AN ABSTRACT OF THE THESIS OF

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Title: Effects of a Written Intervention on the State Anxiety of New Mathematics Teachers

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The goal of the research project was to assess the effect of a written intervention on the state anxiety of new mathematics teachers. Twenty-eight beginning mathematics teachers in Washington, Oregon, and California were randomly assigned to treatment or control groups. Treatment was a survival guide, Green Broke, carefully designed to meet the needs of beginning mathematics teachers. A Delphi panel determined topics for the guide, beginning with suggestions from the literature. The panel included mathematics teachers in grades 7 to 12 from all three Pacific states, and both urban and rural areas. School administration and college mathematics education were also represented on the panel. A subset of the panel and a writer edited the guide.

Trait anxiety of subjects was determined prior to the 1989-90 school year using the trait anxiety portion of Spielberger's State-Trait Anxiety Inventory. The state anxiety inventory was administered at that same time and again three times during the school year. All subjects also completed a teacher report twice during the year regarding their teaching experiences. In addition, the treatment group was asked to complete two questionnaires regarding the effectiveness of Green Broke. Subjects perceived that they were part of two studies, one involving the guide and one involving anxiety inventories.

Analysis of covariance for repeated measures was used to assess differences between groups in state anxiety, using trait anxiety as covariate.
Level of significance was set at .05. There was no significant main effect, but a significant interaction effect was found. The nearly linear relationship between state and trait anxiety found in the control group disappeared for the group having the guide.

Mini case studies, using responses to the teacher reports, were done for seven subjects, including those with very high state anxiety. In addition, a subgroup of the treatment group, for which a linear relationship between state and trait anxiety did exist, was examined for common characteristics. Locus of control was hypothesized to be a variable that would differentiate this group. Other suggestions for further study include use of audio-visual forms of the survival guide, extension to other subject areas, and replication of the study.
Effects of a Written Intervention on the State Anxiety of New Mathematics Teachers

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The outcomes of mathematics education in the secondary school are under constant evaluation. Student attitude, factual knowledge, conceptual understanding and the ability to apply concepts and facts are examined by teacher testing, by standardized achievement testing, and by educational research.

But what about the outcomes of the education of the mathematics teacher? Factual knowledge is tested within the context of a given college course and there is a growing desire to test factual knowledge of teachers within a larger framework. But who is attending to the newly trained mathematics teacher’s attitudes, conceptual understanding, and ability to apply concepts and facts? What happens beyond the student teaching experience? How many new mathematics teachers embark on their careers with enthusiasm, confidence and energy? How many are scared and discouraged? Do differing teacher outlooks affect the enthusiasm and confidence of their students?

The importance of the first year of teaching is vastly larger than the body of research concerning that year. In introducing his case study of a beginning teacher, Bullough (1989) comments that “the first year of teaching sets a foundation upon which is built a professional educator, or something else that masquerades in teachers’ clothing and cashes a teacher’s checks” (p. viii).

However, Bullough’s study is one of the few careful observations of new teachers. Only one study (Cooney, 1985) was found that focused on a new mathematics teacher. The clear need for such observations becomes obscured by the difficulties in doing so. New mathematics teachers are widely scattered geographically, have differing amounts of support from their colleagues and
widely varying assignments. A new mathematics teacher in Seattle, Washington hardly can be compared to a new mathematics teacher in Burns, Oregon with regard to support, assignment, or class ambience.

Nevertheless, the literature indicates a universal perception of new teachers as stressed and anxious. What research supports (or refutes) that perception? What classroom differences result from the anxiety of new mathematics teachers? What are the underlying stressors for these teachers? And, how may negative effects of anxiety be minimized?

California and Oregon have made serious commitments to the mentoring of new teachers. Such a commitment implies recognition of difficulties encountered by beginning teachers. The underlying principle of a mentoring program is that new teachers find problems for which they need the advice and support of more experienced colleagues. Are such problems across or within disciplines? Can an English teacher successfully mentor a new mathematics teacher? Does such support and advice need to be "on the spot," or would written informational support help? Would a mentoring booklet be valuable to new mathematics teachers in remote areas with little opportunity for on-the-spot help or to those in big districts who are isolated by classroom and time constraints?

Rationale

There is substantial evidence in the literature that new mathematics teachers are highly anxious and that such anxiety is detrimental to both teachers and their students. Furthermore, many of the factors creating such anxiety are well described, with some fairly unique to mathematics teaching and some common to general teaching. This section will describe anxiety and its effects on new mathematics teachers. In addition, preventative interventions will be discussed.

In discussing anxiety, limited use of the term "stress" is advisable.
because the word is used in so many contexts (Gaudry & Spielberger, 1971; Lazarus & Folkman, 1984; Selye, 1974). Stress may refer to all those aspects in the classroom that cause a teacher to feel overwhelmed, or it may refer to the tension that results. Stress may be defined as any demand made on the organism by the environment (Selye, 1974; Tache & Selye, 1978) and, therefore, may even include necessary aspects such as atmospheric pressure. "Anxiety" or "distress" better specifies the feeling of not being able to contend with the demands being made. Those demands are then considered "stressors" (Lazarus & Folkman, 1984). The term "stress" in this document will refer to the entire relationship between person and environment when environmental demands appear to exceed personal resources to meet them (Lazarus & Folkman, 1984).

Spielberger (1966, 1983) makes a distinction between state anxiety and trait anxiety. Trait anxiety is a personality characteristic that generally remains constant over time. Some people are calm, some are nervous; as statements about general personalities, these comments are about the extremes of trait anxiety. On the other hand, both calm and nervous personality extremes might be relaxed lounging by a pool with a cold drink; and, indeed, both might be highly anxious trapped in a burning automobile. These reactions refer to state anxiety, the level of anxiety at the moment. Generally, state anxiety is a function of a person's trait anxiety (personality) and also the physical circumstances at the time.

Anxiety of teachers has been documented in numerous studies (Blase, 1986; Cunningham 1983; Holt, Fine, & Tollefson, 1987; Landwehr, 1980; Maslach, 1982). Even greater anxiety has been reported in student teachers (Hoffman, 1971; Petrusich, 1967; Thompson & Ellis, 1983; Underwood, 1981) and new teachers (Bullough, 1989; Houston & Felder, 1982; Russell, Altmaier & VanVelzen, 1987; Veenman, 1984). While experienced teachers, new teachers, and beginning teachers of mathematics have many common problems that become sources of anxiety, some teaching problems exist for the
latter groups that are rarely sources of distress for the experienced teacher. Since one means of reducing anxiety is to find ways to minimize stressors (Lazarus & Folkman, 1984; Sarason, 1980; Spielberger, 1966), these differences become important.

There are some periods during the school year, such as ends of grading periods, when teacher responsibilities increase. Other times, as before a holiday, students are easily distracted. Teacher anxiety seems likely to peak during those times. Calm periods may mark troughs in teacher anxiety levels. Hembling and Gilliland (1981) found evidence of such cycles in Canadian teachers. Petrusich (1967) found student teachers to have fluctuating patterns of anxiety as well. As teacher anxiety is examined, such possible general patterns need to be considered.

Regardless of cause, the effects of anxiety are shared by all groups of people, and by many animals as well. Frequently described as preparation for "fight or flight," anxiety is accompanied by physiological signs such as increased pulse rate, sweating palms and fast breathing (Izard & Tomkins, 1966; Kristal, 1978; Spielberger, 1966; Tache & Selye, 1978; Teichman, 1978). An anxious person is likely to cry or attack, sleep too much or be unable to sleep, have stomach upsets or become ill frequently. Both the mental state and the physical state characterized by high anxiety are most likely to interfere with the kinds of problem solving and compromise needed in a classroom.

Interference of anxiety with a teacher’s effectiveness has been documented in several cases. Anxious teachers report less enthusiasm, less creative energy, more reuse of old materials and more planning with emphasis on student control (Blase, 1986). Anxious teachers appear to have more anxious students (Doyal & Forsyth, 1973). Keavney and Sinclair (1978) cite studies showing teacher anxiety to correlate to lower rapport with students, less warmth, less verbal support of students, and more hostile teacher behavior. Coates and Thoresen (1976) also found that highly anxious teachers appear to be more influenced by their early expectations of student competency.
Furthermore, educational resources expended in teacher training are lost when teachers quit teaching (Holt et al., 1987; Keavney & Sinclair, 1978). Golaszewski, Milstein, Duquette, and London (1984) found that teacher anxiety and depression correlate with high blood pressure, physical fatigue, vulnerability, overuse of alcohol, overeating, and acid stomach. Connections are evident between teachers' personal physiological costs associated with anxiety, the effects reported in the classroom, and the leaving of the profession.

Given that high anxiety is detrimental to teaching effectiveness, it is not surprising to find many studies directed toward reducing teacher anxiety. However, most researchers have ignored the specific problems of beginning teachers and of mathematics teachers, and have concentrated on meditation or relaxation techniques (Daniels, 1985; Forman, 1982; Friedman, Lehrer, & Stevens, 1983; Holroyd, Appel & Andrasik, 1983; Landwehr, 1980; Meichenbaum & Cameron, 1983; Peters, 1981; Remer, 1984; Sharp, 1983; Sparks, 1983; Woodhouse, Hall, & Wooster, 1985). Many of these studies utilized cognitive restructuring in which, as subjects relax, they practice rethinking stressors. The goal is to reevaluate a source of distress as an interesting or challenging problem instead of an impossible barrier.

However, the processes of relaxation and reevaluation have an apparent deficiency for new mathematics teachers. Changing an impossible barrier to a challenging problem generally requires tools for attacking the problem. The type of tool, of course, depends on the nature of the barrier/problem. To the extent that problems are different for the new mathematics teacher than for the general experienced teacher, specialized assistance is needed. For example, if students are rebellious because they are confused, the teacher who is without help in recognizing the cause of student anger will develop inappropriate plans for preventing confrontations, will continue to experience the stressor, and will continue to be anxious.

Three interventions might help provide new mathematics teachers with tools for reducing stressors. One approach is to provide inservice (Klug, 1988;
Manley, Siudzinski, & Varah, 1989). However, few districts have enough beginning teachers to support an inservice program addressing their needs, much less the specific problems in mathematics. Schools' limited financial resources further diminish the likelihood of effective inservice help for new mathematics teachers.


However, many districts do not have a mentoring program, and other programs vary widely in format. Formal mentoring programs have frequently failed because they have not allowed for an evolving, natural relationship of mutual benefit to congruent personalities (Clemson, 1987). It is important that mentors and protégés teach the same subject and grade level and have classrooms close to one another (Gray & Gray, 1985). Among the mentoring programs failing to attend to these criteria is a large project throughout the State of California (Wagner, 1985). In any program, even excellent mentors, close by, teaching similar mathematics classes, may be preoccupied at times by the demands of their own classrooms.

A third intervention might be a survival guide written in a mentor's style. The guide must provide information about the problems experienced by new mathematics teachers and suggest solutions. It must help fill gaps left by other interventions as well as serve as a primary source of help when other sources are unavailable. A written guide would, at least, be available at all hours of the day or night and at any locale, when and where the need for it is most intense. It is inexpensive. It can address the problems specific to new mathematics teachers. Problems might seem less like barriers simply by their inclusion in
such a guide; the problems would not be listed if no teacher had ever experienced them or solved them.

Bain and Wendt (1983) have created such a survival guide for new physical education teachers. However, no indication of its effect was cited, and no other efforts were found that attempt to provide written help for the problems of new teachers. On the other hand, there are some interesting medical studies in which a related approach has been successful. In three different projects, surgical patients experienced reduced anxiety and improved recovery simply through being informed of the procedure, the possible problems, and the techniques for dealing with those problems (Melamed, Dearborn, & Hermecz, 1983; Peterson, Schultheis, Ridley-Johnson, Miller & Tracy, 1984; Siegel & Peterson, 1980). In a similar case, this information was provided in written form with equal effect to the other studies (Wallace, 1984). Thus, anxiety was reduced in the face of a physical threat such as surgery by written information about the nature of the situation, the problems that arise and the appropriate responses to those problems. Logic suggests that such an approach might be considered as a means of reducing anxiety in a different setting, that of beginning teaching.

The validity of a survival guide depends on its addressing the kinds of difficulties experienced by new mathematics teachers in a way that enables the teacher to evaluate them as challenging problems rather than insurmountable barriers. These problems might be placed in two categories: those experienced by all new teachers and those which are particular difficulties in mathematics teaching.

Stressors of New Teachers

The new teacher has concerns about discipline. The issue of maintaining an intellectually functioning classroom arises repeatedly in surveys of both experienced and new teachers (Forman, 1982; Friedman et al., 1983;

Time management is a major difficulty for this group (Blase, 1986; Cunningham, 1983; Daniels, 1985; Forman, 1982; Friedman et al., 1983; Gmelch, 1983; Landwehr, 1980; Litt & Turk, 1985; Nummela, 1982; Riccio, 1983; Sharp, 1983; Sparks, 1983; Woodhouse et al., 1985). New teachers need help reconciling a heavy work load, limited time, their own high self expectations and the conserving of enough energy to remain enthusiastic in the classroom.

New teachers' unrealistic expectations cause them anxiety (Forman, 1982; Gmelch, 1983; Gold, 1985a; Malanowski & Wood, 1984; Peters, 1981; Riccio, 1983; Schwab & Iwanicki, 1982; Sharp, 1983; Sparks, 1983; Veenman, 1984). And, new teachers lack social support and information about social support. Social support is a buffer against distress (Norbeck & Tilden, 1983; Thoits, 1984). However, new teachers typically have left friends and family to begin teaching, a vocation already exceptional for its isolation in the classroom (Blase, 1986; Cunningham, 1983; Daniels, 1985; Gmelch, 1983; Gold, 1985a; Houston & Felder, 1982; Kyriacou & Pratt, 1985; Peters, 1981; Sparks, 1983).

**Stressors Specific to Mathematics Education**

While changes occur in the teaching of any subject, the mathematics teacher is currently being challenged to change nearly every aspect of the mathematics classroom. Documents by the National Council of Teachers of Mathematics (1980, 1989), the National Council of Supervisors of Mathematics (1978), and the Oregon Mathematics Education Education Council (1986) call for a
change in topics taught, the manner in which they are taught, and the means of evaluating learning. These groups all urge less emphasis on algorithmic skills and more on problem solving, concept formation, applications, use of computer and calculator, estimation, approximation, geometry, probability and statistics. They encourage teaching styles involving more manipulatives, more process orientation and more openness toward exploration by the student. They discourage the use of standardized tests to determine the curriculum or to totally evaluate the effects of the curriculum.

The Curriculum and Evaluation Standards for School Mathematics (National Council of Teachers of Mathematics (NCTM), 1989) commonly known as the Standards, has almost certainly held an important position in the training of every new mathematics teacher. An Agenda for Action (NCTM, 1980) was the predecessor to the Standards and similarly has influenced thinking about the teaching of mathematics. But, it is confusing to a teacher to behave in ways that have seldom, or never, been modeled when one was a student. It is equally confusing to students, parents and administrators, who suspect that when an agenda like that of the Standards is followed, "real" mathematics is not being taught.

Results on standardized tests are published and become part of public evaluation of the schools. Public support of schools, including budgetary support, may hinge on such perceptions. Thus, the atmosphere in the school toward the kind of teaching that should occur in a mathematics classroom is different from that which the new mathematics teacher expects.

Few new teachers have been taught mathematics in a laboratory situation, or in an open-ended "let's explore" environment. Few have learned estimation or mental computation. Few have experienced mathematics apart from a page-to-page textbook experience. And, as the new teacher looks around, few "non-traditional" models will be visible. It is highly likely that the same new teacher will notice the highest accolades and the best assignments going to teachers whose students scored highest on tests of paper-pencil skills.
Again, the atmosphere in the school does not match expectations. Conflicting expectations between teacher and student create problems for the new mathematics teacher as well. A student in mathematics at the college level has made abstract thinking a way of life. He or she has heard about Piagetian levels of thinking, for example, but probably is not aware to what degree personal modes of thought differ from those of the junior high or even senior high student. The new mathematics teacher may expect, for example, that a formal proof constitutes an explanation. Student anxiety may thus be aroused and yet another problem introduced.

**Anxiety about Math Anxiety**

The word "anxiety" seems especially attached to mathematics. We don't hear much about reading anxiety, for example. Concerns about student math anxiety and its relationship to modes of teaching mathematics are well documented (Battista, 1986; Baum, 1984; Burton, 1984; Ferguson, 1986; Frary & Ling, 1983; Greenwood, 1984; Kelly & Tomehave, 1985; Martinez, 1987). Math anxiety can result when a teacher misjudges the pacing of the class, the level of abstraction of which students are capable, or student familiarity with skills incidental to the task at hand. Harmful mistakes are easily made in teaching mathematics and are difficult to correct, especially if they were made and ingrained in a prior class. For those reasons math anxiety becomes one of the special problems of a new mathematics teacher.

Trends in a survey of new teachers by Munkres, Johnson, Thomas, Tschanz, and Myton (1984) correspond to the problems raised by changes under way in mathematics education and the problems of math anxiety. Unfortunately, in this study, mathematics and science teachers were grouped together. Still, compared to other teachers, mathematics/science teachers felt better prepared in subject matter and simultaneously less prepared to teach it. They also tended to feel less effective as teachers than other groups.
Summary

The anxiety evident in new teachers is detrimental both to themselves and to their classrooms. Beginning mathematics teachers share many stressors with other new teachers, but in addition have some special problems due to characteristics of mathematics education. Because new mathematics teachers are so widely scattered, no interventions designed particularly for them have been attempted. However, an informational survival guide addressing the problems of the new mathematics teacher appears to have potential for diminishing anxiety. Other major influences on state anxiety may be the trait anxiety of the individual and the overall stress level at that time of year.

Research Question
The Problem

Is anxiety of new mathematics teachers mediated by a supportive written survival guide which addresses the particular problems of new mathematics teachers? Is the effect of the book dependent on the individual's trait anxiety or on the overall trend of the group toward high state anxiety at various times of the year?

Neither of the above questions can be satisfactorily answered if the survival guide fails to address difficulties encountered by new mathematics teachers. Validation of the guide is therefore an important preliminary research step. Such validation should be based on the concerns of new teachers and of mathematics teachers that are cited earlier in the chapter and in more detail in Chapter 2. Validation should involve public school mathematics teachers with as much variation of experience as possible to accommodate the wide range in new teachers' assignments. Teachers of mathematics teachers, other mathematics leaders and school administrators should also be involved since they impact the new mathematics teacher.
Hypotheses

H$_{a1}$: After adjusting for trait anxiety, beginning mathematics teachers given a written survival guide will have lower adjusted state anxiety.

H$_{a2}$: Effects of the survival guide on state anxiety will interact with time of measurement.

H$_{a3}$: Effects of the survival guide on state anxiety will interact with the trait anxiety of the new mathematics teacher.

Limitations and Delimitations

In this study only self-reported anxiety will be examined. Secondly, there are many environmental factors both within and outside of teaching that affect anxiety. This study will examine only the effects of experimental treatment, natural tendency toward anxiety and time of year. Size of district, type of teaching assignment, socio-economic status of district, professional or social support of teacher, prior leadership experience, and non-teaching commitments are all potential factors not considered in this study.

Definition of Terms

1. Anxiety: one form of distress, the "fight or flight" response to a stressor that is identified physiologically by elevated blood pressure, accelerated pulse, muscle tension, and/or perspiration. Affective indicators of anxiety include weeping, feelings of nervousness or fear, or inability to attend to other problems in the environment.

2. Distress: the negative psychological or physiological reaction to a stressor.

3. Informational approach: counteracting stress through provision of
information about a forthcoming unfamiliar situation, including hazards, discomforts, physical and psychological reactions and ways of coping with problems.

4. Mathematics teacher: a teacher whose preparation in mathematics includes a minimum of 30 quarter hours in mathematics and whose teaching assignment is at least 50% mathematics in grades 6 to 12.

5. New teacher: a teacher with no more than one-half year's experience in any subject in public or private schools. A new teacher may have experience working with youth in scout, church, 4-H or other extra curricular activities.

6. State anxiety: a transitory state of anxiety evoked when a person perceives a situation as personally threatening. State anxiety may be measured by scores on the A-state scale of Spielberger's State-Trait Anxiety Inventory and indicates the intensity of feeling at the moment.

7. Stress: the combination of unpleasant stimulus, appraisal of that stimulus and the emotional-physiological arousal that are effects of the stimulus/appraisal process.


9. Trait anxiety; a relatively fixed personality characteristic; inclination toward anxiety. Trait anxiety may be measured by scores on the A-trait scale of Spielberger's State-Trait Anxiety Inventory and indicates how easily an individual's anxiety feelings are aroused.
Generally stress is regarded as a complex phenomenon first involving a call for action (stimulus) from the environment. There is an appraisal on the part of the personality involved, comparing the demand to the resources available. Personality, availability of support, available skills, the person's history, concomitant demands, and the nature of the task all affect the appraisal. If the appraisal is positive, adaptive behavior results. If the appraisal is negative, ensuing behavior is maladaptive. The stimulus, because of the negative appraisal, would be termed a stressor (Lazarus & Folkman, 1984).

Spielberger (1966) describes two behavioral outcomes in the negative case. The first is an anxiety reaction with physiological components including high respiration rate and blood pressure, and with psychological descriptors such as anxious, nervous, embarrassed and tense. The physiological factors seem to be ancient ones that prepare the body for fight or flight. Since neither is appropriate to the usual modern situation, there is no resolution either to the physiological preparedness or to the accompanying emotional state. Once aroused, anxiety may differ in degree but not in essence from one situation to another. A soldier facing a first battle, a child facing a dental drill for the first time, and a teacher facing his or her first class all experience a similar emotional reaction (Izard & Tomkins, 1966; Kristal, 1978; Spielberger, 1966; Tache & Selye, 1978; Teichman, 1978).

The second possible outcome to a negative appraisal of the stressor, according to Spielberger (1966) involves the use of a defense mechanism that has been acquired through a highly overlearned response to the threat. Reappraisal of the stressor may take place at that time. Behavior is more adaptive in responding to the call for action of the stressor, but is still likely to be protective in nature. Protective behavior in teaching might include emotional
withdrawal from students, becoming less caring.

Sarason (1980) describes other negative reactions to a stressor in addition to anxiety. Sarason's "self preoccupation" includes possible anger, depression, helplessness, and self-guilt. All are maladaptive. Sarason posits that the existence of a plan of action creates a more positive behavioral outcome, because the appraisal process is affected in a positive manner. Such a "plan of action" is presumably part of Spielberger's "defense mechanism" as well.

Lazarus (1974) suggests that a stressor requires some action. Anxiety about the outcome occurs, according to Lazarus, and if the outcome is poor, depression or anger may result. Presumably, in that case, the same stimulus would evoke anxiety the next time it occurs; whereas, if performance was acceptable, anxiety would diminish for similar stimuli. Thus, Lazarus views anxiety as a first effect of a stressor, with other possible self-preoccupying thoughts following.

When stressors continue over time, Selye (1974) posits several stages of response. The first is distress. The second is resistance, in which alarm subsides and the organism adapts to (copes with) the stressor. But, after long exposure to the stressor, exhaustion may follow. In this stage, distress returns. In Selye's highly physiological analysis, in which stressors may be extreme heat or cold or sleeplessness or hunger, death is the outcome.

Spielberger (1966, 1983) describes a personality characteristic called trait anxiety. For any given stimulus, persons with high trait anxiety are more likely to appraise the demands of the stimulus as exceeding their personal resources. Trait anxiety is a mostly constant characteristic for each individual. State anxiety, on the other hand, varies with the environment, measuring current appraisal of demand versus resources. Trait anxiety affects the appraisal process, while state anxiety is an effect of negative appraisal.

Maslach's (1982) description of burnout, on the other hand, elaborates on a process similar to that described by Selye, but in more psychological
Burnout is characterized by Maslach as a response to coping with long term stress in occupations such as social work, teaching, police work, or medicine. Burnout occurs when tolerance has diminished until a crisis state (but not death) results.

Characteristics of burnout include emotional exhaustion, depersonalization, and a loss of sense of personal accomplishment. In professions that involve caring for others, intense emotional involvement over months or years of work can lead to emotional exhaustion and a consequent withholding of care. Depersonalization involves a cynical, detached or callous attitude toward one's clients. A feeling of worthlessness (negative personal accomplishment) may follow if the person feels guilty about mistreatment of clients, or if he/she feels cold and uncaring in a profession that expects the opposite.

Maslach (1982) does not mention anxiety. However, in addition to paralleling Selye's description of distress, burnout appears highly related to the anxiety model. In burnout, too, initial stressors are involved and personality plays a role. But, burnout appears to be the result of long-term coping with stress while anxiety is an initial, acute reaction to a stressor. Thus, while high anxiety is frequently reported for beginning teachers, (Burden, 1982; Hoffman, 1971; Petrusich, 1967; Thompson & Ellis, 1983; Underwood, 1981), burnout appears highest in teachers with five to ten years of experience (Holt et al., 1987). Therefore, teacher burnout may be the end effect of anxiety in beginning teachers.

Distress in New Teachers

High stress begins with student teaching. Hoffman (1971) provides detailed descriptions by student teachers of their "anxious days." Underwood (1981) found anxiety levels prior to student teaching to be high (94th and 83rd percentiles) in that study's two groups. Even after student teaching, when
teachers are normally considered to relax, Underwood found anxiety levels to be at the 65th percentile in the control group. Anxiety levels of the experimental group, which had been provided with an anxiety reduction program, were still at the 49th percentile after student teaching. Likely, scores go up again as a new year approaches and these student teachers find themselves alone in a classroom. Petrusich (1967) found fluctuating, but presumably high, anxiety in student teachers. Thompson and Ellis (1983) found that student teachers suffer from numerous anxieties.

High stress levels continue into the first year of teaching. In a random survey of Iowa teachers, Russell et al. (1987) found age to be a predictor of emotional exhaustion, with younger teachers experiencing greater emotional exhaustion. Houston and Felder (1982) found that new teachers reported a sense of isolation, increasing fatigue, crying, and other somatic responses indicating anxiety. Veenman's (1984) review indicates new teachers are shocked with the magnitude of teaching difficulties. Veenman established a long list of problems experienced by new teachers.

Many of these problems, and their potential for highly unpleasant outcomes, are described in detail in Bullough's (1989) case study of a beginning teacher. Bullough described a survival stage arriving "with a flood of grimly insistent problems" (p. 25). He comments that "stress is a fact of life in the first year" (p. 153).

The level at which knowledge about teaching is mastered may play a role in teacher anxiety, according to Nummela (1982). Mastery of new skills is at one of four levels: (1) unconscious non-mastery (we don't know what we don't know), (2) conscious non-mastery (we are aware of it but we haven't learned it well), (3) conscious mastery (we have learned it but it still takes thought), and (4) unconscious mastery (we can do it without conscious thought). Nummela sees levels 2 and 3 as stressful. Ideally, 70% of teacher time should be in operation at the unconscious mastery level. But, Nummela hypothesizes that because of changes in what teachers are expected to do,
only 40% of teacher time is at the unconscious mastery level. Some of the educational changes that concern Nummela regard documentation of behavior, confronting problems regarding drugs, sex education, emotional needs. In mathematics, changes in curriculum and teaching style might well be added. And, new teachers are perhaps at level 2 or 3 in all that they attempt. If being unable to operate at the unconscious mastery level is a problem with experienced teachers, it must be doubly so with new teachers.

Burden's (1982) idea of developmental stages in teaching seems akin to Nummela's (1982) levels of mastery of new skills. Burden defines three states in teaching. The first year is the "survival stage," characterized by confusion and uncertainty. Concerns center around simply meeting professional responsibilities. Growth in professional skills comes later. This first stage, according to Burden, has different attendant anxieties. Therefore, different, more direct supervisory assistance is needed to help the teacher and to allay anxiety experienced in the first year.

Effects of Teacher Distress

Teacher distress does not benefit education. Veenman (1984) found that experienced teachers tend to express concerns about their students, while new teachers have more concerns about themselves. This result reflects the self preoccupation mode of the stress model and indicates a "self preservation" mode of thinking that may conflict with student needs.

Keavney and Sinclair (1978) connected high teacher anxiety to departure from the profession, pointing out that the educational resources used to train these teachers are thereby lost. In their review of the literature, they found teacher anxiety to correlate with lower rapport with students, less verbal support, more hostile behavior on the part of the teacher and less warmth. Best teachers, as determined by student ratings, were more relaxed and at ease.
Unfortunately, many teachers appear not to be relaxed. Blase (1986) found frequent reports of anxiety by teachers, with even higher numbers reporting frustration or anger. Cunningham (1983), Landwehr (1980), and Maslach (1982) all noted high teacher interest in stress workshops.

Holt et al. (1987) summarized research indicating that teacher anxiety and its consequences continue to worsen. More teachers are reporting high levels of stress, absenteeism is increasing, fewer teachers are staying in the profession, and more say they would prefer another occupation. Golaszewski et al. (1984) found that about one third of the teachers in their study reported high levels of stress.

Other evidence of negative effects of anxiety on teaching abound. Coates and Thoresen (1976) cite evidence that expectations of student competency affect the behavior of highly anxious teachers more than that of less anxious teachers. Blase (1986) found that anxious teachers reported a loss of enthusiasm and creative energy, reuse of old materials and development of plans with more emphasis on controlling students than on student learning.

In a study of student teachers, Kracht and Casey (1968) failed to find a significant correlation between anxiety and success of student teachers as measured by evaluations by their supervisors. However, correlations were found between anxiety and attitude, as well as between attitude and the evaluations.

On the other hand, musicians, performers like teachers, perform better under more stressful conditions and high anxiety (Hamann & Sobaje, 1983). However, these results held only for the highly trained musician. Less skilled musicians performed better under a less stressful condition. If these results extend to teachers, the effects of anxiety on experienced teachers becomes less clear, but anxiety's negative effect on new teachers is confirmed.

Doyal and Forsyth (1973) found students of more anxious teachers to also be more anxious. In a similar study Stanton (1974) failed to corroborate
this correlation. In fact, in the latter study, teacher anxiety scores correlated negatively with same-sex student anxiety scores. The Stanton study involved open classrooms, both male and female teachers, and took place in Australia. Doyal and Forsyth used only female teachers in the study, did not have open classrooms, and did their study in the United States. Cultural differences could account for the different results between studies. Open classrooms might also have influenced results; in this situation, relaxed students might make teachers (of the same sex) nervous. Sex of teacher might also make a difference, since there is some evidence that females tend toward greater anxiety. The highly anxious in the Doyal and Forsyth study may, therefore, be more anxious than the highly anxious in the Stanton study. Implications of teacher anxiety on student anxiety are thus conceivable but evidence is mixed.

Precipitators of Teacher Distress

Problems relating to student discipline emerge consistently in the literature as a major stressor, despite highly varied approaches to investigating teacher stress. Whether teachers are asked about their concerns or their anxieties, whether they are experienced, novice or interns, they list issues concerning obstreerous behavior (Brown, 1984; Forman, 1982; Friedman et al., 1983; Gold, 1985a; Landwehr, 1980; Litt & Turk, 1985; Sharp, 1983; Sparks, 1983; Thompson & Ellis, 1983; Woodhouse et al., 1985).

Other difficulties for new teachers center around relationships with parents, administrators or other staff members (Fagan & Walter, 1982; Forman, 1982; Gold, 1985a; Iwanicki, 1983; Litt & Turk, 1985; Sharp, 1983; Sparks, 1983; Thompson & Ellis, 1983; Vittetoe, 1977; Woodhouse et al., 1985). A high work load in combination with limited time is frequently mentioned (Brown, 1984; Cunningham 1983; Daniels, 1985; Forman, 1982; Friedman et al., 1983; Gmelch, 1983; Iwanicki, 1983; Landwehr, 1980; Litt & Turk, 1985; Nummela, 1982; Riccio, 1983; Sharp, 1983; Sparks, 1983; Woodhouse et al., 1985).
Class size was found to be a predictor of emotional exhaustion by Russell et al. (1987).

The term "control" is a pervasive one in the literature, involving more than the desire for control of one's students, as in "classroom control." Blase (1986) describes control and time issues as keys to the problem of stress in teaching. Daniels (1985) suggests that those events furthest from the control of the teacher are precisely those which cause the most distress. Stressful events beyond teacher control include large classes, poor salary, tight budgets, inadequate facilities, minimal respect by the community, and educational decision-making which does not involve the teacher (Brown, 1984; Daniels, 1985; Forman, 1982; Iwanicki, 1983; Kyriacou & Pratt, 1985; Litt & Turk, 1985; Schwab & Iwanicki, 1982; Sharp, 1983).

Peters (1981) and Friedman et al. (1983) cite extensive evidence that the perception of helplessness is a major factor in affecting distress responses. Halpin, Harris, & Halpin (1985) found locus of control of teachers to be correlated to distress ratings. Thus, teachers are more distressed when they perceive control of events to be out of their hands. Sadowski and Blackwell (1987) found this effect to be true for student teachers, as well. Linn & Zeppa (1984) found similar correlations for medical students. According to Lazarus and Folkman (1984) actual control is less important than perception of control.

In the case of new teachers or student teachers, a concern is frequently expressed in the literature that prior expectations do not match the reality of the job. Such unmet expectations thus precipitate anxiety or other stress reactions. Teacher training comes under fire for encouraging, or failing to discourage, unrealistic expectations (Forman, 1982; Gmelch, 1983; Gold, 1985a; Houston & Felder, 1982; Malanowski & Wood, 1984; Peters, 1981; Riccio, 1983; Schwab & Iwanicki, 1982; Sparks, 1983).

Additional mismatching between expectations and reality is also evident in mathematics classrooms. A survey of beginning teachers in Oregon by Munkres et al. (1984) asked 14 forced-choice questions regarding adequacy of
preparation, usefulness of workshops, teaching assignments, and expectations. Of the seven teaching groups described, the average mathematics/science ratings represented an extreme in 6 of the 14 questions. The only significant chi-squares showed that mathematics/science teachers felt little need for additional preparation in subject matter or curriculum-instructional materials.

However, non-significant trends suggest a gap for mathematics/science teachers between what they expect and what they find. Scoring was from 1 to 4, with 1 representing "very poor," 2 representing "poor," 3 representing "well," and 4 representing "very well." Mathematics/science teachers rated the match between college preparation and the first teaching position at an average of 2.85, with 24.4% finding a poor match, a rating of 1 or 2. The average rating over all disciplines on the question was 3.01, with only 17.4% rating the match poor. Mathematics/science teachers gave a lower rating on this question than any of the other seven teaching groups, and they were second highest in numbers finding a poor or very poor match.

Mathematics/science teachers rated their adequacy of preparation for the first teaching position lower than any other group, an average of 3.00. Averaged over all disciplines, the rating was 3.14. Preparation was found to be inadequate by 13.6% of the mathematics and science teachers compared to 9.8% overall. The differences cited here were not statistically significant, but it does seem noteworthy that mathematics/science teachers gave lower ratings than the other teaching groups to all four questions related to preparation for teaching and a higher rating than the other groups for the question regarding subject matter preparation.

Schalock's (1977) descriptive report of first year teachers consists of graphs showing trends that seem similar to those of Munkres et al. When asked to rate contributions of college preparation to teaching functions, mathematics teachers showed more extreme fluctuations. Ratings by mathematics teachers of preparation for classroom instruction and management ranged much lower and appeared lower overall than ratings in those areas by
other teachers. Also, mathematics teachers' ratings of subject matter preparation ranged much higher and were higher overall as compared to other teachers.

Recent developments in mathematics education may help explain the apparent low match between expectations and reality for the mathematics teacher. Leaders in mathematics education are saying,

Students should be encouraged to question, experiment, estimate, explore, and suggest explanations. Problem solving, which is essentially a creative activity, cannot be built exclusively on routines, recipes, and formulas. (NCTM, 1980, p. 4)

NCTM (1989) adds, "Parents who expect students to do mathematics homework on paper at a desk rather than by gathering real data to solve a problem will be surprised" (p. 255). Furthermore, NCTM (1980) states,

Test scores alone should not be considered synonymous with achievement or program quality. A serious danger to the education of our youth is the increasing tendency on the part of the public to assume that the sole objective of schooling is a high test score. (p. 13)

The Oregon Mathematics Education Council (OMEC) adds that "National standardized tests are inadequate instruments for assessing the effectiveness of mathematics programs such as the one advocated in this OMEC document" (1986, p. 82).

NCTM (1989) is explicit about conflicts between current aims in mathematics education and reality in the schools, noting, "Many of these standards can be fully implemented only by changing [local] directives about the selection of texts, mandated testing...." (p.255). Further:

In too many schools, teachers will find it difficult to teach the mathematical topics or create the instructional environments envisioned in these standards because of local constraints, such as directives about which chapters or pages to cover, inadequate time for instruction, and the administration of tests. (p. 254)

Additional problems identified by NCTM are lack of resources, such as manipulatives, and lack of time for reflection and idea sharing. Regarding the
gap between teachers' experiences as students and current views of the ideal mathematics classroom, NCTM says, "Prospective teachers must be taught in a manner similar to how they are to teach-by exploring, conjecturing, communicating, reasoning." (p. 253)

The contrast between leadership views and classroom reality can be seen from a review of advertisements during the 1986-87 school year in three professional journals, The Arithmetic Teacher, The Mathematics Teacher, and (for comparison) The Science Teacher. Issues were examined, under the assumption that advertisers make it their business to address concerns of potential buyers. As previously described, mathematics leaders found a need for hands-on, manipulative materials to develop conceptual understanding. However, of 18 issues containing 33 different advertisements, the existence of suggestions for manipulatives was mentioned twice. In contrast, 25 different ads mentioned review and practice of basic skills and computation. Three ads were for laboratory materials and the remainder were for textbooks.

On the other hand, in science, where the hands-on approach has long been accepted, the ratio was much higher. The nine issues of The Science Teacher for the 1986-87 school year contained 10 ads for lab equipment out of 31 total different ads. Also, the textbook ads more frequently advertised that they contained suggestions for hands-on exercises. It appears that in mathematics, school demands are for textbooks while leadership demands are for hands-on experiences.

Cooney's (1985) case study of the problems of a first year mathematics teacher illustrated another aspect of mismatch between expectations and reality. In this case, the teacher became frustrated and anxious in his attempts to use problem solving situations to motivate interest in mathematics. Such "games" did not match student expectations of how mathematics lessons should proceed, especially with lower ability students. The teacher, having a lack of similar experience during his own school days, did not have a clear expectation of what to anticipate in these lessons. Thus, students rejected the
approach, and the teacher had no bases for finding a way to improve without reverting back to the "teacher tell, student practice" strategies of teaching.

Davis' (1983) review of mathematics instruction also documents the conflicting demands on mathematics teachers. Here, the mismatch of expectations is extended to the community. Many pre-college mathematics teachers share with most parents the view that mathematics is a specific, limited set of algorithms. Culture shock seems to result from trying to extend that view to an open-ended set of techniques involving relatively imprecise heuristics. Yet, research reviewed by Davis indicates that mathematical thinking is improved by encouraging students to do precisely that. Thus, a special problem for mathematics teachers involves serious conflict in views about how the teacher should teach in the mathematics classroom.

A second source of concern particular to the mathematics teacher is that of math anxiety on the part of students. Since math anxiety as a construct has been so widely discussed (Battista, 1986; Baum, 1984; Burton, 1984; Ferguson, 1986; Frary & Ling, 1983; Greenwood, 1984; Kelly & Tomehave, 1985; Martinez, 1987), it is likely to be part of the new teacher's concerns. Frequently, teachers are the recipients of blame for math anxiety or the hope for its prevention (Burton, 1984; Frary & Ling, 1983; Greenwood, 1984; Kelly & Tomhave, 1985; Martinez, 1987). In the advertisements mentioned above, references to success, confidence, enthusiasm or motivation were among the most numerous (21 references). Such frequent reference is another indication that many mathematics teachers are concerned about the feelings of success or enthusiasm of their students. Although the concern is certainly shared by teachers in all subjects, mathematics is uniquely attached to the label "anxiety." Hence, awareness of student math anxiety leads to a major concern for mathematics teachers.
Anxiety Interventions

The potential for alleviating distress occurs at several points along the stress chain. First, one may modify physiological responses to stress through relaxation training. Second, one’s estimate of the impact of the stressor may be changed. Third, stressors themselves may be minimized.

Many stress workshops take the first approach, utilizing meditation and/or relaxation exercises (Daniels, 1985; Forman, 1982; Friedman et al., 1983; Landwehr, 1980; Remer, 1984; Sharp & Forman, 1985; Sparks, 1983; Underwood, 1981). Diet and exercise are potential moderators of stress reactions as well, affecting the body’s ability to handle physiological stress (Gmelch, 1983; Peters, 1981; Remer, 1984; Sparks, 1983; Woodhouse et al., 1985).

The second approach, changing the subject’s evaluation of a stressor, is sometimes accomplished through deep relaxation. Such relaxation appears to be an enabler of a reappraisal process often termed cognitive restructuring (Daniels, 1985; Forman, 1982; Friedman et al., 1983; Holroyd et al., 1983; Landwehr, 1980; Meichenbaum & Cameron, 1983; Peters, 1981; Sharp, 1983). This technique encourages the subject to regard the situation as a challenge, not a threat. Positive "self talk" is emphasized.

Reevaluation of the impact of a stressor usually involves changing one’s view regarding personal resources available to cope with the stressor. Change may occur through acquisition of coping techniques. The issue of control is important here, since, to cope, one must take control either of the situation or of one’s reaction to it. Such control may be actual or perceived (Friedman et al., 1983; Gold, 1985b; Lazarus & Folkman, 1984).

Gmelch (1983) suggested an effective first step in stress management: defining those aspects over which one has some control, and focusing attention on them. Goal setting becomes a part of the process. Friedman et al. (1983) did not consider the issue of control to be as limited, however. Included in their
workshop on stress management was a session in which participants were helped to diminish negative self-talk. Friedman et al. postulated that subjects thus became aware of control over one's own internal responses to stress. In a similar vein, Forman (1982) emphasized that one has control over personal emotions, that they "are not the direct result of objective events but are a product of the view an individual takes of them" (pp 182-183). Both Friedman et al. and Forman were effective in reducing distress, although both approaches included other aspects such as relaxation techniques as well as changing perception of control.

It seems relevant that of the workshops previously cited for reducing teacher anxiety, none were directed toward new teachers and only Underwood (1981) focused on student teachers. New teachers have many problems in common with experienced teachers, and, therefore, would be equally likely to benefit from relaxation training and cognitive restructuring. However, the specific problems of new teachers and those of mathematics teachers might also be reduced by attention to minimizing the stressors themselves.

A general case in reducing anxiety by reducing stressors can be found in workshops in classroom management. These workshops have been effective in reducing anxiety even in experienced teachers by helping them develop a plan for recognizing stimuli that are potentially stressful and acting early to minimize them (Derrick, 1985; Sharp, 1983). Other coping devices, such as deep breaths, also form an important part of a teacher's repertoire. Control is gained over one's own emotions rather than the environment itself, but is nonetheless an effective means of minimizing distress (Daniels, 1985; Forman, 1982; Landwehr, 1980; Peters, 1981; Sharp, 1983; Sparks, 1983).

Low pay, lack of time, or minimal input into the decision-making process are stressors that are unlikely to change through workshops or booklets. However, to the extent that new teachers are unprepared for such stressors, the additional stress of surprise can be addressed. Preparation for stress becomes a means of eliminating anxiety (Gold, 1985a; Iwanicki, 1983; Peters,
Restructuring can also help teachers view problems over which they have no control as not relevant, battles that the wise avoid.


While these criticisms seem misdirected given the frequency of such topics in education classes, the difficulty may be that solutions are presented in preservice classes to problems that are not understood until later, in the classroom. Also, the word "specific" is a key. Generalities made out of the context of the mathematics classroom may not be particularly helpful. How much drill can take place before a general class rebellion occurs? How much open-ended problem-solving can be attempted before a child reacts negatively to the threat to his view of math-as-absolute? And, just how belligerent might a child get? What does one write on a discipline referral? Will the child be sent back with no change except a feeling of triumph? What can be used to motivate a child who arrives in class with no book, paper or pencil? How can one motivate a child who makes it clear the moment he walks into class that he hates teachers, school, mathematics, authority and perhaps life in general? Sharp (1983) found that even for experienced teachers, a workshop in the specifics of classroom management and a workshop in stress management were equally effective in reducing anxiety.
A mentoring program is another means of helping new mathematics teachers. If the mentor also teaches mathematics classes at about the same skill level as those of the protégé, help is available for management problems and more mathematics-specific problems.

Mentoring allows social support as well as support in dealing with specifics. Social support plays an important role in circumventing anxiety, probably at the appraisal level of the stress chain. Support enables people to feel able to handle more demands. Some experimental validation of the role of support, in noneducational settings, has been supplied (Norbeck & Tilden, 1983; Thoits, 1984). Additionally, Russell et al. (1987) found that among their many predictor variables for burnout, only supervisory social support was significant. High support from supervisors was related to low rates of burnout. Teachers who were less burned out reported that their skills were respected by others. The need for open communication, avoidance of isolation, working collectively for changes in education, or of giving and getting support from colleagues is mentioned frequently in the literature (Cunningham, 1983; Daniels, 1985; Gmelch, 1983; Gold, 1985a; Iwanicki, 1983; Kyriacou & Pratt, 1985; Peters 1981; Remer, 1984; Riccio, 1983; Sparks, 1983; Underwood, 1981).

Hence, formal mentoring programs have become common. Some programs involve mentors who have been released from classroom duties (District of Columbia Public Schools, 1985), who are retired teachers (Gold & Pepin, 1987), who have been released part-time (Wagner, 1985), or who remain full-time teachers (Heck & Blaine, 1989; Henry, 1988; Klug, 1988; Parker, 1988). Many programs have included training for mentors (Gold & Pepin, 1987; Parker, 1988; Wagner, 1985), workshops for both mentors and protégés (Parker, 1988), and/or assistance from a teacher training institution (Heck & Blaine, 1989; Henry, 1988; Klug, 1988).

No studies were found which measured the effect of mentoring on anxiety, but mentors and protégés report that mentoring programs are helpful (Brouillet, 1987; Brown & Wambach, 1987; Fagan & Walter, 1982; Gold &
Pepin, 1987; Henry, 1988; Huffman & Leak, 1986; Parker, 1988). Even if the only problems addressed were the isolation of teachers and the particular isolation of new teachers, mentoring surely is a benefit to new teachers.

Characteristics of the most successful mentors include availability and receptivity, the ability to maintain two-way communication, and teaching experience (Egan, 1986). Good mentors tend to be people oriented, altruistic, confident and flexible. They trust, respect and like their protégés (Gray & Gray, 1985).

Unfortunately, mentoring programs have not ended the difficulties of new mathematics teachers. Clemson (1987) pointed out that a personality match between mentor and protégé appears highly important, but is hardly considered in assigning mentors. Clemson further noted the need for time together to allow for growth of trust between mentor and protégé. Such growth cannot be assigned to happen between 2:00 p.m. and 3:00 p.m. on Wednesdays. Gray and Gray (1985) demonstrated the need for mentors to teach the same subject and grade level in a nearby classroom, yet many mentoring projects assign mentors a set of protégés who may not even be in the same building (District of Columbia Public Schools, 1985; Gold & Pepin, 1987; Wagner, 1985). Many schools do not have mentoring programs; some are unlikely to develop such programs because of small school size and inability to adequately match a new teacher with a mentor. Many other schools lack the financial base to provide mentor training or mentor time with the protégé. Certainly, location prohibits many schools from working with teacher training institutions; providing workshops for mentors and protégés also becomes problematical for these schools. It is difficult to find a mentor with a similar teaching assignment to that of the protégé and also insure that the mentor has enough time to effectively support the protégé. So, while mentoring is an important aide for beginning mathematics teachers, it is also important to search for additional resources.

One aspect of anxiety in new mathematics teachers is the need in teacher training for specific information (Underwood, 1981) about likely
classroom events. Such specific information would logically include suggestions for solving problems that arise. However, it makes little sense to provide solutions in preservice education to problems that are not fully recognized until a year or more later in the classroom. A reasonable question, therefore, might be whether such specific information could be provided concurrently with the teaching experience, and whether this information would alleviate anxiety in new mathematics teachers.

Little evidence was found in the literature of attempts to supply new teachers with information specific to subject area and/or age level of students. However, medical studies have demonstrated the beneficial effects of specific information regarding forthcoming procedures and the physical sensations they create. Such information reduced anxiety and improved physical recovery from surgery (Melamed et al., 1983; Peterson et al., 1984; Siegel & Peterson, 1980; Wallace, 1984). Peterson et al. found information about coping techniques to be effective for children about to undergo dental work for the first time. But cognitive information about the procedures and sensations about to be encountered was equally effective. Siegel & Peterson, also working with children, found cognitive information about soon-to-be-experienced sensations as effective as relaxation training, with both groups faring better than the group with whom the issue was avoided. The results suggest that having information enabled subjects to evaluate subsequent stimuli as normal and nonthreatening.

An opposite effect was reported by Melamed et al. (1983), but in a study involving information-giving prior to surgery with children who had already had prior surgical experience. Information provided in the Melamed study included reassurance, but not coping techniques. It may be that the experienced patients were not informed by the Melamed presentation, but were just asked to dwell more on what they already understood would involve unpleasantness.

Wallace (1984) established that information directed to adults is effective in written form. The mode of information-giving in the Wallace study was “a maximally informative booklet containing accurate information about the
stressor and suggestions of how to cope with preoperative fear and postoperative symptoms" (p. 64). The essential elements of Wallace's booklet included information about procedures, sensations, emotions and possible means of coping with those emotions. Such a description matches well with the concerns of educators regarding the informational needs of the beginning teacher.

In education, specific information given in a workshop format has been helpful. Sharp's (1983) workshop in classroom management is one example. Also Pendarvis (1987) found significant reduction in science teachers' anxieties about the teaching of science when they had completed an inservice program on science integrated processes.

Gage (1979) elaborated on the need for solutions to educational problems that are as specific as possible. Even problems such as discipline that appear to be general throughout education may in fact depend on grade level, subject, or may even be specific to a particular topic at a particular age within a certain subject category. Gage suggested that it is wise to look for solutions to specific educational problems first, then look for applications more generally.

To ameliorate the problems of new mathematics teachers, it seems helpful to have specific "survival" information in booklet form as done by Wallace (1984) for surgical patients. In this form it would be available to all new mathematics teachers at all times. The Wallace study together with those of Pendarvis (1987) and Sharp (1983) provide some evidence that anxiety of new mathematics teachers would thereby be reduced.

Implications

High levels of stress appear to be both frequent and counterproductive for the new teacher. Information-giving about specific common reactions and sensations has been a successful intervention in studies of anxiety in surgical
patients. While information is what preteaching training is about, this information may not be sufficiently specific and is removed in time from the experience of teaching stressors. A potential remedy is a survival guide which is specific in addressing common problems of beginning mathematics teachers.

Bain and Wendt (1983) have created a guide for the beginning health and physical education teacher. However, no indication of its effect was cited; also, no similar survival guide has been found specifically related to the needs of the new mathematics teacher. There is no evidence in the literature of any attempt to evaluate the effect on anxiety of a situation-specific survival guide for beginning teachers.

A written guide for new mathematics teachers appears to have a number of advantages over other means of helping that teacher. It is available at any time of the night or day. It is inexpensive. While much of its information may have been previously addressed during teacher training, information becomes meaningful during the teaching experience when the need to resolve problems is intense. Also, problems of the new teacher become a little less frightening simply by inclusion in a listing of common problems in a survival guide. Even in districts in which mentoring or inservice programs have been instituted to help the new teacher, the guide’s availability and ability to address concerns specific to mathematics teachers would augment such programs. A carefully written guide can also be non-judgmental and supportive, an advantage for teachers not involved in a mentoring program or for those whose mentors are untrained, unmatched in personality or philosophy, or who also hold a supervisory roll (Bullough, 1989; Fagan & Walter, 1982; Gray & Gray, 1985; Wagner, 1985).

If Wallace’s (1984) example from the medical field is followed, it appears that information should be as specific as possible to the teacher’s situation, should be highly concrete, and can be in written form. Sources of teacher stress that should be addressed in a survival guide include difficulties in classroom management and discipline. The guide should discuss other interactions with students, administrators, parents or staff. Time management
skills should be incorporated. Realism is essential. Knowledge of what is to come, to allow the teacher to prepare in advance for stressors, is needed. Methods are needed for identifying those elements in the teaching environment that are within the control of the teacher. Means are needed of cognitive restructuring to gain internal control where external control is unlikely. Suggestions for health, relaxation and social support are appropriate. Information-giving in itself should be non-judgmental and supportive.

The specific sources of stress that should be addressed in an informational intervention for new mathematics teachers include means of balancing opposing goals of mathematics teacher leadership and of leaders at the school/district level. It should include specific models or strategies for incorporating some of the topics and techniques suggested NCTM (1980, 1989) into the rigid, paper/pencil curriculum most likely outlined by the new teacher's district. Means of surviving in the midst of contradictory expectations must be addressed. A written intervention must suggest ways of counting student math anxiety. Building of student self-esteem in mathematics may have much in common with incorporating some new techniques, such as hands-on activities. Since mentoring has largely been found to be helpful to new teachers, some of the characteristics of the successful mentor should emerge in the writing style of the survival guide. In particular, the guide should display warmth toward, acceptance of, and respect for the new mathematics teacher.

Use of such an informational guide should make a difference in the state anxiety of new mathematics teachers. However, an important additional factor affecting state anxiety is the individual's trait anxiety. Further, the literature on anxiety suggests that trait anxiety might influence effectiveness of any intervention. Those with low trait anxiety might actually be made more anxious, at least initially, by reading a guide addressed to problems they are likely to encounter. Concerns of median to high trait-anxious teachers, on the other hand, would have emerged early and be calmed by such a guide.
Chapter 3
Method

Overview

A survival guide, Green Broke, for new mathematics teachers was carefully designed. Guidelines from the literature and a Delphi panel of experienced mathematics educators were used to establish content needs. Editing was done by some of the same mathematics educators for content, and by experienced writers for style. A listing of panel members and editors is provided in Appendix A.

Beginning mathematics teachers were identified through current lists of student teachers or applicants for certification at colleges in Oregon, Washington, and California. A randomly selected experimental group was asked to read a new teacher guide and evaluate its helpfulness. All subjects were asked to complete both trait and state anxiety inventories prior to the start of school and additional state anxiety inventories three times during the school year. Two teacher reports were completed along with two of the anxiety inventories. An effort was made to keep subjects from making a connection between the booklet and the anxiety inventories.

Analysis of covariance evaluated effects of the new-teacher guide on state anxiety with trait anxiety as the covariate. Also fluctuations in state anxiety over time were evaluated and teacher state anxiety was compared to norms given by Spielberger (1983).

Subjects

Numerous teaching training institutions in Oregon, Washington, and California (Appendix B) provided lists of students completing student teaching in mathematics or applying for certification for teaching mathematics during the
1988-89 school year. An initial list of such institutions was compiled through suggestions from mathematics specialists in each state. Suggestions from college contact persons for contacts at additional institutions were followed. Some institutions did not respond to request letters or phone calls. Some were unable to provide information about graduates because of human subjects concerns or because current information was not readily available. Thus, sampling is not necessarily representative of West Coast beginning mathematics teachers.

A list of 132 recent graduates in mathematics education was generated. A letter (see Appendix C) was mailed to each graduate, requesting participation in "a research study designed to tell us a little more about the stresses of first year teaching," if they had found a teaching position by August 10. One form of this letter was signed by Doyle E. Winter, Deputy Superintendent of Public Instruction for the State of Washington. This version went to potential subjects in Washington. A second version, sent to potential participants from Oregon and California was signed by Milt Baum, Associate Superintendent, Oregon Department of Education. Both versions also cite support by Dr. James R. Smith, Deputy Superintendent, California State Department of Education. Dr. Smith's permission to indicate his interest in the research is stated in a letter provided in Appendix C.

A subsequent postcard (Appendix C) was sent in mid-August extending the time period for volunteering. There were 27 responses. An attempt was made in late August to contact 83 of the remaining persons on the list by phone. Of the 38 actually contacted, 26 had not found teaching positions, 9 had recently found a position and volunteered to be in the study, 1 did not have a position at that time but later found one and volunteered for the study, 1 had taught previously, and 1 had not completed the teaching training program.

Of the resulting 37 volunteers, 2 did not actually have teaching positions, 1 had a position at a ski school that met only during ski season for individual tutoring, 1 quit in November, and 1 taught mostly nonmathematics classes.
These 5 were thus omitted from the study. Another 4 dropped out of the study when the first questionnaire was sent. The remaining 28 subjects were in the study for the 1989-90 school year, except that 1 failed to return the last survey.

Subjects were screened for prior experience. Maximum experience was a trimester of teaching or a few months of substituting. Subjects also were screened for adequate mathematics background. All subjects had at least 31 quarter credit hours in mathematics, with 19 subjects having over 41 quarter credits or equivalent. Finally subjects were screened to ascertain that they were teaching mathematics at least half-time. One teacher who taught mostly science was eliminated from the study.

Subjects were randomly placed in control or treatment groups. Those in the treatment group were asked (Appendix C) to participate in a second, seemingly unrelated study. All volunteered.

**Development of Guide**

A panel was formed to create, using a Delphi-type technique, a set of criteria for a guide for first year teachers in mathematics. The ten-member committee included the Oregon state mathematics specialist, two college level mathematics educators, a high school administrator and six public school mathematics teachers. The latter included teachers in Oregon, Washington, and California, large and small districts, inner city and remote isolated communities, middle and high school levels, and experience ranging from 1 to 30 years.

An initial survey (Appendix D) was mailed to members of the panel, with a set of criteria indicated by the literature to be of importance for new teachers or for mathematics teachers. Panel members rated the importance of each criterion, made copious comments on each, and suggested additional criteria.

On the second round (Appendix D), panel members were provided with first round results including average ratings on initial criteria, comments, and
additional suggested criteria. In this round the panel clearly identified which
topics were very important, which were important but less critical, and which
were perhaps helpful but not vital.

Six members of the panel also edited the survival guide, *Green Broke*.
Editors included one college and five secondary mathematics educators. Care
was taken to preserve the same range of experience, locale and grade levels
as on the original panel.

A first draft was sent to the editors. They evaluated it using an
evaluation form (Appendix D) suggested by criteria selected by the panel. They
also suggested specific additions/deletions within the guide itself. A revised
draft was sent with the same evaluation form as on the first draft. Suggestions
on the second draft were minor; all editors indicated a high level of satisfaction
with *Green Broke*.

Finally, two non-mathematics teachers edited the guide for style. The
primary style editor was a published writer as well as a secondary teacher. All
editors received the final version of *Green Broke* and remained highly satisfied
with content, tone, and style.

**Questionnaires**

Two questionnaires were written, the New Teacher Project Teaching
Report and the Survival Guide Questionnaire (Appendix E). Each questionnaire
had two slightly different forms, one for fall and one for spring. The New
Teacher Project Teaching Report was sent to all subjects twice allowing them
more input than was possible from the State-Trait Anxiety Inventory (STAI). It
was evaluated informally for patterns between groups or between high and low
anxiety. Comments were grouped by type to determine possible trends.

The Survival Guide Questionnaire was also sent twice, but only to the
treatment group. Its primary purpose was to create distance between *Green
Broke* and the anxiety inventory. Different format and different return addresses
were used for any correspondence related to the survival guide. Evaluation, however, was similar to that of the New Teacher Project Teaching Report above.

**Instrument**

Spielberger's State-Trait Inventory (STAI) is perhaps the most used and respected of anxiety inventories. It is rated highly in Buros (1978). Normative data is abundant and supportive, although Spielberger (1983) makes it clear that "norms are not based on representative or stratified samples" (p. 4). Further, these norms were based on an earlier version of the inventory. Correlations between the two versions ranged from .96 to .98, and "STAI scores reported by other investigators for samples drawn from similar populations are quite comparable" (p. 4-5).

The STAI tests both transient (state) and stable (trait) anxiety (Gaudry & Spielberger, 1971; Spielberger, 1983; Spielberger, Vagg, Barker, Donham & Westberry, 1982). Each inventory consists of 20 questions and takes five to ten minutes to complete.

Test-retest reliabilities (Spielberger, 1983) of the state inventory vary from .16 to .62, a reasonable result since the A-state test is designed to measure a variable construct. A-trait measures a more stable characteristic, and test-retest reliabilities for it are from .65 to .86. Alpha reliabilities on KR-20 tests range from .86 to .95 on the state measure and .89 to .96 on the trait measure.

The trait inventory differentiates between normal and neuropsychiatric subjects and correlates to other anxiety measures. The state measure varies in the appropriate direction with change in stress level of the experimental condition. The latter measure also changes with simulated changes in stress, which is indicative of one possible flaw, its vulnerability to faking. However, in medical studies utilizing available somatic indicators of stress such as blood
pressure together with the A-state inventory, results were in the same direction with each measure.

Of 22 research studies reviewed involving anxiety in teachers, 33% used the STAI as at least one measure. The same percentage prevailed in non-education research on anxiety. The remaining 67% of the studies had little commonality regarding measures. The next highest use of a measure was 9%.

**Experimental Procedure**

Ideally subjects would have taken a trait anxiety inventory early in the summer when influence both of teaching and college study was minimized. Ideally, too, the survival guide would have been sent shortly thereafter. However, many teaching positions are filled late in the summer, and only about 30% of the candidates find positions at all. Thus, it was not practical to involve the entire group of graduating students in mathematics education and it was necessary to wait until mid-August to begin the experiment.

All subjects were mailed both the State and Trait forms of the STAI on August 23, 1989. In each mailing, non-returns were followed by a hand-written postcard reminder; finally, if necessary, a phone call was made to maintain a 100% response level. Heberlein and Baumgartner (1978) found that follow-up contacts and personal contacts such as phone calls increase survey response rates.

Requests to participate were also mailed to members of the treatment group on August 23, 1989. The guide was sent as soon as a response was received. All subjects had returned the STAI prior to receiving a guide, and, with the exception of one subject who was hired just before school started, all members of the experimental group had at least Labor Day weekend to peruse the guide.

The state form of the STAI was sent three additional times, December 1, 1989; March 1, 1990; and May 10, 1990. December and May mailings also
included the New Teacher Project Teaching Report and a one-dollar bill with the suggestion that the subject "take a break on us" to fill out the questionnaires. Heberlein and Baumgartner's (1978) research on survey returns also suggested the latter strategy in improving survey response rates. All surveys were returned with one exception on the last mailing.

Questionnaires regarding the survival guide were mailed in late September and early June. Of the 14 teachers in the treatment group, 11 returned the first questionnaire and 10 returned the last one. Non-returns were less rigorously pursued, since the purpose of these questionnaires was primarily to motivate reference to the guide and to give a sense of follow-up to this "separate" study.

Analysis

Analysis of covariance for repeated measures was utilized. The dependent variable was state anxiety, with trait anxiety as covariate. Independent variables were group (treatment/control) and time of measurement. Interactions between group and trait anxiety, and group and time, were considered, with level of significance set at .05.

In addition, a t-test was used to compare STAI scores of the sample of new mathematics teachers with norms given by Spielberger (1983) for young working adults (ages 19-39). A 95% confidence interval was used.

Finally, descriptive data from the questionnaires was assessed. Patterns and trends were described.
Chapter 4
Results

The purpose of the study was to determine whether written intervention in the form of a survival guide, Green Broke, reduced state anxiety in the treatment group, the new mathematics teachers who had the guide. Since individual trait anxiety has a large impact on state anxiety, analysis of covariance was done with trait anxiety as the covariate. An interaction term between group and trait anxiety was included in the analysis because it was possible that subjects would respond to the guide differentially. For example, the low trait anxious might actually have had higher state anxieties as a result of reading about problems that they may otherwise have ignored.

Fluctuating demands during the school year and fluctuating levels of state anxiety found in other studies required time to be included as an independent variable in the analysis. Finally, interaction between group and time was considered because any differential effect of the guide on state anxiety was likely to vary with the general level of anxiety over time. Actual data are given in Appendix F.

As Table 1 shows, mean state anxiety was consistently higher than mean trait anxiety in both groups. Contrary to expectations, those having the survival guide had higher state anxiety on the average than those without the guide. However, the treatment group also had higher trait anxiety, and the increase in state anxiety compared to trait anxiety appears to be somewhat less for this group as compared to the control group.
Table 1. Means and standard deviations for each group

<table>
<thead>
<tr>
<th>Trait</th>
<th>Control N=14</th>
<th>Treatment N=14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std</td>
</tr>
<tr>
<td>Trait</td>
<td>32.857</td>
<td>6.467</td>
</tr>
<tr>
<td>State, T₁</td>
<td>39.857</td>
<td>9.859</td>
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<tr>
<td>State, T₂</td>
<td>39.786</td>
<td>13.174</td>
</tr>
<tr>
<td>State, T₃</td>
<td>37.286</td>
<td>12.946</td>
</tr>
<tr>
<td>State, T₄</td>
<td>38.714</td>
<td>11.585</td>
</tr>
<tr>
<td>Mean State</td>
<td>38.911</td>
<td>10.076</td>
</tr>
</tbody>
</table>

*T₁, T₂, T₃, T₄ represent the four times of measurement

*based on average state for each subject over four measures

Inferential Data

Each hypothesis will be restated in null form and evidence for rejecting it will be discussed. Significance level for each test was set at p<.05.

H₀₁: After adjusting for trait anxiety, there will be no significant difference in state anxiety between the group of new mathematics teachers who have the survival guide, Green Broke, and the control group with no such guide.

As shown in Table 2, F(1, 23) = .21, p<.65. Thus, there is no evidence for rejecting this hypothesis. The guide appeared to have no significant main effect on state anxiety.

H₀₂: There will be no significant interaction between the effects of group and time on state anxiety.

From Table 2, F(3, 75) = .59, p<.62. Hence there is not sufficient
evidence to reject this hypothesis. The time of year did not appear to
significantly alter the effect of the guide on state anxiety experienced by new
mathematics teachers.

\[ H_{03}: \text{There will be no significant interaction between the effects of group and trait anxiety on state anxiety.} \]

As shown in Table 2, \( F(1, 23) = 5.51, p<.03 \). Therefore, evidence is
sufficient to reject the hypothesis and to infer that there is a significant
interaction between trait anxiety and group in explaining variance in the state
anxiety of new mathematics teachers. Thus it appears that the survival guide
has a differential effect on state anxiety, depending upon the trait anxiety of the
subject.

Table 2. Analysis of covariance for state anxiety over four measures and two
groups, based on individual trait anxiety

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Sqr</th>
<th>Mean Sqr</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>group</td>
<td>1</td>
<td>50.1084</td>
<td>50.1084</td>
<td>.21</td>
<td>.650</td>
</tr>
<tr>
<td>trait</td>
<td>1</td>
<td>2642.1916</td>
<td>2642.1916</td>
<td>11.17</td>
<td>.003*</td>
</tr>
<tr>
<td>grpXtrt</td>
<td>1</td>
<td>1303.4700</td>
<td>1303.4700</td>
<td>5.51</td>
<td>.028*</td>
</tr>
<tr>
<td>error btw</td>
<td>23</td>
<td>5436.9500</td>
<td>236.3891</td>
<td></td>
<td></td>
</tr>
<tr>
<td>time</td>
<td>3</td>
<td>35.52</td>
<td>11.84</td>
<td>.25</td>
<td>.861</td>
</tr>
<tr>
<td>grpXtime</td>
<td>3</td>
<td>82.46</td>
<td>27.49</td>
<td>.59</td>
<td>.623</td>
</tr>
<tr>
<td>error w/1</td>
<td>75</td>
<td>3520.40</td>
<td>46.94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Interaction between Treatment and Trait Anxiety

If the guide had had a main effect, regression curves for state anxiety as
related to trait anxiety would have been parallel for the two groups of the study.
Such parallel curves would have demonstrated lower anxiety for one group,
dependent on trait anxiety. On the other hand, an interaction effect with no main effect normally indicates that the two curves are nonparallel. Lines of this type illustrate higher anxiety in the treatment group for some of the range of trait anxiety, and lower anxiety over the remainder of that range. However, in this study no such straightforward explanation applies.

Table 2 shows that for all subjects, trait anxiety explains a significant portion of the variance in state anxiety \( (F(1, 23) = 11.17, p < .003) \). This effect is clear in the control group, as demonstrated in Figure 1. The state anxiety of the control group is given by the regression equation:

\[
y = 1.34x - 5.10
\]

where \( y \) is mean state anxiety for the individual over four measures and \( x \) is individual trait anxiety. \( R = .87 \) for this relationship.

As Figure 2 demonstrates, the interaction between trait anxiety and treatment appears to have substantially confounded the relationship. The best
linear fit obtained for the treatment group had an $R$ value of .10. Various nonlinear transformations were tried, with the best fit (quadratic) still only having an $R$ of .41.

Figure 3 demonstrates how it is possible that trait anxiety explains a significant portion of the variance in state anxiety for all subjects, while regression over trait anxiety fails for the treatment group. It is evident that there are four extreme values, denoted $T$ and $C$, of which three represent treatment group scores.

In fact, from Figure 4, it seems possible that the treatment group may be comprised of three subgroups, the upper extremes (denoted by $T_3$ on the graph), a small subgroup that behaves more like the control group ($T_2$), and a large subgroup ($T_1$) which behaves in a linear fashion. One subject ($T$) seems to fit with all of the subgroups.

![Figure 3](image1.png)  
![Figure 4](image2.png)

Figure 3. State vs trait anxiety in treatment ($T$) and control ($C$) conditions  
Figure 4. State vs trait anxiety in treatment subgroups determined by experimental outcome
A linear regression was run on the T₁ subgroup with interesting results. The resulting equation was

\[ y = 1.24x - 12.27 \]

where \( y \) represents mean state anxiety over four measures and \( x \) represents trait anxiety. The \( R \) value for this equation for this subgroup is .87. An \( F \) test showed no significant difference in slope (\( F(1, 17) = 1.40, p < .26 \)) between the control group and this subgroup. Using the common slope, the regression equation for the control group becomes

\[ y = 1.24x - 1.98 \]

with \( x \) and \( y \) defined as above. The \( R \) value for this equation is .86; a minor change from that of the original regression equation. Figures 3 and 4 show these regression lines.

The regression line for the T₁ subgroup is well below that of the control group. These data suggest that possibly the survival guide has a positive effect on the anxiety of some new mathematics teachers. However, this subgroup is not defined by any of the variables in the study. Chapter 5 includes descriptive information gleaned from the questionnaires completed by both the T₃ and the T₁ subgroups that may help to determine additional variables for later studies to see if such a subgroup can indeed be defined. In this study, however, the failure to fit the experimental group data precludes any definitive conclusion except that the guide did have an effect dependent upon individual trait anxiety.
Chapter 5
Discussion, Incidental Findings, and Implications

In this study 14 new mathematics teachers in the three Pacific States formed a control group while 14 others were provided with Green Broke, a written intervention, or survival guide, for new mathematics teachers. Prior to the beginning of the 1989-90 school year, each subject was given a trait anxiety test. State anxiety tests were administered four times, in August, December, March and May. All subjects completed a teaching report in December and May. The treatment group was asked to complete a questionnaire regarding the survival guide in October and June.

There was no significant main effect for the guide; beginning mathematics teachers who had the guide did not have significantly lower anxiety levels than those without the guide. However, there was an interaction effect with trait anxiety. The exact nature of the interaction is not clear from this study; the linear relationship between state and trait anxiety observed in the control group was not evident in the treatment group.

State anxiety was not significantly affected by the time at which the anxiety test was administered. There was also no significant interaction between time and trait anxiety.

Discussion of Findings

Relationship of Trait and State Anxiety

The relationship in this study between trait and state anxiety was noted in Chapter 4 (F(1, 23) = 11.17, p<.003), and is predicted by theory (Gaudry & Spielberger, 1971; Spielberger, 1966). A person with high trait anxiety has a tendency toward becoming anxious. A measure of state anxiety under circumstances involving any degree of stress is therefore likely to be high.
Similarly, the measure of state anxiety in a person with low trait anxiety will generally be lower. Research cited by Spielberger (1983) confirms this relationship with one exception. In situations involving physical threat, trait anxiety does not predict state anxiety. Rather, in this case, state anxiety is uniformly high.

Since most research studies on anxiety involve psychological rather than physical threat, more attention needs to be paid to the relationship between trait and state anxiety. All of the studies involving anxiety that have been cited in this dissertation focused on changes in only one of the measures and may therefore have missed real differences or found non-existent ones.

Effects of the Time of Year

In this study, time was not a significant factor for explaining variability of state anxiety in new mathematics teachers. In contrast, studies done by Hembling and Gilliland (1981) and by Petrusich (1967) indicate significant changes of teacher anxiety depending on time of year. One explanation of such contradictory findings is that effects of time were diluted by the design of this study. Questionnaires were mailed, reminders were sent, phone calls were made, with the result that as much as a month may have separated the completing of the questionnaires by some subjects. Probably questionnaires were completed when the subject found time. Since time is a major stressor for these subjects, peaks of anxiety were possibly missed.

Better control of time factors is difficult because of differences in school districts. School starting times, vacation times, and report card dates vary between districts. Since each of these has an impact on school climate and demands on teachers, if there are patterns across time, those patterns may be difficult to discern. In contrast to this study, those by Hembling and Gilliland (1981) and Petrusich (1967) were done within a single district.

Individual differences over time in this study were highly varied. While
some subjects remained relatively constant, others varied greatly, in what appeared to be random directions. Some had large increases in state anxiety while others had large decreases. Group did not appear to have an effect on these changes, that is, the availability of the guide did not influence fluctuations in anxiety.

However, gender may affect fluctuations in teacher state anxiety over time. Figure 5 shows there are large, opposite variations by sex in state anxiety over the four times of measurement during the school year. There were 11 males in the study and 17 females. Caution must be used in drawing conclusions about sex differences in state anxiety, however. Three of the four extremes discussed in Chapter 4, and also in depth later in this chapter, were male. Thus, while sex differences may explain some variation, it is also possible that the patterns in Figure 5 are unduly influenced by the male extremes. Sex differences in Spielberger's normative tables are slight, never approaching statistical significance, with no trends toward one sex being higher in anxiety than the other.

Figure 5. Mean state anxiety for males and females at each of 4 times of measurement.
The High Anxiety Group

The presence of, and location of, three extremes (See Appendix F, subjects 70, 72, and 83) creates a major difficulty in interpreting the effects of the guide. These subjects, denoted by $T_3$ in Figures 3 and 4, Chapter 4, do not represent an extreme trait value, but rather what appears to be an unpredictable response in the middle range of the covariate. A few explanations for these outliers are possible.

First, the result may simply be a sampling problem. With a larger sample it would have been possible to determine whether these outliers were representative of the population. It may furthermore be a sampling problem that these three extremes were in the experimental group.

Secondly, it may be that there is truly a random relationship between trait and state anxiety due to the variety of stressors present in the classroom. Many factors not considered in the study suggest themselves as possible influences: class size, student age, student ability level, number of teacher preparations, teacher responsibilities outside of class, community support, administrative support, ethnic problems, drug problems; the list is lengthy. Physical threat is known to destroy the correlation between state and trait anxiety (Spielberger, 1966) and some of the items on the list of stressors may constitute physical threat. However, the strong relationship found in the control group appears to refute the possibility of randomness between state and trait anxiety. Diversity of teaching assignment and range of problems seem as great in the control group as in the experimental group.

Third, there may not be a simple low trait-anxious type. Some new mathematics teachers may be low trait-anxious because they ignore all danger signs until the situation is out of control, at which point state anxiety becomes extreme. This group would do little in the way of evaluating or reevaluating stressors; stressors do not exist and, therefore, are not a problem, or they do exist and are beyond control. Others may be low trait anxious because they
have observed potential stressors and have prepared for them. Or, perhaps
the only difference between these two groups is the effectiveness of
preparation.

Fourth, some part of the group that prepares to teach is not suited to the
vocation because of temperament or ability. Perhaps the high extremes belong
to this group.

Finally, the potential for upward swing in state anxiety is simply much
greater for the low anxious because of the upper bounds of the measure. A
person who chooses the lowest of four categories on the trait measure can go
up by 20 points on the state measure just by picking the second category. All
trait scores were at least 20 points from the top, but there may be a
psychological barrier against moving into the highest category. It seems
relevant that the mean in experimentally induced stressful situations is also 20
to 30 points from the highest possible score, as is the mean for patients
undergoing treatment for anxiety (Spielberger, 1983).

Mini Case Studies

Because the three treatment groups that appeared in the analysis in
Chapter 4 are not well defined, a mini-case study was done of seven subjects
using information from the questionnaires. Included are the three experimental
extremes, a control subject with high state anxiety, and three with low or
moderate anxiety for comparison. The purpose of these descriptions is to
generate hypotheses for future research to distinguish subjects more likely to
benefit from a survival guide from those whose anxieties were too high for such
an approach. Pseudonyms have been given to each subject discussed for
readability.

"Al," a member of the high-anxiety treatment group, taught in a medium
sized city in California, at the high school level. He had five classes, three of
which were at, or above, the second year of algebra. He taught two sections of Integrated Math first semester, and two of Math A second semester. He was hired close to the beginning of school and reported having no planning days prior to the students' arrival.

Al began the year with a state anxiety score well above his trait anxiety. His state scores steadily climbed throughout the year. In the meantime he acknowledged few problems when he responded to the teaching questionnaires. He rated the transition into teaching as "easy," and the difficulty posed by the subject matter as "low." He did admit to "moderate" difficulty with teaching concerns other than subject matter. He circled just two problem areas at the beginning of the year: discipline and finding enough time. By the end of the year he had added four more concerns: low student confidence, interaction with students, finding encouraging/helpful people, and problems with special students. He added "safety" when asked about other school related problems.

On three of the four surveys sent him, Al mentioned his work on a Masters of Arts in Teaching (M.A.T.) in mathematics, which he completed in June, 1990, at the end of his first year of teaching. He twice mentioned how challenging and time consuming this program was. His first child was also born during this first year of teaching, and he was involved in helping his wife, who was a graduate student, too. Al did not read Green Broke at all, nor did he refer to it. He rated all sources of help suggested on the questionnaires at the lowest level provided, with one exception. He did receive some help from administrators who listened to his concerns and promised to back up his actions in the classroom.

In another comment, Al describes students with "emotional problems (or intense hatred for white and/or authority figures)." He was "regularly threatened" by students; one student said he would break Al's back.

Al commented that he has been almost totally isolated since he started teaching, because he had so "little spare time to 'interact'." He took responsibility for his isolation, but also seemed to regard "interaction" as a
luxury indulged in by those with the time to spare.

When asked if new teachers should be getting more help, he responded similarly both at the beginning and end of the year. He felt that help should be there for those who need it. At the beginning of the year he added, "I feel adequate in the classroom because my previous job prepared me for this job." He was an engineer for over five years.

Al seemed to underestimate the difficulties he faced. He felt that his mathematics skills and his experience in using mathematics would make the transition into teaching easy. Further, he seemed reluctant to change his view despite mounting evidence to the contrary. Dropping the M.A.T. work second semester, to complete it during the summer, must have been a possibility. He staunchly maintained that the transition into teaching was easy, and continued to take on a massive set of new responsibilities. When he identified problems, they seemed disconnected from any personal limitations. Thus, he saw "discipline," "low student confidence" and "interaction with students" to be problems, while "designing lessons students understand" was not checked. He attributed his discipline problems to emotional problems of his students, and appeared to give little thought to other factors over which he might have more control, such as student self-confidence. He was aware that his extra commitments created stress for himself, but did not mention that these pressures may have translated into lack of time for his students. Nor did he perceive conferring with other teachers as a teacher problem solving strategy. Al seemed to simply look for help in the form of administrative action.

Al is returning next year. He plans to teach the same subjects at the same school.

"Bob," a member of the high-anxiety treatment group, taught high school mathematics in a small town of some ethnic diversity in Oregon. He taught six classes with four different preparations. One of these, weight training, was outside his area of preparation. He taught one consumer math class; his other
classes were algebra and geometry.

Like Al, Bob started the year with a high level of state anxiety compared to his trait anxiety. Unlike Al, Bob's anxiety peaked by March and ended up slightly lower than at the beginning of the year. A pattern of problem recognition and problem solving appears in his surveys.

Of the 11 problem areas described on the teaching report, the only one not a problem for Bob in December was "finding encouraging/helpful people." As with the majority of the subjects of this study, Bob rated subject matter low in difficulty, but other concerns high. He described the transition into teaching as "difficult." He experienced depression and anger. By May he was doing a little better, in that he described the transition into teaching as "OK." He continued to describe eight problem areas, experienced depression and anger, and additionally noted "increased tension." However, in December he had mentioned motivating students as a particular problem. By May he was able to report that through his own ingenuity he had found helpful motivational lessons.

Bob said in October that the help available was "about right," but by May he found too little help. He did attribute moderate help to other teachers and inservice programs. He read all of Green Broke and referred to it several times. However, Bob rated "personal ingenuity" highest in helpfulness. He listed professional journals and a book as helpful as well. The publications were The Oregon Mathematics Teacher, The Mathematics Teacher, and Teaching Mathematics by Sobel and Maletsky.

Bob mentioned his coaching position as a source of stress. His main suggestion for helping a new teacher was "don't coach. It takes too much time." He mentions a lack of personal time "and barely ..enough time to prepare the bare minimum for my students. I found myself 'winging it' much more often than I would have liked."

Bob has, in contrast to Al, made a beginning at recognizing and solving at least one problem, that of improving student motivation. He will return to the same subjects at the same school next year. He did not say whether he will
coach.

"Carl," the third member of the high-anxiety treatment group, also taught high school mathematics in a small Oregon town. He taught six classes with three different preparations first semester and two "preps" second semester.

Carl's first semester schedule included two classes each of general math, basic algebra and second year algebra. He said, "pardon my limited vocabulary, but GM [general math] sucks. I won't continue teaching if I am assigned general math class." Second semester he was assigned two second year algebra classes as before and four pre-algebra classes.

Carl's trait anxiety was low, so his state anxiety was especially high in comparison. The only downward fluctuation on the state measure was in March. Possibly at that time things briefly looked better when his teaching assignment was changed.

Carl identified five problem areas in December, most relating to discipline, student confidence and special students. He reported feeling anger. By May only the special students remained a problem and the anger had evidently subsided. He describes moderate difficulty posed by subject matter and high difficulty with other teaching concerns. He described the transition into teaching as "OK" and help offered as "about right." He received a lot of help from other teachers. In particular he needed, and received, help with the pacing of the material and realistic expectations of student skills. He read most of Green Broke and referred to it several times.

With regard to his problems with general math students, Carl says, "I try to understand that these students' life styles are very different, but that doesn't take the stress and discipline problems away." With the change to pre-algebra he no longer mentioned any discipline problems but did find it difficult to pace the class for a wider range of abilities. He felt that some students were placed above their skill levels.

Like Bob, Carl coached and felt that much of his difficulty came from
having "two full time jobs: teaching and head basketball coach." However, he described coaching as fun as well as stressful. In the December report Carl suggests that new teachers should be eased into teaching with perhaps just four classes first semester. He is considering leaving teaching if "next year is as much work and as stressful."

Like Bob, Carl has identified his problems and has made progress on some of them. Both have sought help, although Carl rates the help received more highly. Bob resolved some motivation problems while continuing to teach consumer math, but Carl managed a change in assignment. Carl plans to return to the same assignment at the same school next year. He did not mention whether he will continue to coach.

Of the four subjects who mentioned coaching, two are in the group with state anxiety 15 or more points above trait scores. Thus 50% of the highly anxious but only 8% of the others report coaching. The following subject is one of the two low anxious coaches and an interesting comparison to Carl.

"Mike," a low-anxiety member of the treatment group, happened to teach at the same high school as Carl, and he was Carl's roommate. Mike also coached basketball, perhaps as an assistant to Carl. Mike coached soccer as well. He taught pre-calculus, geometry and basic algebra classes first semester, apparently picking up Carl's basic math second semester instead of basic algebra.

Mike's mean state anxiety was low, below his trait score. His comments center primarily around the problems with time and the conflicts created by coaching. He commented that he needed most help in organization, including handling paperwork and make-up work. Mike generally rated help received much lower than did Carl. But he evidently felt much less need for help. Mike did not respond to either of the Survival Guide Questionnaires, possibly one small way of decreasing time pressures. Mike plans to return to the same position next year. He also did not mention whether he plans to coach next
"Darla," the most highly anxious member of the control group, taught at a private high school in a metropolitan area of Oregon. She taught five classes of geometry, grouped into basic, regular and honors levels.

Darla's high state anxiety is less surprising than that of the first three subjects reviewed because her trait anxiety was also at the upper end for all subjects. Her state scores started high and increased each time they were measured.

She reported seven problem areas in her first teaching report and forgot to complete that section in the May report. Her problems centered around discipline and student confidence issues. She also was unsure about what was expected of her. She reported inability to sleep, stomach upsets and depression. Like Al, her anxiety appeared to keep climbing throughout the year. Unlike Al, she received help: a lot from another teacher and some from yet other teachers and an administrator. As a member of the control group she did not have Green Broke as a resource.

Darla consistently described a need for help with discipline and for help with class rules. She talked out difficult situations to try to learn what she might have done differently.

Darla described the same problems in much the same way in December and in May. She did not seem to make much headway in a situation that was easier than those of earlier cases. She taught fewer classes, none of them remedial, and evidently had fewer outside commitments than Al, Bob, Carl or Mike. But her anxiety may have caused additional problems. She did not appear to see about 25% of one teaching report. She incorrectly filled out the information card with respect to the amount of mathematics she had studied. Similar lapses in the classroom could lead to inattention to potential disruption or breakdown in the teaching/feedback loop.
"Nancy," also a member of the control group, taught in the same high school as Darla. Nancy appears to have had a difficult mid-year change of assignment from high school algebra and pre-calculus to middle school standard and basic math classes. Nancy also mentioned a two-year old child who made it difficult to find time evenings and weekends for school work. She made comments about the stress created by the time crunch.

Yet, Nancy's mean state anxiety was only slightly above her trait anxiety score. Her other comments are positive, about help with discipline she has received from English teachers, counselors and administration. She said that the district provides an administrator to observe new teachers once a week. She credited this administrator for giving lots of great advice, reinforcing effective things she was doing, and helping her to "get cooperative learning off the ground." She also mentions trying to provide success sometime for each student in her basic classes, because otherwise they give up easily.

Thus Nancy, despite her additional responsibilities at home, aggressively went about resolving her most pressing teaching problems. Darla, on the other hand, more passively wished for a mentor and primarily used the helpful people she found to "talk things out with," reviewing what she might have done differently. Nancy experienced less anxiety despite the apparently greater demands placed on her.

Next year is a little uncertain for Nancy. She mentions being "RIF'ed" the week before she completed the last of the teaching reports for the study. She was then rehired, but may end up in a full-time substitute position.

"Orrin," an average member of the control group, taught five classes with four preparations at the high school level in a small town in Washington. First semester he taught a history class for which he had no preparation. He also taught general math, pre-algebra, algebra and physics classes, with four different preparations per semester. His comment on the history class was, "not endorsed, not prepared, not comfortable."
Orrin's anxiety levels, both trait and state, were moderately high. His anxiety peaked about mid-year, with a return to about trait level by the end of the year.

Throughout the year Orrin found discipline to be a problem, along with designing lessons students understand. He found it hard to set appropriate consequences and to follow through consistently. He was concerned about being fair. He was concerned in December about what is expected of the teacher. By May that self-concern was replaced by a student-oriented concern about apathy.

Orrin received some help from an assigned mentor, but a lot of help came from at least two other helpful teachers, one in mathematics and one from another discipline. He commented that specific details were the most helpful. He learned discipline techniques, picked up ideas about what problems students would have with the material, got lesson ideas, shared tests. He appreciated feeling comfortable asking for help and sharing ideas.

This district provided a highly organized mentor program that, for Orrin, took up too much time without helping. He suggested that new teachers should select their own mentors after getting to know the department. Unofficially Orrin did that; his best help came from two other teachers not assigned as mentors.

Orrin enjoyed a part of the mentor program which included an opportunity to meet with other new teachers, but still felt it took up too much time. Evidently help for new teachers must include provision for one of their primary stressors, lack of time, or must be directed toward even more urgent stressors suggested by the new teachers themselves.

Orrin's reports seemed consistent. His concerns about discipline included being fair and consistent. He worked at designing lessons students understand and at appropriate pacing of his classes. Discipline is closely related to having students who understand the lesson. A teacher needs to be fair in expectations, both for learning and for behavior.

The only substantive change evident in the data Orrin provided was his
decrease in anxiety. This decrease corresponded to a change in assignment so he was no longer teaching outside his area of preparation. His lower anxiety also corresponded to a change from self-oriented to student-oriented concern.

Like most teachers in this study, Orrin commented on the lack of time, implied resentment toward giving up much of his personal life, and got too tired. Experienced teachers have similar complaints, but these beginning teachers, in addition to learning new skills and accumulating resources, were frequently assigned more difficult tasks than those generally given experienced teachers. New teacher assignments frequently included more than three preparations, classes outside the teacher's training, and the more difficult to manage general math classes. More details are in Appendix G.

Characteristics of the Largest Treatment Subgroup

To define a group most likely to benefit from written interventions in future research, characteristics are needed of the subgroup of seven treatment subjects described by linear regression in Chapter 4, and denoted by T₁ on Figure 4. In contrast to the treatment subgroup consisting of "Al" through "Carl" above, the major treatment subgroup had low state anxiety as well as few comments about problems.

Unfortunately, it is easiest to describe ways in which this major subgroup was not different from the treatment group as a whole. The teaching assignments of this low anxiety subgroup appeared no easier. They taught at the generally more difficult middle school level slightly more frequently than the rest of the treatment group. They were slightly more likely than the rest of the group to teach six classes rather than five; and they were equally likely to teach remedial level classes. On the other hand, they had slightly fewer preparations and a somewhat longer preparation time prior to the opening of school. They generally had less prior teaching experience but more college mathematics credits than the others in the treatment group. Each comparison here is
generally just a difference of one subject; percentages are not cited because one subject out of a subgroup of seven is 14%, a misleading amount.

The Survival Guide Questionnaires, which were sent out with only one additional request on non-returns, were returned by fewer of the low anxiety subgroup. Of those who answered this questionnaire, those in the subgroup had read more of the guide and referred to it more frequently. This group also more frequently cited professional books, magazines and organizations as being helpful. They received less help from mentors, but more from other teachers, teaching organizations and inservice programs compared to the rest of the treatment group. The only comments linking student confidence to discipline came from the subgroup. The subgroup reported many fewer discipline problems but many more problems in designing lessons students understand, compared to the treatment group.

Of the 28 subjects in the study, two reported that they were not returning to teaching next year. Both of these teachers belonged to the low anxiety treatment subgroup. One of these two was taking a maternity leave; the other offered no explanation.

Control is an important issue in teacher anxiety interventions (Blase, 1986; Daniels, 1985; Friedman et al., 1983; Halpin et al., 1985; Peters, 1981). If there is a definable subgroup for which Green Broke reduces anxiety, it may be those whose locus of control is internal.

The differences cited above are too slight for conclusions, but they are generally not in the direction of fewer school stressors. On the other hand, members of the low anxiety subgroup seemed quite frequently to take matters into their own hands. Discipline tends to be a student controlled issue, for example. But this group did not perceive discipline problems, they saw that they were having trouble designing easily understandable lessons. They seemed more active in seeking help, not from mentors but from teachers they found themselves, or from professional readings and organizations. Their generally higher extent of mathematics preparation seems also to fit this
pattern, as does their lower response to the Survival Guide Questionnaire. In one instance they have taken control of increasing their skills preparatory to teaching, and in the other they have taken control of their most limited resource, time.

Therefore, one hypothesis regarding the characteristics of a group of new mathematics teachers most likely to benefit from a survival guide may be that they have an internal locus of control. A distinguishing characteristic of those who did not benefit from the guide may include willingness to take on too many outside responsibilities, as well as an external locus of control.

**Incidental Findings**

The literature is replete with assumptions regarding the high anxiety level of beginning teachers (Cunningham, 1983; Holt et al., 1987; Landwehr, 1980). However, no actual comparisons were found of state anxiety levels of beginning teachers compared to others in society. Spielberger (1983) measured state and trait anxiety of working adults who were employees of the Federal Aviation Administration. This group was mostly comprised of white collar workers, but was heterogeneous in educational level and administrative responsibility. Spielberger separated widely ranging ages into three categories, one of which was from ages 19 to 39.

A comparison between the workers described above and the new teachers of this study is given in Table 3. Data are separated by sex because Spielberger's data were presented in that form. The 95% confidence intervals given in Table 3 show the state anxiety means for Spielberger's 19 to 39 age group to be within, but at the lower end, of the intervals. Thus there is no statistical evidence that the two groups are different, although male differences approach statistical significance. New teachers' mean anxiety at all four times of measurement was always higher than that of the working population norms. It seems likely a significant difference would be found with larger sample sizes.
Questionnaire responses by beginning teachers were inconclusive but interesting. Those responses are summarized in Appendix G.

Table 3. Mean state anxiety, new teachers (NT) compared to working adults (WA) ages 19-39

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>S.D.</th>
<th>n</th>
<th>95% confidence interval</th>
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<tr>
<td>Males</td>
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<tr>
<td>NT</td>
<td>41.52</td>
<td>8.71</td>
<td>11</td>
<td>35.67 to 47.37</td>
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<td>WA</td>
<td>36.54</td>
<td>10.22</td>
<td>446</td>
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</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>NT</td>
<td>38.13</td>
<td>10.07</td>
<td>16</td>
<td>33.32 to 43.39</td>
</tr>
<tr>
<td>WA</td>
<td>36.17</td>
<td>10.96</td>
<td>210</td>
<td></td>
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</table>

**Implications for Future Research**

This study needs to be replicated. A large sample size is difficult to acquire under present hiring conditions on the West Coast. Also a large sample size would be difficult to monitor in terms of getting a high percentage of returns. So a number of small studies might be advisable. These are needed to determine whether the outliers of this study are typical and if there is any pattern to moderate trait/high state reactions.

Research is needed to determine whether locus of control effectively distinguishes those new mathematics teachers who benefit from this survival guide. Internals may form the low state anxiety subgroup with externals in the moderate to high groups. A measure of non-teaching commitments might also be used to determine whether those with high commitments are less likely to benefit from the survival guide. In particular the effect of coaching on state
anxiety of new teachers needs study.

Comparisons should be made of the guide in written form to other potential formats. Would videotapes make a clearer difference in state anxiety levels? Since time is a major problem for beginning mathematics teachers, would audio cassettes provide a better form of presentation of the same information? Such tapes could then be listened to in the car, while doing dishes, or other times that could not be used for reading.

Implications for other subject areas need to be examined. Gage (1979) points out that if an intervention is successful at one level, ways in which it can apply more generally can be explored. Examples from the new teacher's own setting are most likely to be relevant, and so the survival guide would need substantial revision to accommodate other subjects. The positive effect on a substantial subset of this study seems to justify such an effort.

A related question is whether subjects who choose to read such a guide correspond to those who might most profit from it in terms of reduced anxiety. Of the four most highly anxious subjects of this study, one did not read the guide and one did not have access to it. One subject read some of it and referred to it one or two times. The fourth subject read all of it and referred to it several times. All the subjects of the study volunteered, and reactions might be different from a group that would purchase or seek out such a guide in the interests of self improvement rather than helping a researcher.

The degree to which student math anxiety is correlated to high teacher anxiety has not been established. Also needed is evidence regarding the cause-effect direction of any such correlations. Do anxious mathematics teachers cause anxious students, and do anxious students also cause teacher anxiety?

A regression involving a quadratic fit for treatment groups should be examined. Such a fit seemed plausible in the current study, except for the high anxiety subjects. Theory suggests a possible curvilinear fit, since reading a book describing problems could raise anxiety in the low anxious who had not
thought much about such problems. Trends in state anxiety over time need more careful study. While there were no effects of time on state anxiety demonstrated in this study, others have found significant differences (Hembling & Gilliland, 1981; Petrusich, 1967). Measurements of state anxiety need to be made more precisely in time than in the current study to detect such fluctuations. In studies between states or districts comparison should be relative to similar times on the school calendar, rather than same dates. For example, two weeks after the start of school rather than September 17 might be one measurement point. Possible sex differences need to be examined as well, since gender may be a factor in anxiety fluctuations.

Differences in male and female anxiety levels need more careful study. The three subjects of this study for whom state anxiety compared to trait anxiety was extremely high, were males. A fourth, female subject with high state anxiety also had high trait anxiety. Are males more likely to fly into the outlier range, or was this event an accident of sampling in this study? On the other hand, of the six highest in trait anxiety, five were female. Again, that result could reflect accident or pattern. Sex differences might also be job differences; high stress coaching positions are usually held by males, for example.

The differences in this study that appear to be sex linked may in fact be personality linked. Those whose moderate anxiety levels cause a lack of concern in preparation initially, may be the high state anxious of this study. Others may have moderate trait anxiety because they know they have done what they can to prepare for potential problems, and the rest is beyond their control. This group, having prepared, would be less likely to encounter stressful situations.

Comparisons between the state anxiety of new teachers and other working groups are needed. The bit of good news is that the new teachers of this study at least are not as anxious as the military recruits described by
Spielberger (1983). Beginning teaching is not as stressful as boot camp. But how do new teachers compare to experienced teachers, to other recent college graduates, or to laborers, skilled technicians or other groups not likely to be employed by the Federal Aviation Administration?
References


Nummela, R.M. (1982). The number of teacher adaptations can predict burnout. Education, 103(1), 79-81


Appendix A
Delphi Panel and Editors for Survival Guide

Delphi Panel

Don Fineran, Mathematics Specialist, Oregon Department of Education
*Mary Green, Mathematics Educator, George Fox College, Newberg, Oregon
*Nobuyuki Kawaguchi, High School Mathematics Teacher and Department Chair, Union City, California
Madeline Moore, Mathematics Educator, Portland State University Department of Continuing Education, Oregon
John Oppedisano, High School Mathematics Teacher, Portland, Oregon
*Chuck Peterson, High School Mathematics Teacher, Halfway, Oregon
*Darrell Rasmussen, High School Mathematics Teacher, Redmond, Washington
*Laurie Speight, Middle School Mathematics Teacher, Salem, Oregon
Dick Togni, High School Administrator, Salem, Oregon
*Wade White, High School Mathematics Teacher, Monmouth, Oregon

*content editor

Style Editors

Betty Hamilton, retired teacher, freelance journalist, Salem, Oregon
Judy Weddle, writer, health teacher, Salem district drug and alcohol specialist
Appendix B
Colleges Providing Student Teacher Lists

California State University, Chico
California State University, Long Beach
Linfield College
Oregon State University
University of California, Davis
University of Oregon
University of Portland
University of Washington
Washington State University
Western Oregon State College
Dear

Congratulations on the completion of your baccalaureate and your certification to teach! We share your anticipation of many interesting and exciting events to come as you begin a career in the classroom.

We would very much like to learn a little about your reactions as you begin teaching. Many changes are under consideration, from teacher preparation to mentoring programs for new teachers. Yet we have very little across-the-board information about how comfortable new teachers are in their chosen field.

A research study designed to tell us a little more about the stresses of first year teaching is beginning this fall. This doctoral study has the joint support of members of departments of education in three states. Dr. James R. Smith, Deputy Superintendent, California State Department of Education; and Milt Baum, Assistant Superintendent, Oregon State Department of Education join me in supporting the study and encouraging your participation.

If you think you would be willing to report on a short survey (about ten minutes) several times during the year, and if you find a teaching position by August 10, please complete and mail the enclosed post card. Your answers to the survey would not influence anyone's opinion of you since you will remain anonymous. Your responses will be mailed to an assistant who will check only to see whether you return the survey and then remove all means of identification. Your participation would be a great benefit to those trying to assess the ease with which new teachers begin their careers and therefore the degree to which they might need more assistance in that transition.

Good luck in your job hunting. We hope you find just the position you're looking for. And we hope to hear from you.

Sincerely,

Redacted for Privacy

Deputy Superintendent
of Public Instruction

Old Capitol Building, FG11. Olympia, Washington 98504-3211
John Doe  
Any Street  
Oregon or California,

Dear John,

Congratulations on the completion of your baccalaureate and your certification to teach! We share your anticipation of many interesting and exciting events to come as you begin a career in the classroom.

We would very much like to learn a little about your reactions as you begin teaching. Many changes are under consideration, from teacher preparation to mentoring programs for new teachers. Yet we have very little across-the-board information about how comfortable new teachers are in their chosen field.

A research study designed to tell us a little more about the stresses of first year teaching is beginning this fall. This doctoral study has the joint support of members of departments of education in three states. Dr. James R. Smith, Deputy Superintendent, California State Department of Education; and Dr. Doyle Winter, Deputy Superintendent of Public Instruction, Washington State Department of Education, join me in supporting the study and encouraging your participation.

If you think you would be willing to report on a short survey (about ten minutes) several times during the year, and if you find a teaching position by August 10, please complete and mail the enclosed post card. Your answers to the survey would not influence anyone's opinion of you since you will remain anonymous. Your responses will be mailed to an assistant who will check only to see whether you return the survey and then remove all means of identification. Your participation would be a great benefit to those trying to assess the ease with which new teachers begin their careers and therefore the degree to which they might need more assistance in that transition.

Good luck in your job hunting. We hope you find just the position you're looking for. And we hope to hear from you.

Sincerely,

Redacted for Privacy

Dr. Mitt Baum  
Associate Superintendent  
Office of  
School District Services
August 19, 1988

Barbara K. Freeman
6060 Cooper Hollow
Monmouth, OR 97361

Dear Ms. Freeman:

After reviewing your research design, I am pleased to say we can lend the indirect support you request. Specifically, in the letter from Dr. Blum you may indicate that I am interested in your doctoral research. A guide that did, in fact, reduce the anxiety and sense of overwhelm that new teachers experience would be helpful. As you begin, let me offer a caution on the likelihood of statistically significant results. There is a real chance that many in the experimental group will skim the guide, but not "use" it enough to materially influence their feelings. If this is so, experimental and control groups of only 25 may be too small to reach any conclusions.

Good luck to you. I will be interested in learning the results of your study.

Sincerely,

Redacted for Privacy

James R. Smith
Deputy Superintendent
Curriculum and Instructional Leadership Branch
(916) 322-2363

JRS:wdp
Sample Postcard

Mary Doe
Any Street
Oregon, California
or Washington

Dear Mary,

Teaching positions have been slow to open this year, so we still need more participants in our investigation of new teachers' experiences. If you have recently found a position, or if you find one this week, we hope you will volunteer for the project. A card was included in our previous letter, and you can still send it in. Or write us at the address indicated below, including your address, phone number and school. Thanks!

Kelly Elerath, director
New Teacher Project
P.O. Box 4131
Salem, OR 97302
Aug 10, 1989

Mary Doe
Any Address
Washington,

Dear Mary,

We are delighted to hear that you have found a teaching position at Ellenscity High School. We hope you enjoy your new career as you begin to contribute to mathematics education.

Experienced mathematics teachers report that teaching is always a challenge and that, in particular, numerous unanticipated problems crop up in the first years. Sometimes there are simple solutions that one is just too busy to find, and sometimes it's nice to know that, while you haven't found a solution, neither has anyone else.

We are conducting a study of the effectiveness of a survival guide that addresses some of those problems and that was developed specifically for first year mathematics teachers. We would like to send it to you. In return we would ask only that you help us assess the problems of beginning mathematics teachers and the helpfulness of the guide. We would send you a questionnaire in a few weeks and again two other times during the school year. The questionnaire is reasonably short, and your answers would remain strictly anonymous.

Now is an ideal time to look at the guide, before the onslaught of the school year, so we hope you will choose to receive it and then will spend a couple of evenings in your most comfortable chair perusing the guide to see what is there. You may decide to use its plan of attack for the start of school. You may also find it handy as a reference as problems start to arise later. So, please, if you're interested, complete the enclosed postcard right away. There is no cost to you other than your time commitment for looking at the guide and completing the questionnaires.

May your students all be eager, your colleagues helpful, and your efforts appreciated. Or, short of that, may your problems be solvable and the guide helpful.

Sincerely,

Barbara Freeman
Margaret Niess, Associate Professor
Mathematics Education
Sample Postcard

John Doe
Any Street
Oregon, California
or Washington

Please note any address corrections:

Yes, I'd like to receive a copy of the survival guide for first year mathematics teachers. I understand that my only obligation would be to complete three post-paid questionnaires during the school year. I further understand that my responses to these questions will be strictly anonymous. I will teach _____ math classes and _____ non-math classes.

______________________________
(your signature)
Appendix D
Surveys for Development of Survival Guide

Delphi Survey 1 (Photo-Reduced)

The following have been suggested as possible important topics to address in a forthcoming guide for new mathematics teachers. You are one of ten persons who have been selected to help determine the importance of various topics for the guide. Results of this poll will be used both for adding to and deleting from topics in the guide. Please rate the importance of each, in your opinion, and make comments freely. You will be given a second chance to consider your opinions after responses are received from all those taking the poll.

A. very important  B. important
C. unimportant  D. useless/damaging

1. Discipline

   comments:

2. Building student confidence in math

   comments:

3. Helping the teacher design lessons to match the more concrete student mode of thinking.

   comments:

4. Interaction with
   (a) other teachers
   (b) administrators
   (c) parents
   (d) students

   comments:
5. Management of time
   comments:

6. Realistic self-expectations
   comments:

7. Evaluating and handling varying expectations of the teacher by math leaders, administrators, students and parents
   comments:

8. Means of coping with stress
   comments:

9. Establishing social support
   comments:
10. The special problems of
   (a) middle school
   (b) slow learners
   (c) ethnic diversity
   (d) isolation in small districts
   (e) teaching required (vs elective) classes
   (f) emotionally disturbed students
   (g) at risk students

comments:

A tone in writing style that is
11. Realistic

12. Supportive

comments:

13. Are there other issues that need to be addressed?
   Please rate your suggestions as above.
Delphi Survey 2 (Photo Reduced)

This is the second round of a survey of you and nine others regarding the important topics to address in a forthcoming guide for new mathematics teachers. The "average" rating on each topic is indicated together with a summary of comments and other suggestions.

Please indicate whether you agree or disagree with the average and respond to comments as you see fit. If you disagree with the rating, put in your own arrow. To save writing time you could place one (or two) star(s) by comments with which you particularly agree. If paraphrasing of your original comment misses the mark, please elaborate.

A. very important       E. important       C. unimportant

1. Discipline

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_____ Agree    _____ Disagree

Comments:

1. Teacher should be fair and consistent, constantly re-evaluating what is fair.
2. Administrative support is important as is knowledge of who is the provider of such support.
3. Personal (teacher) discipline is important.
4. Enthusiastic, relevant teaching diminishes need for student discipline.
5. Include a section on defiant students and weapons in the classroom.
6. This topic relates to student confidence, realistic self-expectations (teacher or student?) and the special problems of at-risk, slow learners, etc.
7. This is vital for survival. More practice is needed prior to beginning teaching. Before school starts teacher needs to formulate a clear idea of expectations, guidelines.
8. Booklet should include some "what would you do if..." questions for teacher to ponder as guidelines are formed.
9. Deal with disruptive student fairly and swiftly or the best lesson plan will fail.
10. Be assertive without being intimidating.

Response:
2. Building student confidence in math

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_____Agree ______Disagree

Comments:

1. Low confidence in math is a screen to cover students' lack of respect for themselves and their abilities in many aspects of their life, not just math. When they find themselves having difficulty, they don't have the positive attitudes and perseverance to overcome the difficulty. Giving easy non-thinking worksheets does not build confidence but rather stagnant, apathetic minds. Focus expectations on process.

2. Building student math confidence is very necessary; teacher must stay positive.

3. If teacher relates well with class, this will fall into place.

4. Teacher must praise, encourage, design work to allow success.

5. Teacher comfort/confidence improves student confidence.

Response:

3. Helping the teacher design lessons to match the more concrete student mode of thinking.

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_____Agree ______Disagree

Comments:

1. Begin at concrete, work toward abstract.

2. Abstract thinking can not be told to anyone; individuals must reach that place by themselves.

3. This help may come from teachers who understand this need. Additional help is needed for fending off teachers and administrators who do not understand this need.

4. There is a need for manipulative in the high school.

5. Include use of already existing lessons/activities

6. There is a need for manipulatives generally and a need for ways to find out what is available somewhere in the school.

7. We can push students further in abstract thinking than we do in such things as moving from written-verbal to equations.

Response:
4. Interaction with
   (a) other teachers

   |   |   |   |
   A  | B  | C  |
   Agree | Disagree

   (b) administrators

   |   |   |   |
   A  | B  | C  |
   Agree | Disagree

   (c) parents

   |   |   |   |
   A  | B  | C  |
   Agree | Disagree

   (d) students

   |   |   |   |
   A  | B  | C  |
   Agree | Disagree

   comments:
   1. (a) Give and get advice. We are all working at learning to teach.
   2. (a) How does one introduce new ideas to old teachers? How can you (the new teacher) gracefully convey youth and enthusiasm?
   3. (b) Learn when they are giving lectures and when they really know what they are talking about.
   4. (c) always be supportive and positive; don’t portray the student as the villain.
   5. (c) Help parents understand importance of math and how they can help their children. Help parents alleviate their own fears in mathematics.
   6. (d) care about them, support them, NEVER PITY them.
   7. In all interactions be honest and tactful; don’t try to look good.
   8. Accept personal imperfections.
   9. Don’t keep infringing on your personal life to maintain interactions.
   10. Priority should always be what is best for the student.

Response:
5. Management of time

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_____Agree   _______Disagree

comments:

1. Allow for preparation time, evaluation time (self-evaluation), extra-help time, conference time, relax time, alone time, family time, friend time.
2. First year teachers should curtail other coaching/extra-curricular activities.
3. This is a continuous process as energy and priorities are juggled.
4. Don’t consume time on only one aspect; look at total picture, set goals and determine realistic time frames.
5. Make reference to existing time-management books (suggestions?)
6. One needs to work this out independently.
7. A friendly colleague can talk away a prep period.
8. When time is short temptation is strong to teach by assigning problems "and if you have questions ..."
9. In-class time management is especially important in lower level classes (several mini-sessions, no open blocks of time).

Response:

6. Realistic self-expectations

(on the part of the new teacher)

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_____Agree   _______Disagree

comments:

1. Everything cannot be accomplished successfully immediately.
2. You are human, you never stop working at it and you rarely do everything perfectly.
3. A teacher is part, not all, of a student’s success or failure.
4. You reach and help some students, not all.

Response:
7. Evaluating and handling varying expectations of the
   teacher by math leaders, administrators, students
   and parents

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   ______Agree     ______Disagree

   comments:

   1. Set realistic goals using a variety of sources.
   2. Every group above has its own agenda for teachers; don't be a
      piece of clay molded by the above groups; believe in personal self-
      worth.
   3. Do your share of volunteer work but also be able to say "no".

   Response:

8. Means of coping with stress

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   ______Agree     ______Disagree

   comments:

   1. Allow for relaxation and alone time. TALK to other teachers,
      administrators, parents and students. Accept your imperfections, set
      realistic goals, don't keep it all inside you.
   2. Keep re-evaluating the picture; change directions as needed.
   3. High stress might be sign of wrong profession; there is little
      stress in those who love teaching.
   4. If new teachers talk only to other new teachers they tend to
      think their common problems are shared with all teachers.

   Response:
9. Establishing social support

comments:

** Connotation here was unclear to many respondents. Should a new teacher be encouraged to actively seek a set of friends and mentors to cheer and be cheered by.
2. A mentor and another new teacher form a good support system.
3. Get involved in professional groups to exchange ideas.

Other comments:

10. The special problems of
   (a) middle school
   (b) slow learners
   (c) ethnic diversity
   (d) isolation in small districts
   (e) teaching required (vs elective) classes
   (f) emotionally disturbed students

   | . . . | . . . |
   | A . . |
   -----Agree -----Disagree

   | . . . |
   | A . |
   -----Agree -----Disagree

   | . . . |
   | A . |
   -----Agree -----Disagree

   | . . . |
   | A . |
   -----Agree -----Disagree

   | . . . |
   | A . |
   -----Agree -----Disagree

   | . . . |
   | A . |
   -----Agree -----Disagree
(g) at-risk students

I . . . I . . . I
A E C

Agree Disagree

comments:

1. Keep expectations high; don't pity various student groups.
2. Maintain a central core of learning; vary it but don’t abandon it for special groups of students.
3. There are no clear lines between elective and required classes.
4. (f) and (g) represent a specialized field probably less significant to the general math teacher.
5. (d) prevent isolation by going to conferences, visiting other districts.
6. Hearing much about b, f & g could easily scare off a potentially good teacher.
7. Most teachers have little expertise with b & f and need the support of an outside expert.
8. These are tougher versions of problems encountered in teaching generally.
9. Touch on these topics in a separate, later section for those with these special problems.
10. Math teachers love to work with bright and capable kids, but all kids need math concepts.

Response:

A tone in writing style in the survival guide that is

11. Realistic

I . . . I . . . I
A B C

Agree Disagree

12. Supportive

I . . . I . . . I
A B C

Agree Disagree

comments:

* These questions were not clearly stated. Is it important that a guide addressed to new math teachers be written in a style that is realistic (#11) and/or supportive (#12)?

Response:
13. Other issues that need to be addressed as suggested by respondents.

A. very important  B. important  C. unimportant  D. useless/damaging

(a) The meaning of **student success**: when students succeed it is because they have thought, practiced, explored and understood work in class. It occurs where there has been effort, failure along the way, learning from failure and using that knowledge to move forward. Maintain expectations for this process. 

comments:

(b) Maintain expectations for **teaching success** in the same manner as above. 

comments:

(c) Resist the inertia of the page-by-page mode of teaching mathematics. Keep trying to be creative. But don’t go in and try to change everything others are doing in their classes. 

comments:

(d) **Awareness of resources:**
   human  A B C D
   materials  A B C D
   organizations  A B C D

comments:

(e) Continue **professional growth:**
   classes and inservice  A B C D
   involvement in professional organizations  A B C D

comments:
(f) Develop file and cross reference system for materials.

comments:

(g) Incorporate relevant, hands-on true-to-life problems.

comments:

(h) Group students for better learning of problem solving techniques.

comments:

(i) Provide attention-getter problems/puzzles/ways to make every minute count.

comments:

(j) Provide hints such as keeping a box of scrap pencils, not accepting late (unless absent) papers, keeping homework-discipline policies simple, avoiding becoming the victim.

comments:

(k) Discuss ways to assess learning through other means than traditional testing.

comments:
(1) Discuss helping students with realistic self-expectations; fighting the GPA battle.

comments:

(m) Provide grading techniques

comments:

(n) Provide guidelines for textbook selection

comments:

(o) Discuss peer observation/coaching/meetings

comments:

(p) Describe variations in teaching styles and strategies

comments:

(q) Provide help in lesson planning (being clear, complete, including long and short range)

comments:

(r) Provide suggestions for clear and complete classroom management policies

comments:
(s) Provide suggestions for clear and complete grading policies

comments:

(t) Suggest teaching classes in which the new teacher is most comfortable.

comments:

LAST WORDS:
I. STUDENT INTERACTIONS
   Discipline, student confidence, concrete lessons, general, special problems.

A. Discipline

1. General rating (check one)

________good, complete coverage.  
   Skip item 2; item 3 is optional.

________adequate coverage.  
   Skip item 2; item 3 is optional.

________poor coverage (or not representative of my region).  
   Select deficient items below.

________little or no coverage  
   Select deficient items below.

2. Indicate topics in which coverage is:

   minimal (m)       omitted (o)

   In addition, write (-) if the topic should be omitted.

   _____a. formulating student guidelines and expectations  
           (clearly stated management and grading policies).

   _____b. being assertive without intimidating.

   _____c. being fair, consistent and prompt in response to  
           disruptive incidents (so disrupter doesn't destroy  
           lesson).

   _____d. understanding the benefit (but not cure) of  
           enthusiastic, relevant teaching.

   _____e. learning the degree of administrative support.

   _____f. dealing with defiant students.

   _____g. maintaining realistic expectations for teacher  
           "control," and student "enthusiasm."

   _____h. finding ways to solve the "no supplies" problem.

   _____i. making changes when needed, not keeping kids  
           wondering what today's policy is.

   _____j. understanding the relationship to student  
           confidence.

   _____k. other:

3. Please suggest additions or deletions (either on the back  
       of this page or in the book itself).
B. Student confidence

1. General rating (check one)
   - good, complete coverage.
     Skip item 2; item 3 is optional.
   - adequate coverage.
     Skip item 2; item 3 is optional.
   - poor coverage (or not representative of my region).
     Select deficient items below.
   - little or no coverage
     Select deficient items below.

2. Indicate topics in which coverage is:
   minimal (m)   omitted (o)

   In addition, write (-) if the topic should be omitted.
   _____a. seeing possible relationship between low math confidence and general low self-esteem.
   _____b. seeing relationship between confidence and the ability to persevere at a problem.
   _____c. designing work to allow success, but avoiding easy, non-thinking worksheets which only fake success.
   _____d. focus teacher expectations on process including thinking, exploring, learning from failure.
   _____3. designing lessons for feedback on process, understanding.
   _____f. looking for ways to evaluate students other than through traditional tests.
   _____g. remembering to praise and encourage.
   _____h. allowing students to start with more concrete activities before moving to the abstract.
   _____i. considering using group problem solving activities.
   _____j. keeping realistic expectations: general confidence should rise, but perhaps not everyone's and perhaps not dramatically.
   _____k. other:

3. Please suggest additions or deletions (either on the back of this page or in the book itself).
C. Concrete lessons

1. General rating (check one)

_____good, complete coverage.
   Skip item 2; item 3 is optional.
_____adequate coverage.
   Skip item 2; item 3 is optional.
_____poor coverage (or not representative of my region).
   Select deficient items below.
_____little or no coverage
   Select deficient items below.

2. Indicate topics in which coverage is:

   minimal (m)   omitted (o)

In addition, write (-) if the topic should be omitted.

_____a. actively creating manipulatives and exploring to
   see what is already available.
_____b. exploring the climate for manipulatives in the
   school; if it is negative, seeking support or
   proceeding cautiously.
_____c. actively creating relevant, true-to-life problems
   and exploring to see what is available already.
_____d. beginning at the concrete, moving to the abstract.
_____e. being realistic; resisting inertia of page-by-page
   teaching, but also being satisfied with a few new
   activities each year.
_____f. other:

3. Please suggest additions or deletions (either here or in
   the book itself).
D. Interactions with students

1. General rating (check one)

- good, complete coverage.  
  Skip item 2; item 3 is optional.
- adequate coverage.  
  Skip item 2; item 3 is optional.
- poor coverage (or not representative of my region). 
  Select deficient items below.
- little or no coverage  
  Select deficient items below.

2. Indicate topics in which coverage is:

  minimal (m)  omitted (o)

In addition, write (-) if the topic should be omitted.

- a. caring about them, supporting them, not pitying them.
- b. keeping priorities on what is best for the student.
- c. other:

3. Please suggest additions or deletions (either here or in the book itself).
E. Special problems

1. General rating (check one)

   _____ good, complete coverage.
   Skip item 2; item 3 is optional.
   _____ adequate coverage.
   Skip item 2; item 3 is optional.
   _____ poor coverage (or not representative of my region).
   Select deficient items below.
   _____ little or no coverage
   Select deficient items below.

2. Indicate topics in which coverage is:

   minimal (m)  omitted (o)

   In addition, write (-) if the topic should be omitted.

   _____ a. middle school
   _____ b. slow learners, emotionally disturbed students, at-risk students, ethnically diverse classes
   _____ c. other:

3. Please suggest additions or deletions (either here or in the book itself).
II. GENERAL SURVIVAL

Managing time, talking to others, maintaining realistic self-expectations, handling conflicting demands

A. Managing time

1. General rating (check one)

   _______good, complete coverage.
   _______adequate coverage.
   _______poor coverage (or not representative of my region).
   _______little or no coverage

   Select deficient items below.

2. Indicate topics in which coverage is:

   minimal (m)    omitted (o)

   In addition, write (-) if the topic should be omitted.

   _______a. anticipating school needs: planning, self-evaluation, grading, giving extra help, conferences.
   _______b. reserving time for family, friends, being alone.
   _______c. curtailing other coaching/volunteer activities (when and how to say no).
   _______d. developing a file and cross reference system for materials.
   _______e. looking forward to more available time as familiarity with school and resources increases.
   _______f. other:

3. Please suggest additions or deletions (either here or in the book itself).
B. Talking to others

1. General rating (check one)

_____ good, complete coverage.  
    Skip item 2; item 3 is optional.

_____ adequate coverage.  
    Skip item 2; item 3 is optional.

_____ poor coverage (or not representative of my region).  
    Select deficient items below.

_____ little or no coverage  
    Select deficient items below.

2. Indicate topics in which coverage is:

    minimal (m)    omitted (o)

In addition, write (−) if the topic should be omitted.

_____ a. forming a support system including, if possible, another new teacher and a mentor.

_____ b. getting involved in mathematics organizations to exchange ideas, especially if in a small district.

_____ c. working with other teachers; giving and getting advice.

_____ d. working with parents; helping them help their children in math.

_____ e. being honest, tactful and supportive.

_____ f. taking advantage of conferences, classes.

_____ g. other:

3. Please suggest additions or deletions (either here or in the book itself).
C. Being realistic in self-expectations

1. General rating (check one)

_____ good, complete coverage.
   Item 3 is optional.
_____ adequate coverage.
   Item 3 is optional.
_____ poor coverage (or not representative of my region).
   Go to item 3.
_____ little or no coverage
   Go to item 3.

3. Please suggest corrections, additions or deletions
   (either here or in the book itself).
III. TONE OF GUIDE
Guide feels friendly, supportive, realistic, warm.

1. General rating (check one)

- Good.
  Item 3 is optional.
- Adequate.
  Item 3 is optional.
- More is needed.
  Please make suggestions below.
- Very poor.
  Please make suggestions below.

3. Please suggest corrections, additions or deletions (either here or in the book itself).

IIIB. FORMAT

Printing will be letter quality and there will be sketches (by students) of frustrated students, kids with bright ideas, teacher with arms overflowing with papers, etc. Please make suggestions about size (8 1/2 X 11 vs 5 1/2 X 8 1/2) and binding. Some choices for bindings are staples like your version, spiral binding, or a three-hole notebook style. Any combination of size and binding will work. Also include any other format suggestions you may have.
IV. Needed: fillers for end-of-period, days when much of class is gone. Please add suggestions.

END OF PERIOD:

1. Place value and rounding.
   Write a six to ten place number on the board with a decimal in it somewhere. Ask students to find various place values and/or round to that place.

2. Mental arithmetic.
   Multiplying by 5 (5 = 10/2 so divide by 2, mult by 10)
   Multiplying by 50 (50 = 100/2)
   Multiplying by 25
   Dividing by the same numbers as above.
   Multiplying or dividing by breaking numbers into factors (20 = 10×2) so to multiply by 20, double and move dec
   Finding percents (similar to above)

3. Estimation
   Find any problem in a general math book. If students have the book, find a review page and have them estimate answers. Otherwise read the problem. Or make overhead transparencies and keep handy for such times.
   Estimate size of various things in the room: height and circumference of coffee cup, volume of wastepaper basket, length of room, weight of book.

4. Get to know your students. Ask each what they would do if they were home right now (no TV).

Strategies:

1. Pose a problem, call on someone.
2. Pose a problem, have students write answers.
3. Let students work in groups and give one answer for the group.
4. Use (1) or (2) but divide class into teams.
5. Let students determine exact answers for extra credit.
6. Keep bulk candy handy for incentives.
7. DON'T allow enough time for student to work out problems.
   If you give a set of problems to estimate, make it a very large set with incentives for reasonable answers to a maximum number of problems.

Suggestions? (Use the back, too.)
ALL PERIOD, TOO MANY ABSENT

2. Bring in a community resource person to describe how he (or especially, she) uses math on the job.
3. Think up estimation problems (the class can help with this) such as:
   - number of tiles in all the halls
   - number of diamonds in a specific cyclone fence
   - number of light bulbs in use in the school
   - longest rigid pipe that could be brought around the corner into the room
Supply rulers, string, tape measures as available. Send students in groups of two or three to estimate one problem per group. As they do one, they can come back for another one. Try for duplication of effort between groups without collaboration between groups.
5. Send everyone to the board. Pick a section they had trouble with, give problems to do (could be same problems they've done before). Work with individuals. Pick an exemplary solution, have everyone else erase and look at that one. They, or you, could pick out important strategies, including organization.

Suggestions?
V. Needed: references

Too many references are simply intimidating. Thus I would like to limit this to those you personally keep at arms reach or think might be particularly apropos for new math teachers.

Please star any of my listings if you use them too. Then add those you use. If you can come close on the title or author and provide some description, I can probably find the rest in Books in Print.

Short, ready-made lessons:

**Math Notes**, an insert in each copy of the NCTM News Bulletin. 1906 Association Dr., Reston, VA 22091. Free with membership in NCTM. Because they involve topics often not part of a school sequence, these lessons seem to adapt well to almost any level.

Problem solving:

**Problem Solving in Mathematics** by Lane County Mathematics Project. Dale Seymour Publications, P.O. Box 10888, Palo Alto, Ca. 97303. $17.95. These are also ready-made lessons providing students with means of attacking problems for which they "don't have a clue" otherwise. Available for several grade levels. Go down a grade (or two) for slow students.

**Calendar**, center of each issue of Mathematics Teacher. 1906 Association Dr., Reston, VA 22091. Free with membership in NCTM. Has a problem for each day of the month; mostly secondary level.

**Problem Box**, last pages of each issue of The Oregon Mathematics Teacher (TOMT). Write Lynne Tracy, 1410 Linda, Eugene, Or 97401. Free with membership in OCTM ($15.00). Problems are for all levels. Also contains hints, math history, ready-made lessons. Many out-of-Oregon teachers are subscribing or sharing subscriptions.

**St. Mary's Competition Book**. (I have to look this one up.) "Elementary" problems are for bright middle school students through most high school classes above algebra. "Advanced" problems are for bright juniors and seniors. Lots and lots of good problems of many types.

Atlantic-Pacific Competition. (I have to look this up, too.) Eight (?) competitions during the year, each for 30 minutes. Each has six problems similar to those described above. Problems are good for later use.

Useful many ways:

**Family Math** by Stenmark, Thompson and Cossey. Write to Family Math, Lawrence Hall of Science, University of California, Berkeley, Ca 94720. Or available from Math Learning Center, P.O. Box 3226, Salem, Or 97302. $15.00. Confidence-building activities for children ages 5 to 18,
and their parents. Includes measurement, logical reasoning, geometry, probability and statistics, estimation, arithmetic.

*Mathematics, A Human Endeavor* by Harold Jacobs. Published by W.H. Freeman and Company. Number patterns, geometry, probability, statistics, topology. Many "advanced" topics from an elementary standpoint with a touch of whimsy. Poses good questions that lead to interesting activities. You may find this in your building with math reference books or even old texts.

**Time-management:**

*Making every minute count* by Carolyn Davis. CSA Press, P.O. Box 7, Lakemont, Ga 30552. $7.95.
Appendix E
Questionnaires (Photo Reduced)

Fall Teaching Report

New Teacher Project
PO Box 4131
Salem, OR 97302

TEACHING REPORT

Directions: As before, answers to this report are anonymous. The number on the envelope will help one person determine whether you have returned the questionnaire, while another person will compile responses without access to names. If your address has changed, you should indicate the new one on the envelope.

1. When was the first day of school for students?
2. How many teacher work days were provided before students arrived?
3. How many periods do you teach?
4. Please name the classes you teach (include number of sections of each, such as English 9 (2), Speech (1) etc.)
5. Which (if any) of your assigned classes are outside your preparation/certification?
6. Please comment on classes listed in item 5, and your comfort level in them.

7. Have problems arisen in the area of 
   (circle one)
   a. discipline 
   b. low student confidence 
   c. designing lessons students understand 
   d. interaction with other teachers 
   e. interaction with administrators 
   f. interaction with parents 
   g. interaction with students 
   h. finding enough time 
   i. knowing what is expected of the teacher 
   j. finding encouraging/helpful people 
   k. problems with special students 
      (at risk, emotionally disturbed, ethnic groups, slow learners)
   l. other school related problems:
   m. unusual personal reactions: inability to sleep, sleeping too much, stomach upsets, depression, anger, increased smoking, increased drinking, other ________________________ 
   (circle all that apply)
8. If you answered "yes" to any of item 7, please describe one or two of the more significant problems.

9. Have you received help from

   a. personal ingenuity
   b. an assigned mentor in your subject area
   c. an assigned mentor from another subject area
   d. another helpful teacher in your subject area (not previously described)
   e. another helpful teacher from another subject area (not previously described)
   f. an administrator
   g. other

10. If you received some or a lot of help, please describe. What has been particularly helpful? Will you probably continue to use this resource? How often?

11. Should new teachers be getting more help? If so, what kinds of things do they need help with, and who or what might help?

12. You are (circle a, b or c)

   a. loving it and having an easy time
   b. doing fine most of the time
   c. barely hanging in there

13. Other comments?
Spring Teaching Report

New Teacher Project
PO Box 4131 Salem, OR 97302

TEACHING REPORT

Directions: As before, answers to this report are anonymous. The number and address on the envelope will be recorded by one person, while another person will compile responses without access to names.

1. How many periods do you teach?
2. Please name the classes you teach

(Include number of sections of each, such as English 9 (2), Speech (1) etc.)

3. Which (if any) of your assigned classes are outside your preparation/certification?

4. Please comment on classes listed in item 3, and your comfort level in them.

5. Have problems arisen in the area of (circle one)
   a. discipline
   b. low student confidence
   c. designing lessons students understand
   d. interaction with other teachers
   e. interaction with administrators
   f. interaction with parents
   g. interaction with students
   h. finding enough time
   i. knowing what is expected of the teacher
   j. finding encouraging/helpful people
   k. problems with special students
      (at risk, emotionally disturbed, ethnic groups, slow learners)
   l. other school related problems:
   m. unusual personal reactions: inability to sleep, sleeping too much,
      stomach upsets, depression, anger, increased smoking, increased drinking,
   other

6. If you answered "yes" to any of item 5, please describe one or two of the more significant problems.

OVER
7. Have you received help from
   a. personal ingenuity       none  some  a lot
   b. an assigned mentor in your subject area none  some  a lot
   c. an assigned mentor from another subject area none  some  a lot
   d. another helpful teacher in your subject area (not previously described) none  some  a lot
   e. another helpful teacher from another subject area (not previously described) none  some  a lot
   f. an administrator          none  some  a lot
   g. other ____________________ none  some  a lot

8. If you received some or a lot of help, please describe. What has been particularly helpful? Will you probably continue to use this resource? How often?

9. Should new teachers be getting more help? If so, what kinds of things do they need help with, and who or what might help?

10. You are (circle a, b or c)
    a. loving it and having an easy time
    b. doing fine most of the time
    c. barely hanging in there

11. Next year you are planning to (check one)
    ______ teach, same subject, same school
    ______ teach, making the following changes in position__________________
                    __________________________________________________________
    ______ not teach

12. Please write a summer address on the return envelope so we may let you know the results of this study.

13. Comments?
Fall Questionnaire

O U S T I O N N A I R E
Survival Guide

Directions: The purpose of this questionnaire is to assess the ease or difficulty of beginning teaching in mathematics and the degree to which the survival guide is helpful. To protect your privacy, no identification has been placed on this questionnaire. Your initials have been placed on the return envelope so I can check off those who have responded. Envelopes will be discarded and questionnaires shuffled prior to any reading or analysis of responses.

- Barbara Freeman

1. How much of the "survival guide" for new mathematics teachers have you read?
   None Some Most All

2. How much have you referred to the "survival guide?"
   Never 1 to 2 times Several times Often

3. Do you have ideas for additional needs that ought to be addressed in the survival guide? Describe.

4. Have you found unnecessary information in the survival guide? Describe.

5. Are there parts of the survival guide that have been particularly helpful? What are they?

6. If you have other suggestions for ways in which a new mathematics teacher's life could be made easier, please describe them briefly.
7. The transition into teaching has been
   easy  OK  difficult

8. The amount of help offered has been
   too little  about right  too much

9. The degree of difficulty posed by the subject matter is
   low  moderate  high

10. The degree of difficulty posed by concerns outside of
    subject matter is
    low  moderate  high

11. Do you teach outside your subject area? What classes?
    How many periods?

12. Rate the help received from
    a. the survival guide  Low  Moderate  High
    b. other publications  Low  Moderate  High
    c. another teacher  Low  Moderate  High
    d. teaching organizations  Low  Moderate  High
    e. inservice programs  Low  Moderate  High
    f. other  Low  Moderate  High

13. If you received some or a lot of help from b - f above,
    please describe the source. What publication, organization,
    program was helpful. Or what were the characteristics of the
    helpful teacher?

14. If you received some or a lot of help, how did this
    source help? Is the problem now "under control?"

15. Other comments:
Spring Questionnaire

Survival Guide

Directions: The purpose of this questionnaire is to assess the ease or difficulty of beginning teaching in mathematics and the degree to which the survival guide is helpful. To protect your privacy, no identification has been placed on this questionnaire. I have asked for a summer address on the return envelope. But envelopes will be discarded and questionnaires shuffled prior to any reading or analysis of responses.

- Barbara Freeman

1. How much of the "survival guide" for new mathematics teachers have you read?

   None   Some   Most   All

2. How much have you referred to the "survival guide?"

   Never   1 to 2 times   Several times   Often

3. Do you have ideas for additional needs that ought to be addressed in the survival guide? Describe.

4. Have you found unnecessary information in the survival guide? Describe.

5. Are there parts of the survival guide that have been particularly helpful? What are they?

6. If you have other suggestions for ways in which a new mathematics teacher's life could be made easier, please describe them briefly.

7. The transition into teaching has been

   easy   OK   difficult
8. The amount of help offered at school has been
   too little  about right  too much

9. The degree of difficulty posed by the subject matter is
   low  moderate  high

10. The degree of difficulty posed by concerns outside of subject matter is
    low  moderate  high

11. Do you teach outside your subject area?  What classes?  How many periods?

12. Rate the help received from
    a. the survival guide  Low  Moderate  High
    b. other publications  Low  Moderate  High
    c. another teacher  Low  Moderate  High
    d. teaching organizations  Low  Moderate  High
    e. inservice programs  Low  Moderate  High
    f. other  Low  Moderate  High

13. If you received moderate or high amounts of help from b-f above, please describe the source. What publication, organization, program was helpful? Or what characterized the helpful teacher?

14. If you received moderate or high amounts of help, how did this source help? Is the problem now "under control?"

15. Other comments:

16. Please put a summer address or "same" on the return envelope.
Appendix F  
Trait and State Inventory Scores

Each subject is listed by number, followed by that subject’s sex, trait anxiety, state anxiety for each of four measurements, mean state anxiety over the four measurements, and group. Groups include:

C: Control Group  
T₃: Treatment group, high extreme  
T₂: Treatment group, better predicted by control group’s regression line.  
T₁: Treatment group, linear regression relationship

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<th>SUBJECT NUMBER</th>
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<th>TRAIT</th>
<th>STATE</th>
<th>MEAN STATE</th>
<th>SUB GROUP</th>
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Appendix G
Questionnaire Response Patterns

General Description

The teachers in this study started work as early as August 23, 1989, and as late as September 11, a three week interval. One person had no work days before students arrived and one had seven. Most commonly they were provided with just two preparation days (29%), with 21% having three days and 18% having one day. The remaining 29% had from four to six days.

Assignments were not easy for these teachers; 36% had six classes per day and another 7% had five classes and a study period, home room, or other additional assignment. One person (4%) taught five different preparations and 21% had four preparations. Only two teachers (7%) had two preparations per day; the remaining 68% had three preparations.

Most of this group taught strictly mathematics or mathematics with science, for which they had prepared in college. Some also taught computer classes. None of these various assignments created any difficulty, but three teachers were assigned classes unrelated to their areas of preparation. This was a source of early concern, but once they found a helpful teacher and organized the class, two of these three felt things were going all right.

Remedial mathematics classes were difficult for the 57% of the group who were assigned one or more such classes. Frequent comments were made by this group regarding discipline, motivation, and low student confidence.

Specific Problems

Table 4 shows 11 categories suggested by the literature as problems for new teachers. Teachers in the study were asked to circle "yes" or "no" concerning whether they had experienced any problems regarding each category. The percent saying "yes" in December and May are shown in the
table. As indicated by the literature, discipline does indeed prove to be a major concern. An even greater concern is low student confidence. In fact everyone who circled "discipline" also circled "low student confidence" and/or "interaction with students." One teacher commented that confidence and discipline go hand in hand.

Table 4. Problems circled by new teachers on teacher reports

<table>
<thead>
<tr>
<th>Problems in the area of:</th>
<th>December</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discipline</td>
<td>71%</td>
<td>59%</td>
</tr>
<tr>
<td>Low Student confidence</td>
<td>71%</td>
<td>74%</td>
</tr>
<tr>
<td>Interaction with students</td>
<td>46%</td>
<td>33%</td>
</tr>
<tr>
<td>Designing lessons students understand</td>
<td>29%</td>
<td>22%</td>
</tr>
<tr>
<td>Finding enough time</td>
<td>71%</td>
<td>85%</td>
</tr>
<tr>
<td>Probs with special students</td>
<td>57%</td>
<td>56%</td>
</tr>
<tr>
<td>Knowing what is expected of the teacher</td>
<td>50%</td>
<td>37%</td>
</tr>
<tr>
<td>Interaction with parents</td>
<td>18%</td>
<td>22%</td>
</tr>
<tr>
<td>Interaction with administrtrs</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>Finding encouraging/helpful people</td>
<td>4%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Other problems (4% and 7%): motivation, attendance problems, lack of supplies, faculty politics, coaching, planning with regard to curriculum goals, school too big, morale.

Time had been identified in the literature as a major problem, but as the table shows, the lack of it was the greatest stressor experienced by these teachers by year's end. Comments frequently addressed the frustrations of being unable to adequately prepare and of having no time of one's own.

Physiological reactions indicating distress were reported by 57% in December; by May these reactions were down to 22%. Stomach upsets were most common (21% and 11%), followed by depression (18% and 15%), inability to sleep or sleeping too much and anger. Several mentioned increased illnesses, canker sores, leg cramps, and two teachers reported grinding their teeth. One person was in pain and had to get dental treatment as the result of
this tooth grinding. Additional smoking, drinking, profanity and increased tension were other reactions described by this group.

**Types of Help**

Recognized or not, a mentoring process exists and is a highly important factor in new teachers' survival. By May 63% of these new teachers received help from an assigned mentor, 26% saying that the mentor was "a lot" of help. But 89% obtained help from another helpful teacher, with 59% saying that person was "a lot" of help. Many who had an assigned mentor obtained as much or more help from someone else. Most often the highly helpful teacher taught mathematics also. But several new teachers indicated they received significant assistance from non-mathematics teachers.

By far the most needed assistance was moral support and friendship. Comments were frequent regarding the helpfulness of brainstorming, sympathetic understanding, acceptance and imparting a sense that "you're OK."

Help with discipline came both as specific tips for dealing with a particular troublesome student and general tips for classroom rules and consequences. Administrative intervention helped some, but many times significant administrative help took the form of tips and the promise of support if a student became defiant.

Very important to these new teachers, too, was curriculum support. Tips by other mathematics teachers regarding what was reasonable to expect of students, what depth of understanding and competence was needed, what topics could be integrated and where a little extra time should be spent; all these were valued highly by new teachers.

The personal time crunch also made the sharing of teaching ideas and materials highly valued. Time simply did not exist for a thorough search for better techniques than those suggested by the text. But other teachers shared their best ideas for labs, manipulatives, presentations, worksheets and tests.
All of the above were mentioned both as help received, and for some, help still needed. In addition new teachers mentioned the need for help in such areas as dealing with absences and make-up work. Ideas were needed for handling the mountain of student papers and administrative paperwork as well. Help was needed with general classroom organization and grading policies. One teacher with low ability middle school students needed hints on how to change activities every 10 to 15 minutes. Many teachers desired more effective ways of learning about school organization and policies. And several wished for some specific suggestions for student motivators.

Suggestions for Change

There were several suggestions for easing the process of learning to deal with a full teaching load. One person thought student teachers should experience working with the five or six classes that a beginning teacher has. One suggested that new teachers be eased into the task, teaching two fewer classes than the normal load first semester, and one less second semester. And the teacher with five different preparations thought that such a task should not be given a new teacher "just starting out."

There were several suggestions also for improving communications and sharing between teachers. One person suggested a support group consisting of the new teachers in the district. A second teacher thought the school, which served 1200 students, should have teachers divided up into several interdisciplinary teams. A number of teachers wished for observation of, and by, experienced teachers. Some wanted to be able to select their own mentors.

Several suggestions were made for changes in college preparation. Recommendations included an emphasis on practical ideas rather than theory, discipline training, and realistic suggestions for dealing with paperwork.

Finally, suggestions were made that new teachers should be provided
extra administrative support. And one person mentioned convincing beginning teachers that "it's OK to get help."

Responses to the Guide

Of the 10 teachers who responded to the June questionnaire, one had not read the guide at all, four had read some of it and five had read most or all of it. Since it was not designed for cover-to-cover reading, having looked at some or most of it was satisfactory for the study. Hopefully from that, new teachers would get a sense of support, a feeling of not being alone in their problems, and a general idea of topics with specific suggestions if they needed them.

The guide was referred to several times by three teachers, one or two times by six teachers. The person who didn't read it of course didn't refer to it. Nearly all sections were mentioned by someone as helpful. Three people specifically liked the section on grading, two used the discipline section and two enjoyed the brain teasers at the end.

All the respondents to the survey rated problems caused by mathematics content as low (60%) or moderate (40%). All rated non-mathematics teaching problems as moderate (50%) or high (50%).

Other helpful sources included a number of publications of the National or State Council of Teachers of Mathematics, including the Standards (1989). Books on teaching, time management, discipline, and the teaching of mathematics were also cited. But, consistent with the other surveys, other teachers were rated as the greatest source of help.

Some Enlightening Comments

"Most of what I do and the way that I do it came from the wonderfully effective and creative teacher I worked with last year when I did my student
teaching. I feel that he is the biggest factor in how well things are going for me this year."

"I am having a positive experience, with a lot of support from the administration. I love teaching and really enjoy my students and my subject matter. I do spend much of my weekend preparing for the next week, but it is worth it since things are running smoothly."

"I've virtually eliminated my social life and cut back on hours of sleep. I stay up late to plan for the next day then am exhausted after school so put off planning for the next day, stay up late,..." (This person teaches five different classes.)

"I get very stressed because there aren't enough hours in a day. I have a 2 1/2 year old... I spend so many hours nights and weekends. It's very hard. I'm not sure I can imagine doing this for very long."

"No time, no rest for the weary, don't coach the first year."

"I got lots of help but I had to go out and get it ... no acknowledgement for helpers ... a formal help system is needed."

"We had a highly organized mentor program that took up too much time and didn't help. Need to talk to others without taking up too much time."

"New teachers were given time off with mentor and other new teachers for discussing problems, sharing solutions, making manipulatives, getting caught up. The problem was that it didn't start until second semester."

"Mentor program ... fantastic."

"You can't overestimate the need for emotional support and your emotions' effect on teaching."

"Our district provides an administrator to observe and discuss ... I got great advice, reinforcement of effective things I'm doing, help getting cooperative learning off the ground."

"There was a lack of equipment and materials in a programming class ... class deteriorated into something really bad ... no respect for me ... they would say I haven't taught them anything."