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From the Editor

Welcome to the first issue of the "next generation" of ***GATEways***. In 1990, Edi Guyton and Jan Towslee accepted the challenge of reestablishing the publication of the GATE Journal. They developed editorial policy, established an editorial board of distinguished educators, and for the past six years, have published an annual issue containing thoughtful articles addressing concerns in teacher education. We owe them our thanks for developing a vibrant resource for our profession. Thanks also to the College of Education at Georgia State University for their generous support of the endeavor.

This issue continues their tradition of excellence with three articles by Georgia teacher educators that examine the professional development of preservice and inservice teachers from different perspectives. I hope you will use these articles as springboards for dialog about teacher education.

The Journal is a resource and representation of our organization. I invite you to contribute to its health and well-being by submitting articles, by sharing the publication with colleagues and encouraging them to submit material, and by offering feedback and suggestions for improvement. Thanks for your support.

Diane Willey
Editor

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Reflecting on the Purposes of Education: The TOTAL Project

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Emory University

Abstract

Teacher education, both preservice and inservice, often focuses on the specific knowledge and strategies of instruction. In this paper we argue that it is important for practicing teachers to take a step back from the day-to-day concerns of teaching and reflect on the larger purposes of schooling. What do we want students to learn? Why do we want them to learn it? What messages do we send students about what is valued in classrooms and school? A collaborative project (the Team Oriented Task Approach to Learning, or TOTAL project) between a team of four 7th grade teachers and one professor of education during which these questions were addressed is described. Implications and suggestions for inservice education are discussed.

Teaching is a profound profession. Although we are not the first to make this observation, it is the central notion that guides this paper and the project we will describe in it. Teachers are asked to spend six or seven hours a day educating children. With such a daunting task and responsibility before them, one might expect teachers to spend a considerable amount of time thinking about the purpose of teaching, learning, and education. This reflection extends beyond the typical concerns that dominate teachers' time of what subjects to teach and how to teach them. It extends to larger questions such as the following: What do we want students to get from their time in school, both in terms of content knowledge and affective responses to school? Why do we want students to learn certain things? What are the effects of teacher practices and policies on all of their students? Unfortunately, many teachers may not have the opportunity to explore these issues.

The purpose of this paper is to describe a collaborative project between a professor and researcher of educational psychology and a team of four seventh grade teachers during which these questions were explored. We will begin with a description of the theoretical framework that guided the project, followed by a description of the project itself. Next, one of the participating teachers will describe some of the consequences of participating in the project for herself, her teammates, and the school. Finally, we will conclude with a consideration of the implications of this project, or projects like ours, for teacher education.

Theoretical Orientation of the Project

Teacher education is often divided into two parts: preservice and inservice. Preservice teacher education consists primarily of instruction in subject areas and the methods for teaching these subjects. Inservice education mostly deals with the methods for teaching specific concepts or how to use specific teaching strategies. Neither of these teacher education systems addresses in depth the most fundamental educational issues: Why do we want students to learn this material? How do we create an instructional climate that motivates as many students as possible to learn? What effect do certain teaching methods have on students' motivation and performance? In short, why are we (teachers) here?

One approach to answering these questions is offered by taking a motivational perspective. A number of educational researchers and theorists have suggested that the purpose of education should be to tap into and nurture students' innate motivation to learn (e.g., Ames, 1992; Deci & Ryan, 1985; Kohn, 1993; Piaget, 1970). With this perspective, the key issues involve determining what is motivating for students and developing instructional strategies that are motivating for all students.

The project described in this paper was based upon a prominent theory of motivation known as achievement goal theory (Ames, 1992; Dweck & Leggett, 1988). According to achievement goal theory, the quality of students' motivation to engage in school work is determined to some substantial degree by the purposes that students perceive for doing the work. For example, students may believe that the purpose of doing academic work is to learn new things, to improve skills, or simply to pursue an interest in a topic. This type of orientation toward work is referred to as a task goal orientation (Midgley & Urdan, 1995). Another reason students may have for doing their work is to demonstrate superior ability relative to others or to avoid appearing less able than one's peers. This type of orientation, called a performance goal orientation (Ames, 1992; Dweck, 1986), is based on social comparison, whereas a task goal orientation is based more on information about the academic task and self-referent information. The type of goal a student pursues is not necessarily related to the amount of motivation she has to engage in the task. For example, a student may be very motivated to demonstrate her ability relative to others (performance goal), just as she may be highly motivated by the desire to develop her competence (task goal). Rather than affecting the amount of motivation a student has for performing in school, goals are thought to affect the quality of motivation.

A large body of research has demonstrated that when students are task goal oriented they have more positive feelings about school and school work, persist longer in the face of failure or difficulty, use more deep and less shallow cognitive processing strategies, and have a more favorable pattern of attributions for success and failure than when they are oriented toward performance goals. This research has inspired some goal theorists to initiate projects at both the classroom (Ames, 1990) and school levels (Maehr & Midgley, 1991) designed to create task-oriented learning environments. Using the TARGET framework developed by Epstein (1989), these efforts have focused on changing classroom and school policies regarding the Tasks assigned to students, opportunities for student Authority, how students are Recognized, Grouped, and Evaluated, and how Time is used so that task goals

are emphasized and performance goals are de-emphasized.

In a school-wide project conducted at the middle school level, Maehr & Midgley (1991) attempted to work with teachers and administrators to create a task-oriented school. Although considerable progress was made during the three year collaborative project and subsequent years, progress was stunted by a number of logistical barriers (Urdan, Midgley & Wood, 1994). The present study was undertaken to determine the utility of attempting to create a task goal oriented climate within a single team of middle school teachers.

Description of the Project

The project was called the Team Oriented Task Approach to Learning (TOTAL). As with the school-wide TARGET project on which it was based, the TOTAL project was non-prescriptive in nature. That is, the researcher did not bring a prescription for change to the project. Rather, the project was process based. A series of eight meetings, ranging from 45 to 120 minutes, was held between the researcher and the team of teachers. The first two meetings were discussions about the theory of motivation, achievement goal theory, that would serve as the framework for the project. Each of the next six meetings, conducted at the beginning of the academic year, covered a different TARGET area. The purpose of each of these meetings was to discuss ways in which the teachers could create a task goal oriented environment in their classrooms by altering their policies and practices in each of the TARGET areas.

To achieve this purpose, a variety of approaches was tried. Some conversations began with the researcher asking the teachers to think about their current practices and to determine whether each practice reflected a task or performance goal orientation. For example, when discussing the Task dimension, the teachers were asked to think about a task that was particularly motivating for students and one that was less motivating. This discussion led to an analysis of what the features of engaging tasks are, and what factors inhibit motivation, at least for some students. Another

approach, used during the discussion of recognition practices, was to begin by discussing the purposes of recognizing students. This process led us to examine the existing recognition practices from a goal theory perspective. All of our discussions culminated in the production of a list of "Considerations" for ways to promote task goals in each of the TARGET areas, an example of which is presented in Table 1.

Table 1.
Task Goal Considerations for Creating Assigned Academic Tasks.

1. Make the task relevant to students.
2. Allow students some choice in the task.
3. Variety within the task (e.g., including options for what students can do, how to do it, and the materials they use).
4. Make the task somewhat offbeat or colorful.
5. Create reasonable opportunities for all students to succeed and reduce the threat of failure.
6. Make the task active and "hands-on."
7. Include an element of fantasy in the task.
8. Make the task into a game.
9. Introduce the task with an advance organizer that emphasizes the relevance of the task for students and the inherent value of the task.
10. Introduce the task with genuine enthusiasm regarding the inherent value of the task.
11. Whenever possible, try to develop tasks that are conceptually related to what students are learning and doing in other classes and in their lives outside of school.

The weekly meetings were fairly unstructured, allowing for the open exploration of issues as they arose. Because teachers' lives are filled with concerns regarding the management of students and teaching specific lessons, as well as the myriad of school and district policies that affect instruction, the discussions often included the logistical barriers to creating task-oriented environments in their classrooms. For example, the discussion of evaluation focused so heavily on grading policies and practices that at one point the researcher reminded the teachers that evaluation is a broader issue than simply how grades are determined. A central role of the researcher was to redirect the discussions away from day-to-day logistics toward broader issues. What is the purpose of evaluating students? What do we want to accomplish with the tasks we assign? What are the messages we send to students about what is valued in the school with the recognition systems we employ? What are the messages that our teaching practices send students about what we value? How is student motivation affected when they are given a voice in classroom decisions?

These are the types of questions that relate to the broader purposes of schooling. And these are the issues that should govern the logistics in schools, not vice versa. Yet, because of the demands on teachers' time and mental energy, these questions rarely get asked and these issues rarely get addressed, either in preservice or inservice teacher education. Because the answers to these and related questions determine what is valued, what is taught, and what is learned in school, the weekly meetings and the entire TOTAL project were designed to address these issues. This focus on the broad theoretical issues of schooling and away from the logistics of education represented a conscious decision on the part of the researcher to explore the question: What is the purpose of schooling? When the discussion swung heavily toward the logistical constraints on achieving these purposes, teachers were encouraged to think about what they would do in the ideal world, without practical restrictions. In short, teachers were invited to reflect on the purposes of schooling and to dream about ways to achieve those purposes. Practical considerations were taken into account, but only after a clear vision of the ideal, or nearly ideal, was developed.

What were the consequences of this project for the teachers involved? Is there anything to be gained by reflecting on the purposes of education from a motivational perspective while giving practical considerations a secondary role beneath broader conceptual considerations? Answers to these questions will be provided by the second author, who was one of the participating teachers.

Consequences of Participating in the TOTAL Project

I have to admit that when I was first asked to participate in this project I was hesitant. Experienced teachers traditionally view educational research and professors of education with some skepticism. Fairly or not, educational research is associated in teachers' minds with the impractical and overly theoretical courses that were a part of many of their undergraduate programs. In addition, I was apprehensive about my instructional practices being judged and my teammates were skeptical that the researchers' theory could teach them anything new. Research indicates that beliefs about teaching are well established by the time students get to college, and preservice teachers are likely to leave their respective colleges believing they have learned nothing new (Lortie, 1975; Nespor, 1987; Pajares, 1992). On the other hand, the topic was certainly interesting, and I was flattered to be asked for my opinion. I was curious about what the teachers on my team would have to say. I wanted to be helpful and cooperative to the researcher, but I also felt that my years of experience in the classroom lent authority to my contribution. I felt I had something of value to share. And, if the collaboration was successful, both sides would benefit.

The consequences of participating in the TOTAL project for myself, my teammates, and the school can be divided into two types: changes in perception and changes in practice. Perception includes both my feelings about my efficacy in reaching all of my students, views of my teammates beliefs and practices, and beliefs about the effects of my teaching practices. Kagan (1992) has argued that, without common goals, teachers become increasingly isolated, unsure, and defensive of their practices, harboring their respective pedagogies while avoiding interaction with one another.

In time they "grow detached and pessimistic about their ability to effect positive change among students" (p. 84). Lortie (1975) noted that "the modesty of the occasions which produce prideful feelings [in teachers] underscores the difficulty teachers see in attaining worthwhile results" (p. 133). For example, teachers often speak of a feeling of accomplishment if they can reach just one child. Lone teachers, like single parents, have no one with whom to share the blame when things do not go well. Although I felt that I belonged to a supportive, collaborative team of teachers, I was nagged by doubts about the students I was not reaching. I also felt somewhat isolated and did not often have the opportunity to reflect about my teaching practices with my teammates.

The TOTAL project became an opportunity to think reflectively with my teammates about practices that had become routine, and to examine those practices through a specific lens (achievement goal theory). Thinking about improving student performance and motivation through creating a task goal environment in our classrooms gave our discussions focus. Although every teacher thinks about ways to motivate students, increase participation, create interesting and engaging lessons, and generate enthusiasm for learning, keeping the principles of goal theory at the fore of our discussion helped me to see beyond my good intentions to the hidden messages sometimes contained in my practices. In addition, meeting weekly with my teammates specifically to think about and discuss the purposes of our practices helped to reduce the sense of isolation discussed by Kagan (1992). Although our team had a common planning period, our time was usually taken up discussing individual students, conferencing with parents, returning phone calls, completing paper work, or talking about the day's events. Seldom was there an opportunity to reflect in any meaningful way on the adequacy, validity, or unintended consequences of the practices we engaged in day-to-day. Participating in the TOTAL project provided this opportunity.

Participating in this project also afforded me an opportunity that is all too rare in the regular school day. It enabled me to look at my own classroom practices and policies from a different perspective, through the eyes of a non-threatening and knowledgeable

expert. One meeting session was spent closely examining routine homework assignments for ways to make them more inherently engaging. One of the features of task goal oriented instruction is that the academic tasks assigned to students are somehow meaningful and inherently valuable to the students. To get the discussion of academic tasks started we used a specific example of an academic task provided by one of the members of my team, but which each of us agreed was very like tasks each of us had assigned in the past. It required students to read a particular passage from a book and select ten events mentioned in the passage that were important.

To engage the thinking and discussion about the overall purposes of this and similar assignments the researcher began asking questions about the task. Why should students find ten important events in the reading? What if one student found 15 important events? What if another, thinking more integratively, identified two larger themes in the reading? This led to a broader discussion regarding the purpose of the assignment. Why do students need to know this material? What would they get out of this assignment? Is there anything inherently engaging or meaningful about this assignment? What was your purpose, as the teacher, in assigning this task? And is this task the best way of achieving your purposes? This discussion helped us to think critically about <u>why</u> we assign students the academic work that we do and culminated in the creation of a list of considerations to keep in mind when creating assignments. (See Table 1.) Two examples of these considerations are "Make the task relevant to students" and "Whenever possible, try to develop tasks that are conceptually related to what students are learning and doing in other classes and in their lives outside of school." These considerations are designed to help teachers think of ways to create a task goal environment by creating academic tasks that are interesting and meaningful for students. I refer to these considerations now as I make my plans and I use them as a filter to evaluate those favorite units that are assigned each year. The focus shifts from <u>what</u> I am asking my students to know to <u>why</u> I am asking them to know it. As often as I am able, I articulate my reasoning to them. It has to be more than

"Because it will be on the test."

Discussions like the one described above involving academic tasks led to changes in my perceptions regarding my teaching policies and practices. In addition to changes in perceptions, our discussions also led to changes in practices, sometimes at the school level. It was unsettling to discover that what we believed was not always what we practiced. For example, our discussion of recognition and reward practices led to the development of a list of considerations regarding student recognition. Included among these considerations are "All that meet the criteria should get the recognition" and "There should be no arbitrary limits set on the number of students who can receive any type of recognition." After our conversation on recognition and rewards we were determined to change our practices to be more in line with the beliefs we articulated in that discussion. Recognizing that school-wide practices were often more salient and pervasive than individual teacher's practices, we also set out to change some of the school-wide recognition practices. We convinced the school's leadership council to abandon the practice of asking teachers to recognize a Student-of-the-Nine-Weeks because it arbitrarily limited the number of students who could receive the recognition and the criteria for the award were not clear. Similarly, we convinced the teachers on our grade level to rethink end-of-the-year awards day. This awards ceremony has traditionally failed to recognize some students who met the criteria simply because arbitrary limits had been placed on the number of students that could receive an award. This practice sent the message to students that some students were more valued in the school than others and had the unintended consequence of being a disincentive to many students. We are turning it into a rewards day, with motivational guest speakers, games, and a picnic lunch in the park to celebrate the efforts of <u>all</u> students.

Overall, participating in the TOTAL project had its strongest effects on the ways in which we (teachers) thought about our practices. By continually thinking about the purposes behind our practices, we were forced to take a fresh look at what we do in the classroom and in the school. Sometimes, the examination of

existing practices led to the realization that they were not always in line with our larger objectives. In addition, we realized that there were unintended consequences for some of our practices, such as possibly inhibiting the motivation and achievement of some students by engaging in practices that limited students' opportunities for choice, developing interest in a topic or academic task, or being recognized. These altered perceptions led to some immediate changes in classroom and school-wide policies and practices as well as a set of considerations that continue to affect my thinking as I develop instruction in my classroom.

Implications For Teacher Education

Lessons Learned

The purpose of the TOTAL project was to help a team of middle school teachers develop a task goal oriented environment in their classrooms by getting them to take a step back from their day-to-day teaching concerns and reflect on the purpose of schooling, as well as ways to achieve those purposes. Our reflections on our participation in the TOTAL project, both from a teaching and a research perspective, have led to a number of conclusions regarding the application of this project to teacher education. These conclusions include suggestions for future teacher preparation efforts in this vein. Each of five suggestions will be described.

Outside influence. One important issue to address when considering the application of the TOTAL project to teacher education more generally involves the nature of the impetus, or catalyst, of the process. In the TOTAL project, a researcher from outside of the school coordinated the project and provided the initial push for what became a continuing reflective discussion about the purposes, and practices, of teaching. Is it necessary for an outside influence to get the ball rolling? We do not know. But we do believe that there may be some advantages to having an outside influence, rather than someone within the school, provide the impetus for reflection and facilitate the process.

One reason that an outsider may be helpful, if not necessary, is that an outsider may bring a less evaluative feel to the

project than would someone within the school. During the TOTAL project, the researcher was invited by the teachers to sit in their classrooms during the school day and observe their teaching, which he did. The purpose of this, from the researcher's perspective, was simply to get a better feel for the school and these classrooms in particular. At the meeting after the classroom visits, the researcher offered no feedback to the teachers about their teaching. Instead, he suggested that the teachers observe each other and have discussions about their observations. This suggestion was met with strong opposition and the ensuing discussion focused on the evaluative nature of classroom observations by others in the school, be they other teachers or administrators. In fact, the suggestion was offered that teachers from outside of the school observe their classrooms, as these observers were less closely involved in the lives of the teachers and the operation of the school.

We offer this example to clarify our contention that an outsider may have more success in initiating and facilitating the type of reflective process involved in the TOTAL project. To engage in discussions about practice that are meaningful and insightful, it may be necessary to raise some uncomfortable issues. As Kagan (1992) noted and our own discussions in the meetings confirmed, teachers can become isolated in their teaching and defensive about their practices. Questioning those practices and challenging beliefs is critical to developing a clear sense of purpose regarding teaching and learning and to altering practices to fit that purpose. For this process to occur, it is important to create a sense of trust, fostered by developing a non-judgmental atmosphere. It may be easier for an outside person rather than a member of the school faculty or administration to accomplish this.

Another benefit of having an outsider lead the process is that the outsider may be perceived as having some expertise that is lacking in the school. In the case of the TOTAL project, the researcher had some experience working on similar projects in schools, had been a teacher at the middle school level, and had some expertise in student motivation and achievement goal theory. As discussed earlier in the paper, professors of education armed with a theory are not always welcomed or trusted by teachers, so

these characteristics are not necessarily strengths for engaging in this type of reflective process. Coupling expertise with a non-evaluative method, however, may lend credibility to the outside person and provide a combination of qualities that is hard to match when the impetus for change comes from within the school.

A guiding theory. Related to the question of whether an outside influence is necessary to begin the reflective process described in the TOTAL project is the issue of whether such a process needs to be driven by theory. The TOTAL project was undergirded by achievement goal theory, a prominent theory of motivation. But was this theory, or any other theory, necessary?

Using goal theory as a framework to guide our discussions was useful for a number of reasons. First, it provided a consistent reference point we could use to evaluate existing teaching practices used by the team and the generation of new ideas. Although the tenets of the theory may not have stuck in the minds of teachers, having a theory to guide our discussions helped to keep the discussions focused. Second, having a guiding theory may have helped the researcher establish credibility with the teachers by a) providing a somewhat tangible set of beliefs supported by research and b) serving as a distant, objective theory that could be used to deflect personal judgments of teachers' practices. For example, in some discussions teachers' practices and ideas were questioned directly and repeatedly (e.g., the teacher's assignment asking for 10 questions described earlier). It can be a difficult and uncomfortable experience having one's ideas challenged. Teachers, who have received a steady diet of criticism from the press and society in conjunction with the perceived failure of public schools, may be especially sensitive to such criticism and challenge. In some instances, it was helpful to diffuse such difficult situations by using the theory, rather than the researcher's personal opinion, as the basis of the challenges. In this way, achievement goal theory helped maintain an atmosphere of trust among the team and the researcher.

It is unclear whether a theory is necessary for a project like TOTAL to be successful. We know that it was helpful in our project. In addition, we agree with the recommendation of

Edmonds (1984) and others that schools and schooling should be driven by a clear mission or purpose. It may be possible to think reflectively about the purposes of school and the ways in which those purposes can be achieved without having the process guided by theory, but it is hard to imagine the process being successful without a strong and focused mission guiding the inquiry.

Time and a process. Advocates of the middle school model of education have suggested that teachers should be organized into teams with a common planning period (e.g., National Middle School Association, 1992). In the middle school where the TOTAL project was conducted, the teachers were organized into teams and team members shared a common planning period. As the teachers in the project and elsewhere (see Mac Iver, 1990) have demonstrated, simply sharing a common planning period does not ensure that teachers will plan interdisciplinary instruction, much less discuss the broader purposes of education. Instead, teachers often spend common planning time grading papers, planning instruction for their classes separately, or discussing with each other problems regarding individual students. Such immediate, daily concerns can inhibit teachers from addressing the types of issues raised in the TOTAL project, a process that the participating teachers found clearly beneficial. We suggest that teachers should be given time, either during the school day or longer sessions periodically throughout the school year, designated specifically for discussing with each other what they want to accomplish in their teams and in their classrooms, why they want to accomplish these things, and how they can achieve these goals. It is not enough simply to provide time, such as a common planning period. A focused process is needed as well.

Dreaming vs. logistics. Teachers are often so enmeshed in the daily concerns of school life that they have difficulty finding time to discuss the larger purposes of schooling. In addition, there are so many logistical constrictions in schools (e.g., the daily schedule, grading policies, large class sizes, curriculum objectives), it is often difficult to shake free of these concerns to think more broadly. This is unfortunate, because these micro-level concerns can cause teachers to lose sight of the larger issue that

should be driving the process of education; namely, "What do we want students to learn, and why?" A primary objective of the TOTAL project was to have teachers spend time putting logistical concerns aside temporarily while they dreamed about what they would like to do in their classrooms in an ideal world. Once these dreams were verbalized, we then returned to the logistical and practical world to see how we could adapt the dreams to the real world, and vice-versa. It was through this process that some of the teachers on the team felt empowered to question, and ultimately change, some of the school-wide recognition practices that had existed for years. Without a suspension of logistical concerns, it is difficult to question and alter practices that may not fit with one's overall view of what school can and should be about. (See Midgley & Urdan, 1992, and Urdan, Midgley, & Wood, 1994, for more discussion of these issues.)

Inservice vs. preservice. A final recommendation is that this type of project should be used with practicing rather than preservice teachers. Having preservice teachers think about the purposes of education is certainly a good idea and has the potential to be a valuable experience. However, the strength of this type of inquiry for the participating teachers may have been derived in part from two sources unavailable to preservice teachers—experience working with students and experience working within the real-world restrictions of schools. For teachers to have the type of learning experiences produced in this project, those that caused the teachers to say "I never thought of it like that before," they need to have experience thinking of "it" in the context of practice.

Conclusion

We believe that having experienced teachers engage in a formalized process of critiquing their own practices can lead to insights that will affect their teaching profoundly. The TOTAL project provides one example of a theory-based process designed to help teachers think about the larger purposes of schooling, but it is not the only model. The process of reflecting on teaching practices and focusing on particular topics, such as the purposes

and consequences of those practices, may be more important than how the process of reflection is initiated. Without the time and an impetus to think about the purposes of schooling, what students should learn, why they should learn it, and the messages given to students by various practices and procedures, teachers can become isolated, desensitized to the effects of their instruction on students, and automated in their teaching. Teacher education, both preservice and inservice, is often narrowly restricted to the mechanics of instruction and classroom management. This is unfortunate as it can lead teachers to lose sight of their larger objectives and strip teaching of its meaning. A primary objective of teacher education should be to help teachers think clearly about what they are trying to achieve in their classrooms, why they are trying to achieve it, and how to reach their objectives to the benefit of all students.

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Teacher Induction: The Needs Of The Mentor Teacher

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Abstract

This research examines the motives, qualities, and skills of experienced teachers who select mentoring as their first avenue of professional leadership outside of the classroom. The research findings show that teachers are motivated to prepare for new formal mentor teacher leadership roles primarily because they seek an avenue for their own professional growth and stimulation, and that helping novice teachers is a secondary motivating factor. Furthermore, this research indicates that most of the aspiring mentor teachers want, but after years of successful teaching have not acquired, the knowledge and skills to assume new teacher leadership roles such as mentoring. The need for teacher leadership preparation and support is addressed.

Introduction

The first step that many experienced classroom teachers take to acquire a new leadership role without leaving the classroom is to become a mentor teacher. This is not surprising because mentoring provides a natural opportunity for them to use their acquired classroom knowledge and skill to help a novice teacher enter the profession. The research findings presented in this paper, however, show that teachers are motivated to prepare for new

formal mentor teacher leadership roles primarily because they seek an avenue for their own professional growth and stimulation and that helping novice teachers is a secondary motivating factor. Furthermore, this research indicates that most of the aspiring mentor teachers want, but after years of successful teaching do not possess, the knowledge and skills to create or assume new teacher leadership roles such as mentoring.

Formal mentoring means that experienced teachers assist novice teachers in numerous ways as they enter the profession. For example, effective formal mentoring includes observing in the novice teachers' classrooms and discussing their teaching. This new activity leads to creating new teacher roles, developing new skills, and reorganizing schedules. Thus, mentor teachers become involved in educational change issues in their institutions.

Pre-service and in-service programs currently do not prepare teachers for new leadership roles. (Goodlad, 1994). Also, most schools are not structured to encourage teacher leadership. Thus, without leadership skills or support for their leadership positions, the teachers remain within informal helping roles and rarely become leaders with a voice and vote in organizational decision making (Johnson, 1990). They have difficulty asserting themselves as change agents who shape the restructuring of schools in ways that would support teacher leadership roles.

Context

Current national and local reforms in teacher education are advising changes in the traditional structure of professional roles. One important result is that mentor teachers are assuming more responsibility for the preparation and induction of new teachers (Thies-Sprinthall & Sprinthall, 1987). This shift to formal mentoring roles represents public acknowledgment and respect for the expertise of effective, experienced teachers.

Formal mentor teacher programs are created for several purposes. First, they provide novice teachers with valuable information, guidance, and support. An important part of the support is helping novice teachers clarify and maintain their vision during the

first years of teaching (Featherstone, 1988). Mentoring also provides new avenues of professional growth and leadership for the experienced teacher (Little, 1988). Furthermore, mentor programs can help reduce the amount of teacher isolation often found in schools because, in the mentoring model, teachers observe one another teach and reflect together on the teaching and learning process. Thus, mentoring programs promote collegial interaction.

The recently changed preparation for a provisional teaching certificate in Massachusetts is typical of the changes in many other states that are moving toward the involvement of mentor teachers. The provisionally certified teacher in Massachusetts can apply for a permanent certificate after completing at least one year of full-time teaching responsibility while working with a mentor teacher. Thus, the mentor teacher has been given a new crucial role in the preparation and induction of novice teachers.

The findings from the research data presented in this paper are intended to identify some of the salient issues related to understanding and developing the numerous reform efforts that promote formal mentoring programs. Implications for other teacher leadership initiatives may also be related to the issues addressed.

Research Method

Subjects and Setting

The research data were collected from seventy-three experienced early childhood, elementary, and middle school teachers. Approximately 85% of the total number of teachers in the sample were female and 40% were persons of color. All of the teachers in the sample were enrolled in a graduate course for mentor teacher preparation offered by an accredited graduate school program in the Boston area. All of the teachers demonstrated individual initiative when they sought preparation to be among the first formal mentor teachers in Massachusetts. Furthermore, they all pursued the mentor teacher role before the state officially required it.

The mentor course developed a common vocabulary for discussing mentoring, clarified the meaning and responsibilities of

mentoring, and provided initial practice with mentoring skills. Topics in the mentor teacher preparation course included adult development; the vision, principles, and responsibilities of mentoring; observation and recording skills; communication and reflective conferencing skills; school culture; organizational change; and current research and information about curriculum. A multicultural perspective was infused throughout the course. Simulations, videos, case studies, journals, and cooperative learning strategies were employed as means of integrating theory and practice. College faculty and public school teachers co-taught the course.

Research Instrument

The *Mentor Teacher Preparation Inventory and Guide for Planning and Action* (Manthei, 1990), hereafter referred to as the Inventory, was developed by the researcher for two reasons. First, no research instrument existed for assessing the training needs of mentors. Prior research evaluated the outcomes of mentoring experiences. Second, by providing an opportunity for the aspiring mentor teachers to summarize individual areas of competence and need as they pursued their next steps of mentor preparation, the research instrument could be an active part of the training. Thus, the data collected would expand the literature about the preparation and support needed to prepare effective mentor teachers.

The Inventory is divided into two major sections. Section One includes five categories of information that reflect the topics addressed in the mentor preparation course:

Personal Motivation for Becoming a Mentor
Personal Traits and Qualities
Knowledge and Skill as a Classroom Teacher
Knowledge and Skill as a Mentor Teacher
Knowledge of Organizational Issues

The first two categories help guide the teachers' reflections on their reasons for choosing to pursue mentor preparation and the personal traits and qualities they bring to mentoring. The last three categories help teachers determine what areas of knowledge and skill they may need to acquire in order to become effective mentors.

The five categories of the Inventory are separated to provide focus. It is clear, however, that they are not fixed and they are closely related.

Under each of the five categories there are between 11 and 27 descriptors as well as spaces to name additional descriptors. The teachers ranked each descriptor on a Likert-type scale of 1 through 5. They were asked to give a number 1 ranking to indicate the descriptors that always represented them, a 2 ranking to indicate the descriptors that usually represented them, with 3, 4 and 5 rankings indicating descending degrees of self-representation. Only the 1 and 2 rankings from the Likert-type scale of 1 through 5 were used to compile the findings reported in this paper. The use of just the 1 and 2 rankings was decided for two reasons: 1) the scales were constructed to move from the most to least like in a uniform way. Thus the results are strikingly obvious when the two highest "most like" descriptors are examined; 2) the data were intended to be easily understood and used by practitioners in the field, so actual percentages were used rather than other statistical interpretations.

Data Collection

The research data presented in this paper concentrate only on the responses collected from Section One of the Inventory. Section Two of the Inventory helped teachers formulate individual action plans to address the areas of need identified in Section One and are not relevant to this research report.

The data were collected by compiling the results from the five categories of information (listed above) in Section One of the Inventory. After completing the Likert-type scales for each of the five categories, each teacher submitted a carbonless copy of her/his responses. Seventy-one percent of the data were collected from the participants in two graduate summer mentor preparation courses. The remaining twenty-nine percent of the data were collected from teachers who took the mentor preparation course when their large urban school system requested that the course be offered to them on site.

Research Results

A summary of the results of the Inventory will be presented for each of the five categories in Section One. Tables of the descriptors given a 1 or 2 rank are provided. Conclusions and implications based on the research findings will be presented in later sections of the report.

Category A: Motivation for Mentoring (Table 1)

The data from the Inventory clearly indicate the most significant reasons for preparing for a mentor teacher leadership position. The descriptor *Professional Growth* is ranked as a primary motivating factor by 94.5% of the teachers; *Professional Stimulation* follows closely at 93%.

A second cluster of motivation factors is also significant. The descriptor *Contribute Support and Information to New Teachers* is cited as their primary motivation factor by 84% of the teachers. Both *Help New Teachers Adjust* and *Preparation of New Teachers* follow closely at 82% each. It is interesting to note that 67% of the teachers also cited *Improve Present Teacher Preparation Methods* and 63% cited *Change the Ways Teachers Enter the Profession* as primary motives for mentoring. Their concern for **improving** present teacher preparation and for **changing** the present ways of entering the profession indicates that these experienced teachers not only want to have responsibility for new teacher preparation and induction but they also want to change the existing policies and practices.

In contrast to the above highly ranked motivation factors, only 17.8% chose the motivation factor *Request From an Administrator*. Other least significant motivation factors are *To Gain Status Within the School or System* at 20.5% and *Financial Gain* at 27%.

Table 1.
Category A: Motivation For Mentoring:
Percentage of 1 and 2 Responses.

PERCENT	DESCRIPTOR
94.50%	PROFESSIONAL GROWTH OPPORTUNITY
93.00%	PROFESSIONAL STIMULATION
84.90%	CONTRIBUTE SUPPORT AND INFORMATION TO A NEW GENERATION OF TEACHERS
82.00%	HELP NEW TEACHERS ADJUST
82.00%	PREPARE NEW TEACHERS
80.80%	ENHANCE MY OWN SENSE OF PROFESSIONAL IDENTITY
78.00%	GENERAL WISH TO BE A MENTOR
72.60%	COLLEGIAL OPPORTUNITY
71.00%	AVENUE FOR TEACHER EMPOWERMENT
67.00%	PROVIDE WHAT I WISH I HAD EXPERIENCED AS A NOVICE TEACHER
67.00%	IMPROVE PRESENT TEACHER PREPARATION METHODS
63.00%	CHANGE THE WAY NEW TEACHERS ENTER THE PROFESSION
52.00%	CAREER LADDER STEP
31.50%	REPEAT THE MENTORING HELP I RECEIVED AS A NOVICE TEACHER
31.50%	COMPLY WITH NEW STATE MANDATES
27.00%	FINANCIAL GAIN
20.50%	GAIN STATUS WITHIN THE SCHOOL AND/OR SYSTEM
17.80%	RESPONSE TO A REQUEST FROM AN ADMINISTRATOR

Category B: Personal Traits and Qualities (Table 2)

The following personal descriptors received the highest rankings from the aspiring mentor teachers. *Enjoy Learning as an Adult* is cited by 93% of the teachers as a primary distinguishing characteristic. The descriptors *Value the Teaching and Learning Process* and *Positive Vision as an Educator* are both reported by 91.7% of the teachers as primary personal qualities.

The personal attributes that received the lowest rankings are *Abstract Thinker* and *Able to Tolerate Ambiguity*. Both are chosen by only 47.9% of the teachers as strong personal qualities. The other personal trait descriptors chosen infrequently are *Prior Positive Leadership Experiences* at 52% and *Comfortable With Administrators* at 58.9%.

Table 2.
Category B: Personal Traits and Qualities:
Percentage of 1 and 2 Responses.

PERCENT	DESCRIPTOR
93.00%	ENJOY LEARNING AS AN ADULT
91.70%	POSITIVE VISION AS AN EDUCATOR
91.70%	VALUE THE TEACHING/LEARNING PROCESS
89.00%	VALUE SHARING IDEAS AND MATERIALS WITH COLLEAGUES
86.00%	SENSITIVE
86.00%	EMPATHETIC
84.90%	PROBLEM SOLVER
83.50%	ENTHUSIASTIC
83.50%	REFLECTIVE
83.50%	FLEXIBLE
83.50%	RESPONSIBLE
83.50%	SENSE OF HUMOR
83.50%	PEOPLE ORIENTED
78.00%	INNOVATIVE

Table 2. continued
Category B: Personal Traits and Qualities:
Percentage of 1 and 2 Responses.

78.00%	PATIENT
75.30%	PREFER COLLABORATIVE WORK
75.30%	NURTURANT
72.60%	ENABLER
71.20%	CONFIDENT
71.00%	ACTIVE LISTENER
65.70%	ARTICULATE
61.60%	POSITIVE EXPERIENCES WITH STUDENT TEACHERS
60.00%	RISK TAKER
58.90%	COMFORTABLE WITH ADMINISTRATORS
52.00%	PRIOR POSITIVE LEADERSHIP EXPERIENCES
47.90%	ABLE TO TOLERATE AMBIGUITY
47.90%	ABSTRACT THINKER

Category C: Knowledge and Skills As a Classroom Teacher (Table 3)

Categories A and B have primary descriptors that are common to at least 93% of the teachers. Beginning with Category C the percentage of agreement lessens with each successive category. In Category C the areas of classroom teaching expertise that all teachers rank highest for themselves do not reach 85%. The areas that are ranked "most like" are related to classroom management issues rather than to subject content or teaching methodology. The descriptor chosen by the most teachers as an area of strength is *Positive Discipline Strategies* at 84.9%. The next highest ranking areas of classroom expertise are, *Small Group Learning* with 83.5% and *Effective Classroom Organization* and *Individualization*, both with 82%.

Fewer than 50% of the teachers state they have significant expertise in *Teaching Computers,* 41%; *Ecology,* 46.5%; or *Global Awareness,* 47.9%.

Table 3.
Category C: Knowledge and Skills As a Classroom Teacher:
Percentage of 1 and 2 Responses.

PERCENT	DESCRIPTOR
84.90%	POSITIVE DISCIPLINE STRATEGIES
83.50%	SMALL GROUP LEARNING
82.00%	EFFECTIVE CLASSROOM ORGANIZATION
82.00%	INDIVIDUALIZATION
80.80%	PROVIDE FOR DIVERSE DEVELOPMENTAL LEVELS
80.80%	CELEBRATE DIVERSITY OF STUDENTS
80.80%	POSITIVE PARENT/TEACHER COMMUNICATION
80.80%	DEVELOPMENT OF CREATIVE AND CRITICAL THINKING SKILLS

Table 3. continued
Category C: Knowledge and Skills As a Classroom Teacher:
Percentage of 1 and 2 Responses.

79.50%	WHOLE LANGUAGE APPROACH TO LITERACY
78.00%	PROVIDE FOR STUDENT CHOICE
75.00%	SKILL ACQUISITION WITHIN MEANINGFUL CONTENT
75.00%	MATH MANIPULATIVES
73.90%	PROVIDE FOR DIVERSE LEARNING STYLES
73.90%	OPEN-ENDED QUESTION TECHNIQUES
71.00%	PROVIDE FOR MULTIPLE FORMS OF INTELLIGENCE
71.00%	LEARNING CENTERS
71.00%	PROCESS WRITING
68.40%	INTEGRATED UNIT TEACHING
64.30%	MULTIPLE STUDENT EVALUATION STRATEGIES
57.50%	AWARENESS OF ENGLISH AS A SECOND LANGUAGE ISSUES
57.50%	HANDS ON SCIENCE
57.50%	INTEGRATION OF THE ARTS
57.50%	MULTICULTURAL EDUCATION
56.00%	USE OF COOPERATIVE LEARNING GROUPS
53.40%	CREATIVE CONFLICT RESOLUTION
47.90%	GLOBAL AWARENESS
46.50%	ECOLOGY
41.00%	COMPUTERS

Category D: Knowledge and Skill As a Mentor Teacher (Table 4)

There are eleven descriptors in the category of mentor teacher knowledge and skill and none of them is chosen as an area of expertise by more than 75% of the teachers. The three descriptors that rank highest are *Understand the Culture of the Community Where I Teach,* 73.9%; *Ability to Articulate Effective Teaching and Learning Concepts*, 73.9%; and *Understand My School Culture,* 72.6%. The descriptors related to working with adults, or colleague consultation skills such as observing and recording in classrooms or reflective conferencing, are given 1 or 2 rankings by 45% or fewer of the teachers.

Table 4.
Category D: Knowledge and Skill As a Mentor Teacher:
Percentage of 1 and 2 Responses.

PERCENT	**DESCRIPTOR**
73.90%	UNDERSTANDING THE CULTURE OF THE COMMUNITY WHERE I TEACH
73.90%	ABILITY TO ARTICULATE EFFECTIVE TEACHING/LEARNING CONCEPTS
72.60%	UNDERSTAND MY SCHOOL'S CULTURE
71.20%	TEAM TEACHING ABILITY
67.00%	TEACHING WELL WHILE BEING OBSERVED
65.70%	WORKING WELL WITH ADULTS FROM DIFFERENT BACKGROUNDS
53.40%	ACTIVE LISTENING AND RESPONDING
45.00%	EFFECTIVE CLASSROOM OBSERVATION AND RECORDING STRATEGIES

Table 4. continued
Category D: Knowledge and Skill As a Mentor Teacher:
Percentage of 1 and 2 Responses.

43.80%	TEACHING ADULTS WITH EASE
38.30%	REFLECTIVE CONFERENCING
30.00%	APPLICATION OF ADULT DEVELOPMENT AND LEARNING CONCEPTS

Category E: Knowledge of Organizational Issues (Tables 5, 6)

The results of Category E are divided into two parts because the teachers from the urban system had the course on site and already had applied and been through a mentor selection process. Therefore, they had some school system information when they took the mentor course. Their results are reported separately in Table 6. The summer graduate course teachers, however, were from school systems that had not developed formal mentor programs or processes. Their results are reported in Table 5.

The descriptor given the most 1 and 2 rankings by the teachers who had the course through their school system (Table 6) was *Knowing the System's Process for Selecting Mentors*, 71%. In contrast to the teachers who had already been selected as mentors, only 23% of the summer graduate course teachers (Table 5) chose 1 or 2 rankings for *Knowing the System's Process for Selecting Mentors*. The highest-ranked descriptor of the summer school groups was *Actions Taken by the System to Develop a Mentor Program*, 34.6%. Among the lowest-ranked descriptors for both groups of teachers were *Knowledge of the Decision Making Process in the System*, 13%; *Options for "Unemployed" Mentors*, which means teachers prepared for mentoring but not matched with a novice, 0.06%; and *Parent Views About a Mentoring Program*, 0.06%.

Table 5.
Category E: Knowledge of Organizational Issues — Summer Course Teachers:
Percentage of 1 and 2 Responses.

PERCENT	DESCRIPTOR
34.60%	ACTIONS TAKEN BY THE SYSTEM TO DEVELOP A MENTOR PROGRAM
30.70%	SUPPORT FOR INNOVATION
30.70%	ADMINISTRATIVE SUPPORT FOR A MENTOR/ NOVICE TEACHER PROGRAM
28.80%	MENTOR'S ROLE IN THE EVALUATION PROCESS
28.80%	IF THERE WILL BE FINANCIAL REWARDS FOR MENTORING
28.80%	ROLE OF A CHANGE AGENT
26.90%	IF MENTOR TEACHERS NEED A MASTER'S DEGREE TO MENTOR CLINICAL MASTER'S DEGREE CANDIDATES
23.00%	KNOWING THE SYSTEM'S PROCESS FOR SELECTING MENTORS
23.00%	LENGTH OF TIME TO SERVE AS A MENTOR
21.00%	IMPLICATIONS OF DIFFERENTIATED STAFFING IN MY SCHOOL
19.00%	REQUIREMENTS FOR MENTOR TEACHER PREPARATION
19.00%	WHO HAS RESPONSIBILITY FOR ORGANIZING AND MAINTAINING A MENTOR PROGRAM
17.00%	PROCESS FOR MATCHING MENTORS AND MENTEES
17.00%	HOW TIME WILL BE PROVIDED FOR THE MENTORING PROCESS
17.00%	AVAILABLE ON-GOING SUPPORT FOR MENTORS
15.00%	SYSTEM'S COLLABORATIVE EFFORTS WITH A COLLEGE
13.00%	KNOWLEDGE OF THE DECISION MAKING PROCESS IN THE SYSTEM
00.08%	ROLE OF THE UNION
00.06%	OPTIONS FOR "UNEMPLOYED" MENTORS
00.06%	PARENT VIEWS ABOUT A MENTORING PROGRAM

Table 6.
Category E: Knowledge of Organizational Issues — Urban Teachers:
Percentage of 1 and 2 Responses.

PERCENT	DESCRIPTOR
71.00%	KNOWING THE SYSTEM'S PROCESS FOR SELECTING MENTORS
57.00%	IF THERE WILL BE FINANCIAL REWARDS FOR MENTORING
52.00%	MENTOR'S ROLE IN THE EVALUATION PROCESS
47.60%	WHO HAS THE RESPONSIBILITY FOR ORGANIZING AND MAINTAINING A MENTOR PROGRAM
42.80%	LENGTH OF TIME TO SERVE AS A MENTOR
42.80%	ROLE OF THE UNION
42.80%	ACTIONS TAKEN BY THE SYSTEM TO DEVELOP A MENTOR PROGRAM
38.00%	PROCESS FOR MATCHING MENTORS AND MENTEES
38.00%	REQUIREMENTS FOR MENTOR TEACHER PREPARATION
38.00%	AVAILABLE ON-GOING SUPPORT FOR MENTORS
38.00%	SUPPORT FOR INNOVATION
38.00%	ADMINISTRATIVE SUPPORT FOR A MENTOR/ NOVICE TEACHER PROGRAM
33.00%	SYSTEM'S COLLABORATIVE EFFORTS WITH A COLLEGE
33.00%	IF MENTOR TEACHERS NEED A MASTER'S DEGREE TO MENTOR CLINICAL MASTER'S DEGREE CANDIDATES
33.00%	ROLE OF A CHANGE AGENT
28.50%	HOW TIME WILL BE PROVIDED FOR THE MENTORING PROCESS
23.80%	KNOWLEDGE OF THE DECISION MAKING PROCESS IN THE SYSTEM
23.80%	IMPLICATIONS OF DIFFERENTIATED STAFFING IN MY SCHOOL
14.00%	OPTIONS FOR "UNEMPLOYED" MENTORS
00.09%	PARENT VIEWS ABOUT A MENTORING PROGRAM

Conclusions

Conclusions based on the research findings provide a general profile of the seventy-three aspiring mentor teachers. The teachers in this sample were among the first to pursue graduate preparation for the new formal mentor teacher leadership roles being created by the changes in the Massachusetts state teacher certification requirements. They clearly indicate that they are choosing to become mentors primarily because they seek an opportunity for professional growth and stimulation. They also want to assume more responsibility for the preparation and induction of new teachers. External reasons for mentoring, such as financial gain or a request from an administrator, were the least influential motivators. Another motivating theme, that of changing and improving what exists, also emerges from the data.

The personal qualities that most teachers use to describe themselves are closely linked to their profession. These are teachers who have maintained a positive vision, value the teaching and learning process, and enjoy learning as adults. Fewer than 50% of the teachers describe themselves as able to tolerate ambiguity or as being abstract thinkers. It would be interesting to see if this self-concept would be the same for undergraduate education majors and liberal arts majors. Or perhaps the school work site itself limits adult growth in more abstract thinking areas.

Overall, a picture emerges of a group of experienced teachers who value and are interested in their profession, display initiative, seek an avenue for professional growth and stimulation, and want new formalized relationships with novice teachers as they enter the teaching profession. The teachers demonstrate enthusiasm and interest, perhaps even a developmental need, for increased leadership opportunities in their profession.

The teachers state that there are areas of classroom expertise they need to acquire, especially in the content areas, in order to be effective mentors. The subjects in which the highest percentage of teachers reports the least knowledge and skill are computers, ecology, and global awareness. These are content areas of increasing importance and indicate the need for more in-service and/or

graduate school learning opportunities about these topics. Another obvious avenue to pursue further is the discrepancy between their highest ranked descriptor, *Positive Discipline Strategies*, 84.90%, and the lower ranked *Creative Conflict Resolution*, 53.40%. It would be interesting to find out how teachers define their positive discipline strategies if they do not use creative conflict resolution.

These aspiring mentor teachers are people who take initiative; therefore, it is not surprising that they are on the forefront of reporting their own needs as well as what may also be the needs of other experienced teachers. Their candid self-evaluation demonstrates they can define their needs and are willing to address them.

The teachers' rankings of many of the descriptors in categories A, B and C are in very high agreement. These three categories elicit responses about how the teachers describe themselves as experienced classroom teachers. Categories D and E ask teachers about their knowledge and skills related to working professionally with other teachers and within their school systems. In these latter two categories, the overall rankings for all descriptors decrease significantly.

Approximately fifty percent of the mentor preparation course time is spent addressing issues and skills related to the categories D and E. Perhaps the scores would be even lower without the benefit of the mentor course or, conversely, perhaps the course developed an awareness of how little they knew in these areas and consequently the lower rankings indicate a realization of what they need to learn to be effective mentors.

In either case, the data clearly demonstrate that experienced teachers are not familiar with collegial strategies for observing one another or talking about their teaching. Nor do they use adult development and learning concepts within their professional relationships. Likewise, the teachers state emphatically that they know very little about how decisions are made, how change takes place, details about the new program or parent views about the new program. Even the urban teacher group who had gone through a competitive mentor application process had very limited information about organizational issues or processes connected with the new mentor program. Overall, the findings indicate that neither

teacher preparation nor professional life in schools have provided basic organizational information or leadership training for teachers.

Implications

Mentoring provides a way for experienced teachers to satisfy their need for professional growth and stimulation and it also gives them an opportunity to contribute to their profession. Teachers who seek formal mentor teacher leadership roles need preparation in order to acquire the knowledge and skills that will allow them to be successful in their new role. The findings indicate that teachers know they have needs for updating their curriculum skills. Future graduate courses and in-service programs that are developed collaboratively with the teachers and are designed to address their specific needs will motivate and support the teachers' professional growth in ways that are clearly defined by the teachers themselves.

Skilled mentor teachers in new formal leadership roles will change the teacher induction processes. Novice teachers will begin with less isolation and with the expectation that teachers observe and learn from one another, reflect together, and jointly define and solve problems. This change represents a dramatic departure from the present way most teachers enter the profession. Currently, new and experienced teachers usually work in isolation within their own classrooms and the only observing done is by administrators for evaluative purposes. Mentoring relationships traditionally have been informal and voluntary, dealing mainly with logistical issues and offering friendly support.

Experienced teachers need on-going support as they move into formal mentor positions. Workshops and courses about adult learning, observing, recording, and conferencing prior to assuming mentoring roles are necessary but are not enough to sustain new behaviors (NCRTL, 1992). Mentors should not be asked to work in isolation. Their need for support as they develop and use new information and skills is as real as the support needed for new teachers as they develop their classroom teaching skills. To go forward without supporting both the novice and the mentor teacher

is to perpetuate the status quo.

Obstacles to teacher leadership exist at all levels. Most pre-service, in-service, and graduate programs for teachers have not prepared them for creating and/or assuming leadership roles. In addition, schools remain structured as hierarchies that limit the teachers' involvement in policy debate, decision making, and solving problems. The teachers indicated an overwhelming lack of information about institutional structures and processes. Without that knowledge their leadership roles will be very limited. Thus, the creation of viable teacher leadership roles for classroom teachers depends on changing many components of the profession.

Schools both reflect and shape our society. A multicultural democratic society needs to have all of its educational institutions model and teach democratic values and practices, such as participatory decision making, in order to maintain itself as a multicultural democracy. It is difficult for teachers to create democratic classrooms that value and empower all their students if they attend undemocratic schools as children, are later prepared to teach by faculty in undemocratic college settings, and finally, work in sites and systems that do not value or support the empowerment of teachers.

The profession requires new visions, different practices, and restructured institutions at all levels to change hierarchical institutions into democratic settings that encourage and support the professional voice of teachers. Practitioners in colleges and school systems need to confront both the constraints that exist between and within all levels of our educational institutions and the way individuals are prepared to work within them.

Educators find that collaboration within and between institutions proves to be difficult (Boles & Troen, 1992). The hierarchies, traditions, power relationships, role boundaries, competition, and lack of support for change are barriers that are hard to overcome. Teacher leadership preparation and support may provide a significant step toward improving these existing conditions.

In this paper the formal mentor teacher role has been examined as an example of leadership that is becoming more available to experienced teachers as we change the teacher induction process. The data indicate the assets and needs of seventy-three experienced teachers who sought formal mentor preparation in Massachusetts. The data also point to the reality that change is needed at all levels of the profession in order to create and support this leadership opportunity for classroom teachers.

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Gaining Insights Into Teacher Education Through the Eyes of Students

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> Neither current academic nor current professional educational coursework are particularly good at helping prospective teachers develop high literacy in their content areas. . . . Improvements in both should be the focus of teacher education reforms. (Brown & Borko, 1992, p. 221)

> National surveys of teachers indicate that they generally believe that their teacher education programs did not prepare them adequately for teaching. (Bush, 1986, p. 21)

Comments like those shared above provide a great challenge to teacher educators. Not only are teacher education efforts often minimally effective with traditional methods of instruction, but now contemporary approaches and standards for school course content create further challenges in preparing future teachers. In mathematics, for instance, instructors using traditional methods of lecture and drill practice are challenged by reform efforts to create investigational approaches to mathematics that facilitate individual mathematical power for students (American Mathematical Association of Two-Year Colleges, 1995; National Council of Teachers of Mathematics (NCTM), 1989, 1991). Students accustomed to instructional approaches where facts and procedures are given to them are challenged by mathematics classrooms where problem solving and reasoning become the tools to gain new understandings. The aspiring mathematics teacher struggles between the safety and comfort of the familiar and the challenge and intrigue of

the new. Teacher educators must acknowledge this complexity of the development of the future teacher and seek means for aiding that development.

Making a transition myself from high school teacher to college level teacher educator, the complexities of preparing mathematics teachers for the challenges of instruction were very real to me. I myself had disregarded much of my teacher education as I embarked on my own career, only to fall back on the wisdom and traditions of teachers with whom I worked. Issues of new standards and new pedagogical methods were often discredited as idealistic and experimental. I wanted the best for my students; yet, it was often difficult to see success in ideas and methods that were alien to my own experiences. As I did experiment with new pedagogical methods, I sought direction and validity through the responses of the students. In preparing to become a teacher educator, I studied the theoretical contributions from reform efforts and research in more depth, only to create new conflict between innovative new ideas and traditional methods from my experience. As before, I looked for answers to my instructional dilemmas from the students. In the reflections and insights from several aspiring teachers I found strategies to guide my instruction as a developing teacher educator.

This article shares the insights and reflections of several prospective teachers as they experienced new instructional methods guided by reform efforts and research. The preservice teachers share their views as to why the new pedagogical emphases, often seen as idealistic, became relevant and imperative for their future instruction. The student insights provide guidance in developing a model for effective teacher education, in which wisdom from research and reform documents can develop personal meaning and relevance for aspiring teachers. In the first section, the need for *instructing* is emphasized. This emphasis focuses on the importance of providing students experiences with alternative perspectives from which they can choose, as opposed to the common indoctrination of students with the latest or most popular new theory. The second section on "what preservice teachers learned in a mathematics methods course" describes three aspects of an

instructing program that were influential to students:

Content knowledge - familiar subject matter experienced and examined from different perspectives;

Pedagogical content knowledge - specific teaching techniques for individual topics; and

Pedagogical reasoning - the process of identifying, selecting, and adapting pedagogical techniques to meet the needs of the learners.

The students' further comments emphasize not only the importance of providing alternatives with content knowledge, pedagogical content knowledge, and pedagogical reasoning, but also the modeling of those various aspects of instruction. The combination of the modeling and instructing within the three content emphases creates a powerful strategy for teacher education.

Through the Eyes of a Student: Instruction vs. Indoctrination

For over a year Ken shared his beliefs and aspirations as a future mathematics teacher as part of case study of his development within his teacher preparation equence.[1] In one of the final interviews, as a means of personal interpretation of the data, Ken read through the transcripts of earlier interviews and underlined passages that he felt were important in his development as a teacher. One passage Ken underlined was from his third interview regarding a problem about a Ferris wheel that his methods instructor used to introduce the families of sine and cosine functions. The passage read:

> If you introduce [sine and cosine functions] through a problem, [the content] can get unclear in so many ways. . . . People are concentrating on the Ferris wheel and not thinking about sine. . . . So, if you just lecture them about the properties of sine, true, they might be bored, but you're not there to make their life fun all the time. You have to get the message across to get the point across. So, even if you have to just sit there and tell them, then they work a problem and they . . . learn just by you telling them. [This] can fit like in the Ferris wheel or you know there's atomic problem[s] about sine and cosine. So, bottom line is, if you introduced it through a problem then I think the opportunity is there for students to get confused really easily. So for me the best way would be to just tell them. You know, kind of briefly I suppose, but clearly and thoroughly and then do the problem. . . . Then you can do this Ferris wheel problem to see how well, how the amplitude fits into it or something like that. Or the phase shift or whatever. (Interview with Ken[2], June 2, 1994)

As Ken re-read the passage he wrote, "Can I change this?" Asking Ken to clarify his question in the next interview, Ken commented:

> If you're going to introduce a concept, in this case it was like sine and cosine or something, I didn't think that it was a good idea to introduce it through a problem. . . . Let's take the Ferris wheel problem . . . . If you're going to do that problem that we had in that book way back when, I felt that was the kind of problem where you needed to already know what sine and cosine were in order to really get at the heart of the problem. I overgeneralized this to say that you can't introduce concepts through a problem. . . . Maybe I felt that way back then, but now, I like totally disagree with that because even this Ferris wheel problem, it could have been modified. . . . You tell the students we're going to be looking at a Ferris wheel. Okay, we're going to be introducing some new function and I'm not going to tell you what it is. . . . We take a few measurements . . . what is it about this, the movement of the wheel, you know. It always comes back. You're getting at the idea of periodic in other words. And then, through looking at it like that, the students will see something about periodic or something. What I'm trying to get at is you're bringing out the sine, the trig functions. . . . You're showing them where it comes from, where it's used, you know, why it even exists because there's a situation where this kind of thing happens, you know. (Interview with Ken, May 30, 1995)

What caused Ken to desire change in his viewpoint? How had the experiences over the past year influenced Ken to now indicate preferences for teaching mathematics that were similar to recommendations for teaching indicated in reform documents? Ken's response to those questions gave me important insights into how I should teach as a beginning teacher educator in my first college position. The dialogue from our conversation follows:

> I[3]: Can you give me any insight as to why [your view of using a problem situation to introduce new material] would have changed?
> K: . . . It's basically like a given, now, that I'm going to use some kind of a problem or some kind of a creative situation to introduce new things. That's just how I feel comfortable and most effective teaching stuff. So, this is like an uneducated viewpoint, I think.
> I: Where did the idea to use the problems come from? Was that from being in the class or was that from things your teachers did, the teachers whose high school classes you had?
> K: I don't think it was, I think it was from the class, definitely.
> I: Let me take it even further. If it did happen in class, did it happen as someone telling you, "Go out and do this, this, and this" or was it from experiencing using a problem to start out an activity, or was it a combination?
> K: Well, I can't remember specifically, but you guys don't just tell us to do something. If you want us to use a problem then you're going to do that first of all for us in class. So, that's probably where it came from, if I had to guess. I can't remember anything you guys have ever just come out and said, "Do this." You know, "We're not going to tell you why, we're not going to show you why it's good, just do it." You guys just don't work that way.
> I: Well, tell me about that. How do you feel about that?
> K: That's wonderful. I mean, because [I'm] (and I'm sure a lot of other people, too) [not] going to accept it if you just say do it. Because, . . . we still have our own viewpoints — especially before — we had our own ideas of what was good and what would work and stuff like that. . . . If someone tells me, go out and take all your clothes off and run around, I'm not going to do it unless they show me first of all that it's a good idea to do so!
>
> I: Is it enough, alone, just to experience it? For instance, in the spring quarter last year, y'all experienced a lot of things. Do you feel like that was as effective right then, or did it take time?
> K: Experiencing it is the biggest part, but even with someone showing it to you, you have to think about it yourself. Just analyze it.
> I: What do you mean by analyze?
> K: You know, go over the pros and cons. Or, say if I was in teaching, how would I do this myself, or, in addition to doing that you kind of have to try it yourself too, I think. (Interview with Ken, May 30, 1995)

Ken, in his simple reflection of his own learning, brought credibility to several theories, research, and observations regarding educational reform that I had encountered within my few years of searching for effective ways to teach. Ken's comparison of experiencing and reflecting about educational philosophies versus simply studying and discussing those philosophies reminded me of Green's (1971) distinctions between instruction and indoctrination. Indoctrination involves leading another person to a correct answer or correct belief without concern that the person arrive at that answer or belief on the basis of good reasons. Instruction, on the other hand, focuses on the individual's ability to examine and personally understand multiple answers or beliefs in order to arrive at the correct answer or belief by way of reason. Ken's first experience with using problem solving situations to introduce new material met with his resistance to the idea, but the experience combined with opportunity to analyze the technique, comparing the "pros and cons," allowed Ken to accept a new belief regarding instruction based on reason and comparison of alternatives.

Ken's conviction for his new pedagogical technique, while being aware of alternatives, illustrated what I view as pedagogical power. Pedagogical power seemed to go hand in hand with current reform documents in mathematics for emphasizing mathematical power for all students. While the study of mathematics has always emphasized correct procedures and answers, current educational reform documents consistently emphasize the importance of obtaining those procedures and answers through investigation and reason (American Mathematical Association of Two-Year Colleges, 1995; NCTM, 1989, 1991).

> [Mathematical power] denotes an individual's abilities to explore, conjecture, and reason logically, as well as the ability to use a variety of mathematical methods effectively to solve nonroutine problems. This notion is based on the recognition of mathematics as more than a collection of concepts and skills to be mastered; it includes methods of investigating and reasoning, means of communication, and notions of context. (NCTM, 1989, p. 5)

In the same way, pedagogical power indicates the teacher's ability to explore, conjecture, and reason logically about various pedagogical procedures. It was this sense of pedagogical power and the view of mathematical power emphasized in mathematics reform documents that created my goals for teacher education. Ken helped me see the importance of instruction, as Green (1971) had defined it, but there was still the task of defining what the content of the instruction would be and what specific tasks would provide an environment for a comparison of alternatives in order to develop beliefs. As with the case of Ken, it was preparing teachers that provided insight into defining content for the courses I would teach and the tasks that would instruct rather than indoctrinate.

What Preservice Teachers Learned in a Mathematics Methods Course

Within my doctoral studies, I was provided an opportunity to observe middle and elementary grade mathematics methods

courses. One quarter I observed a course entitled "Teaching Number Systems in the Middle Grades." The course was designed for middle grades preservice teachers who were in their junior year of their undergraduate degree program or full-time graduate students seeking certification in middle grades education. The content and instruction were guided by the NCTM reform documents for mathematics education. Group learning utilizing problem solving situations organized the class structure. Most classes utilized manipulative materials or technology. The structure was consistent with NCTM recommendations: "Mathematics and mathematics education instruction should enable all learners to experience mathematics as a dynamic engagement in solving problems. . . . Instructors need to experiment with new tasks, tools and modes of classroom interaction and share and model new instructional strategies" (NCTM, 1991, p. 128).

In all honesty I was somewhat skeptical of the learning environment. The students were actively involved in mathematics, yet I felt that not enough of the content or pedagogy was examined explicitly. I now see that the students were experiencing *instruction* while I had expected some form of *indoctrination*. Toward the end of the course the students provided me with their written reflections about the course, responding to the open-ended questions "What have you learned from this course to make you an effective mathematics teacher?" and "How did you learn this?" I also had the opportunity to interview two of the students, in order to gain deeper insights into their view of the instruction.

While the responses from these inquiries were never intended to document a formal research of the instruction, they provided me validation for instructional theories that I had studied, yet not fully accepted. In order to organize the responses, I looked for general categories to communicate the essence of commonly occurring themes. Tables 1 and 2 share the categories that I developed from the responses as well as representative excerpts to better define each category. Reflecting on the student responses in relation to research and reform documents provided a view for how teacher education should be restructured. Three areas of emphasis for an effective instructional teacher education program emerged.

An emphasis on content knowledge, pedagogical content knowledge, and pedagogical reasoning provides a curricular foundation for a relevant teacher education program that encourages instruction rather than indoctrination. The following sections synthesize ideas expressed in research and reform documents with student

Table 1.
Descriptions of Topics Learned by Preservice Teachers.

Percentage of Responses	Topic Which Was Learned	• Sample Descriptions of the Topic Learned
79	The importance of the use of manipulatives and hands-on experience	• *"If there is one main idea that this class has shown me it is that a hand's on approach using manipulatives is a highly affective way to learn mathematical topics"* #1 • *Manipulatives are a very important part of the middle school mathematics classroom."* #2
52	The importance of accepting a variety of responses	• *"The biggest learning experience has been to be able to see that there are many ways of looking at the same problem."* #5 • *"I've learned that as a teacher I must be open to more than one specific answer."* #7 • *"The rationale behind their answer is what, as a teacher, I need to be concerned with. To encourage the students thinking freely..."* #24

Table 1. continued
Descriptions of Topics Learned by Preservice Teachers.

Percentage of Responses	Topic Which Was Learned	• Sample Descriptions of the Topic Learned
52	Multiple representations of content	• *"In learning one concept, in many different ways, and being able to visualize the concepts, the students as well as the teacher will better be able to really understand the concepts."* #15 • *"If I as a teacher constantly use visuals, manipulatives, diagrams, etc. to represent and compare fractions, students will understand a lot better."* #3
52	Connections amongst topics and with the real world	• *"All concepts should be connected to each other and not taught as separate units."* #19 • *"We need to guide the students in being able to relate what they are learning to real life situations."* #26
48	The importance of conceptual learning and number sense	• *"Being able to understand what numbers actually mean (number sense) and having the confidence in my own mathematical abilities..."* #12 • *"After models have been used, the teacher should focus on the meaning of the operations involved."* #9

Table 1. continued
Descriptions of Topics Learned by Preservice Teachers.

Percentage of Responses	Topic Which Was Learned	• Sample Descriptions of the Topic Learned
27	The importance of the teacher as a facilitator to guide instruction	• *"I feel it is important for students to discover concepts for themselves. I plan to act as a facilitator for their learning."* #2 • *"I learned the importance of being a 'guide on the side' instead of a 'sage on the stage'."* #22
27	The importance of the use of technology for instruction	• *"Using technology in the classroom is also important."* #25 • *"Other classroom materials that I think will make me an effective teacher are calculators and computers."* #14
27	Grouping and how to effectively use groups	• *"During this course, I have learned that groupwork among students can be one of the most effective ways to provide instruction, since students can frequently grasp concepts better when described by, and working with, their peers."* #10 • *"In addition, I have learned how to monitor group work."* #17
24	The importance of student led instruction	• *"One being the technique of letting the*

Table 1. continued
Descriptions of Topics Learned by Preservice Teachers.

Percentage of Responses	Topic Which Was Learned	• Sample Descriptions of the Topic Learned
		students take over the lesson. I see this in how our classes are run." #4 • *"If ideas are presented, strike while the iron is hot and add an impromptu lesson. Be a guide, but be student-led. If students have a say in what they learn, they will feel more powerful."* #22
18	Developing questioning strategies	• *"The one thing that really sticks out in my mind that I learned was how important a questioning strategy is for each class. By watching [the instructors] ask questions in an open ended way for exploration I learned how this can spark new aspects of learning. This method had never been mentioned to me before and definitely not used in any of my classes."* #28 • *"I have learned the types of questions to ask: 'What else?', 'Can you tell me?', 'Is this the only answer?', 'What if we...?', 'What does the rest of the group think?'."* #17

Table 1. continued
Descriptions of Topics Learned by Preservice Teachers.

Percentage of Responses	Topic Which Was Learned	• Sample Descriptions of the Topic Learned
18	The importance of thinking with mathematical power	• *"I also believe that learning about mathematical power is helping me to become an effective mathematics teacher."* #12 • *"Now, with the new standards, the idea is to think with mathematical power."* #7
15	The importance of being supportive of students	• *"Students who are not criticized will not withdraw into a shell. Students who feel welcomed and supported will learn. This is a valuable teaching style, and it should be particularly effective in math classes."* #22 • *"I also hope to have an open, interactive class where students feel free to share ideas, conjectures, and question . An explorative environment definitely aids in learning."* #31
15	Developing understanding of students	• *"I also learned to see things from a kids point of view."* #34 • *"The 'sum to 100' problem gave us the chance to experience the frustration many students feel in math classes, but*

Table 1. continued
Descriptions of Topics Learned by Preservice Teachers.

Percentage of Responses	Topic Which Was Learned	• Sample Descriptions of the Topic Learned
		the friendly groups and lack of teacher criticism allowed us to continue our explorations." #22

comments to better communicate the three instructional emphases.

Content Knowledge

According to a review of research studies by Ball and McGalliard (1990), content knowledge should be the central focus of teacher education programs. However, the responses I received from the preservice teachers made few comments about the specific subject matter of their course. The one category that seemed to signify content knowledge, **"the importance of conceptual learning and number sense"** (See Table 1.), was indicated by only half (48%) of the responses. My interviewee commented, "Probably for a lot of folks, coming in [the class] was kind of, 'Let me brush up on just how to work with fractions here..'" Nonetheless, the fact that the preservice teachers so strongly responded to **"the importance of the use of manipulatives and hands-on experience"** (See Table 1.) for instruction (79% of responses) indicated that revisiting the number systems topics challenged the students. One student wrote, *"Math used to be a lot of rules to me, and it didn't bother me or anything—it's just how I saw math. I now understand the concepts of numbers better. I really do know what it means when I see* 1/4 ÷ 1/2. *I used to say, 'Oh, yeah, that's* 1/4 x 2/1 *or* 1/2,' *but I had no clue as to the meaning of the statement. I feel almost stupid for writing this, but this class has been a revelation for me"* (response #18).

This student's "revelation" in her understanding of division

Table 2.
Effective Methods to Help Preservice Mathematics Teachers Develop.

Percentage of Responses	How a Topic Was Learned	• Sample Descriptions of the Instructional Method
67	Experience	• *"I have learned this through the many activities that we have done thus far. ... At this point, I am glad that we have performed a lot of these standards activities in class because I know how they work and I somewhat know what to expect from them."* #12 • *"I have learned through experience with activities and modeling. The activities were taught by actually taking part in them. Never was an activity explained without actually completing it."* #13 • *"I have learned through hands on activities and modeling. We spent the quarter being the student and experiencing these teaching methods ourselves. That was the best possible way to motivate me as a future teacher to teach using these types of activities. I now firmly believe that the more active a student is in the teaching process, the more he will learn."* #27

Table 2. continued
Effective Methods to Help Preservice Mathematics Teachers Develop.

Percentage of Responses	How a Topic Was Learned	• Sample Descriptions of the Instructional Method
33	Modeling	• *"The teaching modeled by the instructors of this course,..., have given me ideas for teaching my class."* #2 • *"I observed the teachers constantly and took notice of what I thought was effective."* #13 • *"You ask how have I learned this and I only have a short answer. By the way the class modeled the stragedy [sic] of teaching math."* #19
21	Reading the NCTM Standards	• *"This class has given me an opportunity to look closely at the NCTM Standards and how to implement them."* #23 • *"In my opinion, the most important thing this class has taught me is about the curriculum and evaluation standards."* #13 • *"However, the most important subject that I have learned in this course and will help me become an effective mathematics teacher is the standards. I have never owned a standards book before this course. Now, I own four. I really liked how we worked activities in class that came out of the standards."* #12

Table 2. continued
Effective Methods to Help Preservice Mathematics Teachers Develop.

Percentage of Responses	How a Topic Was Learned	• Sample Descriptions of the Instructional Method
9	Confrontation with alternatives to methods I was taught with	• *"I of course added them using 'the rules'. Then I heard people talk about the different methods they used, and I thought, 'Wow! That's really neat!' So I began to try and solve the problems in different ways."* #18 • *"I have learned that I will not be teaching like I was taught and that putting my personal experience aside is going to be difficult."* #27
9	Class Discussion	• *"The interaction among students has been helpful since new ideas come out during class discussion."* #31 • *"From these reflections and discussions in class, I have become more knowledgeable about 'the student' and what they are thinking."* #13

of fractions developed in response to a focus on content knowledge approached through manipulatives and hands-on experiences. Reform documents encourage this approach to mathematics teacher education. "Teachers need opportunities to revisit school mathematics topics in ways that will allow them to develop deeper understandings of the subtle ideas and relationships that are involved between and among concepts" (NCTM, 1991, p. 134). Research recommends teaching of content knowledge with a focus on conceptual understanding — an understanding that is enhanced by varied representations of content, including manipulatives (Borko, Eisenhart, Brown, Underhill, Jones, & Agard, 1992; Shulman & Grossman, 1988).

The combination of these recommendations and student reflections provided a clear strategy for my future teaching. The instruction in courses I taught needed to center around specific content knowledge, approached in new ways, in order to allow the students opportunities to examine alternative understandings of the content and to choose the understanding they felt was best. One preservice teacher shared, *"Once the students can actually visualize concepts with manipulatives and approach math from different angles, it helps. I think before I teach the rules, I will start out teaching the why. I want the students to really understand"* (response #24). I want the students to "really understand," too!

Pedagogical Content Knowledge

Implied in the focus on content knowledge is also the focus on what Shulman (1986) calls pedagogical content knowledge. Pedagogical content knowledge refers to moving beyond a personal understanding of the content to an ability to represent the content in ways that make it comprehensible to others. Powerful analogies, illustrations, examples, explanations, demonstrations, as well as an understanding of what makes the learning of a specific topic easy or difficult become aspects of an individual's pedagogical content knowledge. Research in mathematics education often documents that pedagogical content knowledge is relatively undeveloped in mathematics teachers (Brown & Borko, 1992). Reform in mathematics teacher education clearly emphasizes this impor-

tant element of instruction. The National Council of Teachers of Mathematics (1991) recommends:

> Teachers need a rich, deep knowledge of the variety of ways mathematical concepts and procedures may be modeled, understanding both the mathematical and developmental advantages and disadvantages in making selections among the various models. . . . Not only do teachers need to be familiar with a variety of representations, they must be comfortable with helping students construct their own representations. . . . Teachers need to focus on creating learning environments that encourage students' questions and deliberations—environments in which the students and teacher are engaged with one another's thinking and function as members of a mathematical community. (pp. 151-152)

Four of the categories given to the preservice teacher responses seem to correspond to their perceived importance in developing a pedagogical content knowledge: **"the importance of the use of manipulatives and hands-on experience"** (79% of responses), **"multiple representations of content"** (52% of responses), **"connections amongst topics with the real world"** (52% of responses), and **"the importance of the use of technology for instruction"** (27% of responses). I was amazed by some of the preservice teacher's insights into the importance of pedagogical content knowledge. *"I also learned how important using manipulatives are in learning math. For once in my life I actually understand one concept behind fractions instead of the algorithm. Manipulatives are very useful in presenting a concrete model for understanding a concept"* (response #28).

Research suggests that pedagogical content knowledge should be a central priority in mathematics education methods courses (Brown and Borko, 1992). Ball and McDiarmid (1990) suggest that students develop pedagogically primarily from experiencing good pedagogy. Not only did my strategies for instruction need to emphasize the content, they needed to emphasize the good pedagogy that would allow the students to develop strong pedagogical content knowledge.

Pedagogical Reasoning

Some researchers suggest another category of teacher education that is subtly different from pedagogical content knowledge referred to as pedagogical reasoning. While pedagogical content knowledge is made up of representations of the subject matter that facilitate learning, pedagogical reasoning is the process of identifying, selecting, and adapting those representations to meet the needs of individual learners (Brown and Borko, 1992). Feiman-Nemser and Buchmann (1986) identify the transition to pedagogical reasoning as a major component of learning to teach. Responses from the preservice teachers such as **"the importance of accepting a variety of responses"** (52% of responses), **"grouping and how to effectively use groups"** (27% of responses), **"developing questioning strategies"** (18% of responses), **"the importance of being supportive of students"** (15% of responses), and **"developing understanding of students"** (15% of responses) suggested developing aspects of pedagogical reasoning. (See Table 1.) Some of the comments made by students seemed surprisingly insightful for inexperienced preservice teachers. *"By my evaluating the students' understanding and knowledge and asking lots of open ended questions, I hope my students will leave my class with a deeper understanding of math"* (response #11). *"I also believe I have changed my thinking completely from the 'one right answer' mind set. I do understand that there may be more than one right answer or it may depend on how the student interprets the problem. But most important is why he/she got the answer they got. The rationale behind their answer is what, as a teacher, I need to be concerned with. To encourage the students' thinking freely and not being afraid of a sledge hammer if it is the wrong answer for the student is important"* (response #24).

NCTM (1991) encourages teachers to model and elicit "mathematical discourse" by asking questions, following the leads of the students, and allowing conjectures rather than faultless products. The responses indicate that students in this course were developing pedagogical reasoning abilities. Studies suggest that

pedagogical reasoning is often neglected by novice teachers as they face survival issues in the classroom (Borko, et. al., 1992). Pedagogical reasoning develops by exposure to the actual challenges that teachers face in the classroom (Lanier and Little, 1986) as well as by being "enculturated" in a standard pedagogical method such as the NCTM recommendations (Brown and Borko, 1992). Such recommendations and insights from the preservice teachers provided yet another strategy for instruction: a consistent learning environment that would model reform-oriented pedagogical methods and create explicit attention to classroom challenges that might foster growth in the preservice teacher's pedagogical reasoning.

Summary

The NCTM (1991) *Professional Standards* recommend, "Mathematics and mathematics education instruction should enable all learners to experience mathematics as a dynamic engagement in solving problems. These experiences should be designed deliberately to help teachers rethink their conceptions of what mathematics is, what a mathematics class is like, and how mathematics is learned" (p. 128). The strategies for mathematics teacher education gleaned from these reform standards, from research, and from the students themselves provide a powerful model for mathematics teacher education. First, students need opportunities to experience and examine alternative approaches to familiar mathematical content. Second, effective pedagogical methods must be modeled and students should be expected to describe and explain effective pedagogical methods for different content on written assessments. Third, pedagogical reasoning is developed as a learning environment is created that consistently refers to reform-oriented practices and brings attention to classroom challenges that are a part of such practices. These three ideas provide a foundation for instruction in teacher education courses.

One student very concisely expressed how this foundation for instruction affected her development as a mathematics teacher.

> *The types of things I have learned in [this class] are not things that I could have learned from a textbook. I have learned through hands-on activities and modeling. We spent the quarter being the student and experiencing these teaching methods ourselves. That was the best possible way to motivate me as a future teacher to teach using these types of activities. I now firmly believe that the more active a student is in the teaching process, the more he will learn.* (response #27)

Other student responses verify the importance of experiencing the mathematics and reflecting on the modeling of the teaching methods as the most influential aspects of their developments as teachers (see Table 2). I would hope that the experiences I could provide in classes, based on the strategies investigated and shared in this article, would produce similar responses from my students. After one semester of attempting to incorporate these strategies into my teaching I read the following journal from a graduate student beginning her second year of teaching.

> "It is ironic that we spend time in our own classrooms discovering the prior knowledge of our students, but we rarely reflect upon or discover why we, as teachers, are having difficulty teaching different mathematical concepts." I wrote this in my first journal entry on September 2. Since then, I have reflected and have had several revelations concerning my own miseducative experiences. "Rarely was I given the opportunity to experiment with problems, discuss them with my classmates, or produce reasons for 'why' they worked." I have used this revelation and this class to concentrate on providing my students with experiences that are meaningful. On September 2 without much insight into this course, I wrote, "It is my hope that this methods course will assist me with generating ideas for providing my students with experiences that allow them to discover "why" a problem works through the use of manipulatives, thoughtful questioning, and discussion." At the time, I did not realize how beneficial [this course] would be to the math program in my classroom.
>
> Overall, this class has provided worthwhile math

lessons and ideas to use in my classroom. It has provided an opportunity for me to expand my math program while taking risks. Math is no longer an isolated subject, but it is discovered in everything we do each day. My students have been motivated and liberated as they take control of their learning. They are less reluctant to communicate and even request to share ideas! Their parents tell me how their children come home sharing what they learned in school! I have gained confidence in teaching this subject. Assessment and communication have become important parts of my curriculum. I include these words in my lesson plans and construct questions to ask students as they discuss ideas. Discourse is a constant struggle, but I am beginning to provide a learning environment where students can discuss and debate freely. This class and the professor have encouraged and empowered me as a graduate student and teacher! (Student journal, 12/3/95)

At the writing of this document, I am completing my second semester as a full time mathematics teacher educator. The opportunities to test ideas presented in reform documents and research through actual experiences with preservice teachers provided me with a clear focus for my personal strategies for instruction as a teacher educator. Like the students I observed, the experiences were important in allowing me to examine and compare philosophies I encountered regarding mathematics teacher education. The feedback from my first semester as a teacher educator further confirmed the effectiveness of the strategies I learned.

Notes

1 The study of Ken is documented in the author's doctoral dissertation listed in the references.

2 Exact wording from interview transcripts have been slightly modified to clarify the ideas discussed.

3 The initials, I and K, are used to indicate the investigator and Ken.

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