also correlate academic performance of teachers (such as G.P.A. or other standardized indicators) with whether they remain in or leave teaching.

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Appendix A.

Direct quotations of statements made by respondents.

"I feel this type of survey is a good idea to take inventory of how and what we do at the college level in education, really affects the new crop of teachers. I mentioned several times that I would like to see , on hand, different types of teaching methods that seem to be working in America as part of teachers preparation. I know first hand experience is the best teacher. But I always wonder how someone else might have taught a particular lesson that I am teaching."

"I feel great changes are needed in educating teachers. Below are two ideas that I think would work: I don't understand why teachers aren't ready to go that first day of school after they graduate. For example, I made all A's and B's on my upper level math courses. Yet when I taught my first unit on fractions to 9th graders I didn't have a clue. Something is wrong with the system! Every subject has its typical units. I feel that college classes for math teachers need to teach ways to present these units. During the methods class, college students would prepare objectives, lecture notes and other methods of presentations, and tests for the major units. There should

be a methods class for every high school course. Then all of this information would be kept (in a three ring notebook for example) and adapted by the teacher for whatever textbook they have at their high school.

I feel this would be true teacher preparation. I came away from K-State with absolutely no materials whatsoever (partly my fault). A new teacher has enough trouble coping with discipline, coaching, etc. to worry about a lot of preparation. All material I see says make your math classes real and interesting etc. But no one has ever showed me how it's done. If I had been better prepared in college I would have had more time to find ways to be innovative. Finally, what good did "Series & Differential Equations" do me when now after ten years of teaching I am just figuring out how to teach % to 9th grade students".

"The education I received at K-State helped me very little. My first year of teaching science was very very difficult. The information that I needed then wasn't available. It could, or should have been much easier".

"Obviously I have some strong opinions about some parts of the program at K.S.U. The main point is you need to get those students out in the schools observing EARLY so they know what's going on and what the current issues are -

and make them accountable for this. Sorry, my major was not English".

"We spent all our time taking math classes and very little time taking TEACHING classes. Isn't that why so many math professors at the college level are not very good teachers? They know the math but not how to teach it. The 8 weeks of student teaching were very important but not enough. The cooperating high school teacher should be made accountable for training the student teacher".

"Care should be taken in the selection of competent and responsible supervising high school teachers. I think we lose potentially good teachers due to this".

"The College of Education would do well to send professors into public schools for observation. Many of the ideas they presented never approached problems like lack of supplies, lack of textbooks, dealing with students from broken homes, dealing with students whose parents want them to drop out. It might have changed our expectations a little, and could have at least prepared us to some extent. It might be possible to do a follow up of first year teachers to see what problems they encounter, and then use this info to adjust the curriculum".

"You are trying to answer some tough questions. I personally do not think that we are doing any better or worse in education than in any other profession. Our problem is we do nothing to weed out poor teachers once they are in the field. Our administrators on the average are spineless managers who do nothing to help or reprimand our poor teachers. In the business world, our "poor" teachers would be out on the road looking for a new job in no time".

"No courses that are pertinent for the teacher in the class room - in particular the high school science teacher".

"Got a real eye opener in my first 4 years of teaching regarding the people who run a school district".

"I really enjoy the profession and the students. My greatest concern is the attitude of parents toward the school system. Education is taking a second place to family problems and sports being overemphasized by the community. What is needed is more respect from school boards, congressmen, and communities and support for high academic performance rather that mediocrity".

"I had to be a nurse, parent, counselor, psychologist, coach, all in one. Also I had to fill out one absence form for student athletes, another for honor students, etc., there were three types of hall passes, two types of parental advisement slips, etc.. It took over one hour a day to fill out forms. When do you teach????".

The following comments are those made by teachers that have left the teaching profession.

"I did not think K-State did a very good job in preparing me for teaching. I was lacking the necessary chemistry and biology studies courses that would give me the background needed to teach. I do believe, however I was a good teacher, and I am eager to get back to teaching".

"Math and science teaching vastly improved since the 60's. Unfortunately these curriculum improvements eliminated a lot of students of modest ability.... When the country is ready for seriousness at all levels, K-State's ideas in education will make more sense than they do now".

" My teaching program spent much time on technique, teaching theory, etc. with too little on real classroom

concerns. E.g. a teacher spends 90% of their time on 10% of their students, the student who NEVER does homework (or anything else), the PSA kid who is still disrupting classes even after years of school, what can (will?) the principals office do for you? The nub of good teaching is PERSONAL INTERACTION with the student; neat equipment, technique and facilities are window dressing.

I should note that the college freshmen and sophs I teach now are an absolute joy. If high school was like this I'd still be doing it,even for the low pay. Lastly, I should point out that I was disappointed in many teachers around me. Only about 50% represented desirable role models. Often teachers were somewhat lazy, complained about any extra time and behaved more like common labor than professional educators. FEW were excited about teaching".

"I believe that by and large, products of our public schools and universities are not mature enough to do a first class job of educating without further serious study and world experience. A longer apprenticeship, with relevant coursework, would perhaps be better".

"I feel the ED. I took at KSU were NOT worth the time spent. I over doubled my salary upon completion of my Master's & entered industry. How could a person have a

family on $20,000 and purchase a house? This may be offset by a good societal attitude of the roles and capabilities of teachers.- But, current attitude rating is poor (i.e. those who can't do, teach). My mother is a teacher of 25 years (Master's + 30hrs) and my salary has passed hers a while ago".

"I found the majority of the teachers were women who used their jobs as second income for their families. Because of this they are reluctant to fight very hard to get higher pay or for just about anything they need. While women make some of the finest educators, until they, along with their male peers, "stick to their guns", to get the pay and rewards most Americans feel they deserve, the teaching profession will not advance".

"We must encourage the best into education with scholarships and salaries comparable to other professions. But, this also means that those not deserving of the pay or professional status must be removed as in other businesses and professions. If we are to model education after other businesses/professions in salary, etc., then we should insist also on quality outcomes (output) or train/replace with a performing employee -- just like in business! Accountability scares those who can't or won't perform".

scares those who can't or won't perform".

"The biggest problem in attracting new science teachers is a lack of dynamic role models. Students see consistently ho-hum teachers and think all science teacners are introverted, dull and boring. The talented students who are turned on to science do not go into a profession where they earn a pauper's wage".

"I found my biggest problem were from classroom discipline. Many of my students were incapable of course demands, several were unable to read and incapable of single digit addition. I think we all have difficulty understanding the child who couldn't care less. Yes, all teachers do, but many more science and math teachers simply won't, they have other options".

"I loved teaching. But the parents were much more cnallenging than the students".

"I left teaching because the parents didn't care, only that I gave their child a good enough grade to stay in sports or other activities. I don't see the good student given as many pats on the back as the good athlete. I know trends are changing, but I don't think the emphasis is

still strong enough on learning the basics of reading, spelling and simple math - people apply for jobs at my company every day who simply can't read and understand a paragraph of instructions. You simply can't build or improve on things without understanding the basics".

"Tips on how to deal with parents could be very helpful to someone that thinks they are going to be the one to change the world".

Comments of those that never taught.

"Many people who have the potential to be excellent teachers will never become one because of low salaries. A teacher is a professional and should be given the same respect and status as any other professional. I am contemplating a career change out of engineering and would very much like to teach, but I am not willing to greatly decrease my standard of living".

"Algebr. Systems, Num. Analysis, Real. and Theory to name a few, have done me little use. There needs to be a class that takes us through secondary math units (topics). A class that tells us what high school students need to

know. For example, Why does the quadratic formula work, why is a number raised to the zero power always 1, a section on the proofs of HIGH SCHOOL geometry, etc.. Something to strengthen our back ground of what we'll be teaching".

"In my present job I am in contact with a lot of high school seniors who are exposed to K-State student teachers, in general the students dislike the quality of instruction they are receiving. For the college bound senior, the areas of science and math are very important and some of the students feel like they are missing out because of the student teachers. I know that the experience is necessary but some schools are inundated with student teachers".

Appendix B. Questionnaire 1

Currently Teaching

Name
(optional):_____ Year
last) (first) (middle) Graduated____

Maiden name (optional):_____

1. Name of school
in which you teach
(optional):_____

2. School address
(optional):
_____
(street) (city/state) (county)

3. Type of school in which you teach: (check or appropriate categories)
( ) Public ( ) Jr. College
( ) Inner city ( ) Private
( ) College ( ) Suburban (
( ) Jr. High ( ) University
( ) Rural ( ) Sr. High
( ) Other (specify)

4a. Total number of students enrolled in your school district :_____

b. Average number of students per class period:_____

5. Married:_____, Single:_____

6. Male:_____, Female:_____

7. To which age group do you belong? (Circle one)

20-25 36-40

26-30 41-50

31-35 over 50

8. List subjects for which you are certified to teach:

1. _____ 3. _____ 5. _____

2. _____ 4. _____ 6. _____

9. At present, are you employed in (state field)

a. major field _____ b. second teaching field_____

c. combination _____ d. other(please specify)_____
(a and b)

10. Check the undergraduate degree(s) earned:

a. College of Education:

EDBSC(Biology)____BA/BS EDMTH(Mathematics)____BA/BS

EDCHM(Chem.) ____BA/BS EDPHY(Physics ____BA/BS

EDESC(Earth Sc.)____BA/BS EDPSC(Phys. Sc.) ____BA/BS

b. College of Arts and Sciences:
(with certification requirements fulfilled)

Biology _____BA/BS Mathematics_____BA/BS

Chemistry_____BA/BS Physics _____BA/BS

Earth Sc._____BA/BS Others _____BA/BS

11. Indicate graduate degree(s) earned:

MS_____ Major_____ Year _____ Institution_____

MA_____ Major_____Year _____ Institution_____

PhD____ Major_____Year _____ Institution_____

EdD____ Major_____Year _____ Institution_____

12. Record of employment since graduation (list present position first)

Date/year Employer name & city Type of position

13. How many total years have you taught? _____

14. How many years have you been in your present teaching position ? _____

15. Are you required to teach courses in subjects other than areas for which you are certified? yes_____, no_____:if yes, please list

_____

16. Are you involved in non-teaching duties in your school outside of regular class hours? yes___ no_____

if yes, please list duties:_____

17. How many class periods per week do you teach?_____

18. How many different subject preparations do you have every day?_____

list subjects:_____

19. Do you consider lesson preparation time provided by the school sufficient? yes_____, no_____

20. Do you think that additional education in science and/or mathematics would help you in your teaching? yes_____, no_____. If yes, should the additional education take place a. during the four years of undergraduate university education, or b. after you have been in the profession?
circle a. or b.

21. Do you feel isolated in your profession? yes_____, no_____

Explain:_____

22. Does your school give you opportunity and incentives to keep up in your field?
Explain:_____

23. How many science teaching related workshops have you attended in

the last year_____ last 3 years_____

prior to last 3 years_____

Were these workshops private _____ or school sponsored?_____

24a. To which professional organizations do you belong? please list:

_____

PLease list those in which you are actively involved: (attend meetings,give presentations, serve as officer,etc.)

_____

24b. Which professional journals do you receive?_____

_____

Which professional journals do you read on a regular basis?_____

25. Do you think that science and mathematics teachers deserve a higher salary than other teachers? yes_____ no_____, why?_____

_____

26. In how many years do you plan to retire from or leave teaching?_____
Give reasons if this is before age 65:

27. Do you feel that you as a teacher are respected in your community? yes_____ no_____

Explain:_____

28. When did you first decide to become a teacher?_____

29. Why did you want to be a teacher_____

30. What do you like best about teaching_____

31. What do you like least about teaching_____

32. Are you satisfied in your present position? yes _____ no _____

    If no, please explain:_____.

33. On a scale from 1-poor to 4-excellent, how do you rate your student teaching experience? (circle one)

    1 2 3 4

    Explain (no names)_____

34. How could your student teaching experience have been improved?_____

    _____

35. On a scale from 1-poor to 4-excellent, how do you rate the supervising secondary school teacher you had during student teaching? (circle one)

    1 2 3 4

    Comment (no name please)

    _____

36. Which education courses in the teacher education program did you find most helpful in your teaching profession? Please list:

    _____

37. Which education courses in the teacher education program did you find least helpful in your teaching profession? Please list:

_____

38. Which courses would you like to see emphasized in the teacher education program? Please list:

_____

39. How can the teacher education program at K-State be more helpful in preparing students for the teaching profession?

_____

40. To better prepare you for the classroom, would you have preferred a longer time as a student teacher? yes___, no____. If yes, what length and under what conditions?

_____

41. What incentives do you think are needed to attract new teachers to the profession?

_____

42. What incentives do you think are needed to keep teachers in the profession?

_____

43. Does there appear to be a shortage in your school district of mathematics teachers? yes_____ no_____; of science teachers? yes_____ no_____ . If yes, which areas of science?

_____

Please note that the optionals for name and address are for the purpose of establishing a complete and accurate mailing list of our graduates.

Thank you for your help.

Additional comments, if any:

Questionnaire 2

Previously taught, but left teaching

Name
(optional):_____ Year graduated_____
(last) (first) (middle)

Maiden name (optional):_____

Address
(optional):_____
(street) (city/state) (county)

1. Married:____ Single:____

2. Male: ____ Female:____

3. To what age group do you belong?

20-25 36-40

26-30 41-50

31-35 over 50

4. List subjects for which you are certified to teach:

1._____ 3._____ 5._____

2._____ 4._____ 6._____

5. Indicate the undergraduate degree(s) earned:
a. College of Education:

EBSC(Biology)_____BA/BS EDMTH(Math.)_____BA/BS

EDCHM(Chem.) _____BA/BS EDPHY(Physics)

EDESC(Earth Sc.)_____BA/BS EDPSC(Phys.Sc.)____BA/BS

b. College of Arts and Sciences:
(with certification requirements fulfilled)

Biology	_____BA/BS	Mathematics	____ BA/BS
Chemistry	_____BA/BS	Physics	____ BA/BS
Earth Sc.	_____BA/BS	Others (specify)	____ BA/BS

6. Graduate degree(s) earned:

MS_____Major_____

MA_____Major_____

PhD_____Major_____

EdD_____Major_____

7. Record of employment since graduation (list present position first)

Date/ Year	Employer name/city	Type of position

8. How many total years did you teach?_____

9. Why did you leave Teaching ?_____

10. How many years have you been in your present non-teaching position?___

11. Were you ever required to teach subjects you were not certified in? Yes___, no____. If yes, list subjects:

_____

12. Were you involved in non-teaching duties while you taught? Yes___no
If yes, please list:

_____

13. When did you first decide to become a teacher?_____

14. Why did you want to become a teacher?_____

15. What did you like best about teaching?_____

16. What did you like least about teaching?_____

17. Do you plan to return to teaching? Yes___, no____. If yes, when?

_____

18. Do you think that science and mathematics teachers deserve a higher salary than other teachers? Yes____, no____. Why?

_____

19. On a scale from 1-poor to 4-excellent, how do you rate your student teaching experience? (circle one)

1 2 3 4

Explain (no name please)

_____

_____

20. How could your student teaching experience have been improved?_____

_____

21. On a scale from 1-poor to 4-excellent, how do you rate the supervising secondary school teacher you had during student teaching?
(circle one)

1 2 3 4

Comment (no name please)
_____

_____

22. Which education courses in the teacher education program did you find most helpful in your teaching profession? Please list:

_____

23. Which education courses in the teacher education program did you find least helpful in your teaching profession? Please list:

_____

24. Which courses would you like to see emphasized in the teacher education program? please list:

_____

25. How can the teacher education program at K-State be more helpful in preparing students for the teaching profession?

26. To better prepare you for the classroom, would you have preferred a longer time as a student teacher? Yes____, no____. If yes, what length, and under what conditions?

_____

27. What incentives do you think are needed to attract new teachers to the profession?

_____

28. What incentives do you think are needed to keep teachers in the profession?

_____

29. Did there appear to be a shortage in your school district of mathematics teachers? yes____no____; of science teachers? yes____no___. If yes, which areas of science?

_____

Please note that the optionals for name and address are for the purpose of establishing a complete and accurate mailing list of our graduates.

Thank you for your help.

Additional comments, if any:

Questionnaire 3

NEVER TAUGHT

Name(optional):_____ Year
(last) (first) (middle) Graduated____

Maiden name (optional):_____

Address
(optional):_____
(street) (city/state) (county)

1. Married_____, Single_____

2. Male_____, Female_____

3. To which age group do you belong?

20-25	36-40
26-30	41-50
31-35	over 50

4. List the subjects for which you are certified to teach:

1. _____ 3. _____ 5. _____
2. _____ 4. _____ 6. _____

5. Record of employment since graduation from KSU. List present position first.

_____
Date/ Year Employer name & city Type of position

_____

6. University or college degree earned since graduation from KSU:

BS/BA_____ MS/MA_____ PhD/EdD_____

7. Do you think that the teacher education program at KSU prepared you well enough for student teaching? Yes____, no____. If no, please explain:

_____

8. On a scale from 1-poor to 4- excellent, how do you rate your student teaching experience? (circle one)

1 2 3 4

Explain (no name please)

_____

9. How could your student teaching experience have been improved?_____

_____

10. On a scale from 1-poor to 4-excellent, how do you rate the supervising secondary school teacher you had during student teaching? (circle one)

1 2 3 4

Comment (no name please)

_____

_____

11. Which education courses in the teacher education program did you find most helpful in your student teaching? Please list:

_____

12. Which education courses in the teacher education program did you find least helpful in your student teaching? Please list:

_____

13. Which courses would you like to see emphasized in the teacher education program? Please list:

_____

14. When did you first decide to become a teacher?_____

15. Why did you want to be a teacher?_____

16. Why did you never enter the teaching profession?_____

_____

17. Do your future plans include teaching? Yes____, no____. If no, what would have to change in order for you to change your mind?

_____

Please note that the optionals for name and address are for the purpose of establishing a complete and accurate mailing list of our graduates.

Thank you for your help.

Additional comments, if any:

KSU
ANSAS
TATE
VERSITY

Department of Curriculum and Instruction

College of Education
Bluemont Hall
Manhattan, Kansas 66506
913-532-5550

December 6, 1988

Dear KSU Alumnus:

The Department is conducting an evaluation of the current KSU mathematics and science teacher preparation program, and is seeking input into the planning process for a revised program. We are also soliciting your views concerning the shortage of science and mathematics teachers and your present occupational status.

We request your assistance with the enclosed questionnaire. The responses will be analyzed by Ms. Ita Nassar, a graduate student in the Department.

You only need to send back the completed questionnaire (in the provided pre-stamped envelope) that pertains to you.

WHITE:	if you are presently teaching
YELLOW:	if you have taught, but have left teaching
GREEN:	if you have never taught

The success of this study will depend on your full participation. The information furnished by you will be kept strictly confidential. The optionals on the survey for name and address are for the purpose of establishing a complete and accurate mailing list of our graduates so we can communicate with you in the future about course and program offerings. No name of either persons or schools will be mentioned in the final report of the study.

For your information, I have enclosed a brochure describing the new Center for Science Education which is dedicated to the improvement of science, mathematics and computer-based education. The Center was recently funded by the Kansas Board of Regents and a new faculty member, Dr. John Staver, has been employed to direct its operations.

Thank you very much for your assistance. We are looking forward to your prompt response by January 15, 1989.

Sincerely yours,

Emmett L. Wright

Emmett L. Wright
Professor of Science Education
and Department Head
Curriculum and Instruction

ELW/tjh