Factors Influencing Preservice Teachers' Variation in Use of Instructional Methods: Why Is Teacher Efficacy Not a Significant Contributor?

By Gassia Gerges

Thousands of studies were conducted between 1960 and 1980 to determine which teaching method produced the greatest gains in student achievement. Researchers compared and contrasted a number of approaches to teaching and concluded that there is no single instructional method that is most effective in all teaching situations (Anderson, 1959, Keislar & Shulman, 1966; Peterson & Walberg, 1979). In order to meet the multiple learning goals, teachers must practice alternative techniques in the delivery of instruction. In fact, today it is more important that teachers vary their practice since students are now more culturally diverse (Cushner, McClelland, & Safford, 1996), and continue to be diverse in their learning needs (Hallahan & Kaufman, 1997), learning styles (Dunn & Griggs, 1988), cognitive style (Shuell, 1981), and intelligence (Gardner, 1993).

Gassia Gerges is an assistant professor in the Department of Instruction and Curriculum Leadership at The University of Memphis, Memphis, Tennessee.

In his research and reflections on American education, John Goodlad (1984) contended that schools have two main functions: to develop students' thinking skills for productive participation in society, and to socialize them into a social and political democ-

racy. In order to meet those goals, teachers must possess what Shulman (1987) termed "pedagogical content knowledge." Like other professionals who possess a body of knowledge unique to their profession, teachers need to master the essential content, skills, and strategies required for effective teaching. Thus, the goal of teacher preparation programs across the country is to provide prospective teachers with the knowledge, skills, and strategies necessary for effective, and even, exemplary teaching. Teachers' attitudes and beliefs have also been found to contribute to their effectiveness as educators (Ashton & Webb, 1986; Tracz & Gibson, 1986). In particular, teacher beliefs about their personal effectiveness or efficacy appear to discriminate between more—and less—effective teachers (Brophy & Evertson, 1976; Volkman, Scheffier & Dana, 1992). Research has also indicated that teachers' efficacy beliefs influence students' motivation (Midgely, Feldlaufer & Eccles, 1989) and their achievement (Ashton & Webb, 1986; Tracz & Gibson, 1986). A number of studies have also linked teachers' strong feelings of efficacy with classroom behaviors associated with effective teaching (Ashton & Webb, 1986; Gibson & Dembo, 1984) as well as willingness and effectiveness in implementing instructional innovation (Guskey, 1988; Stein & Wang, 1988).

Despite the fact that conventional wisdom and research have pointed to the need for teachers to vary instruction, there is no available data relating teacher efficacy to extent of instructional variation. It is important to understand what factors influence teachers' attitudes and beliefs toward the implementation of a variety of instructional models and strategies. This study was undertaken in an attempt to generate some reliable descriptive information with regard to a possible relationship between preservice teachers' sense of efficacy and use of instructional variation.

The primary purpose of this study was to identify and describe the relationship, if any, between the teacher efficacy of preservice teachers and the extent to which they vary their instructional practices. This study also sought to identify the factors other than efficacy which influence preservice teachers' attitudes toward practicing varied methods and techniques in the delivery of instruction. The specific research questions explored were: (1) Is there a relationship between preservice teachers' teaching efficacy and the extent to which they vary their teaching practices? and (2) What factors other than efficacy might be contributing to the degree of instructional variation exhibited by preservice teachers?

Methodology

The 32 perservice teacher participants in this study were enrolled in a five-year teacher education program. Program course work included a year-long methods course in which participants were exposed to instructional strategies, including models of teaching (direct instruction, concept attainment, concept development, inquiry, cooperative learning, and synectics). When the study began, the participants were either undergraduate students in their fifth year of study or graduate

students in their sixth year of study, all working toward licensure at the elementary level. None of the participants had prior formal teaching experience and all were scheduled to complete two seven-week, full-time student teaching assignments. Each student teacher was required to develop and implement a ten-day unit of instruction for each of the two student teaching assignments. The unit of instruction consisted of a series of interconnected lessons focusing on a general topic selected by the student teacher with the guidance of the cooperating teacher.

The input of the cooperating teacher and university supervisor was assessed using the Instructional Unit Cover Sheet, a four-item self-report survey developed by the researcher. The instrument was designed to assess the cooperating teacher's and university supervisor's input with regard to the *topic* of the instructional unit, *daily lesson plans*, *instructional methods*, and *resources*. The extent of the cooperating teacher's and university supervisor's input in the development of the unit ranged from "no input" to "lots of input." Instructional units with "lots" or "some" input from the cooperating teacher or university supervisor with regard to *instructional methods* and *lesson plans* were not included due to the need to have units planned primarily by the preservice teachers as evidence of their tendency to vary instruction. The extent of the cooperating teacher's and university supervisor's input with regard to unit *topic* and *instructional resources* was not taken into consideration in the selection of units for the study.

In order to investigate the relationship between preservice teachers' sense of teaching efficacy and the extent to which they vary their instructional methods (Question 1), Pearson product-moment correlation coefficients were computed for all measures of efficacy and instructional variation. Early in their student teaching semester, the 32 participants (24 females and 8 males) completed the Teacher Efficacy Scale (Gibson & Dembo, 1984), an instrument designed to measure their teaching efficacy (general and personal[1]). The degree to which participants varied their use of instructional methods (strategies, models, method of student organization[2]) in their unit of instruction was measured using the Instructional Variation Checklist, an instrument developed by the researcher for this study. Index scores were calculated for their instructional units based on evidence of high or low levels of variation of instructional methods. The degree of variation was based on the range of scores among the 32 participants. The top 20-to-30 percent of scores for instructional strategies, instructional models, and student organization of the 32 participants were considered high variation and the bottom 20-to-30 percent of the same scores were considered low variation. The measures of teacher efficacy and the measures of instructional variation were used in computing the correlation coefficients.

In order to determine the factors other than efficacy that might contribute to the extent to which participants varied their instructional methods (Question 2), a qualitative inquiry approach was utilized. Eight of the 32 preservice teachers who participated in the quantitative component of the study were selected to participate in the qualitative component of the study. Listed below are the four possible

combinations, in the qualitative component of the study, of efficacy level and instructional variation level that were considered. Participants included two preservice teachers for each combination, and involved two males and six females.

High Efficacy	High Variation	(Kristi and Dina)
High Efficacy	Low Variation	(Jill and Corrie)
Low Efficacy	High Variation	(Ed and Brad)
Low Efficacy	Low Variation	(Eliza and Gail)

Structured interviews, direct observation, and written documents, all qualitative techniques for collecting data (Patton, 1990), were used in this component of the study. The audiotaped interviews with each of the eight participants were transcribed and the data were then developed into a thumb-nail sketch for each of the participants in which a brief description of what was stated in the interview was provided. Written observations conducted by the participants' university supervisors were used to triangulate the interview data. Finally, similar themes were identified from each of the thumb-nail sketches to draw conclusions.

Findings and Discussion

The results and discussion that follow are organized by the two major research questions of the study.

Research Question One

Is there a relationship between preservice teachers' teaching efficacy and the extent to which they vary their teaching practices?

It was expected that individuals who believe in the ability of teaching to make a difference in student performance (high general teaching efficacy) and believe in their own capability to affect student achievement (high personal teaching efficacy) would demonstrate teaching practices that are considered to be effective, including the implementation of a variety of teaching methods. In this present study, however, no statistically significant relationship between the efficacy measures and the measures of variation was found. Correlation coefficients for the three measures of variation in practice and each of the three measures of teacher efficacy are presented in Table 1. None of these correlations was statistically significant at the .05 level of probability.

The failure to find a relationship between the variables of instructional variation and preservice teachers' sense of teaching efficacy may be explained by the findings of the second research question.

Research Question Two

What factors other than efficacy might be contributing to the degree of instructional variation exhibited by preservice teachers?

The cross-case analysis conducted on the thumb-nail sketches of the eight

participants in the qualitative component of the study resulted in the identification of various factors other than efficacy that contributed to the degree of instructional variation exhibited by the eight preservice teachers. The factors included the subject area taught by the preservice teachers, the developmental ability of their students, their status as student teachers, and the extent of their pedagogical and content knowledge.

Subject-Matter Taught

Six of the participants indicated that subject area influenced their choice of teaching methods. The four participants—Jill and Corrie (HE/LV), Eliza and Gail (LE/LV)—who planned for very little variation in their instructional units, all expressed the belief that while some content areas, such as science and social studies, lend themselves to student-centered methods, others, such as math and reading, do not. They all indicated that math, specifically, is best taught using direct instruction, a teacher-centered approach. All four participants developed units focused on either math or language arts, subject areas they did not think lent themselves to student-centered methods. The following comment, made by Gail, was typical of the four participants:

> There are some strategies that are more conducive to certain content. This placement, I did a math unit on multiplication and taught it using mostly the direct instruction approach. Math lends itself to direct instruction.

There may be several possible explanations for their beliefs. Their beliefs may have been influenced by the methods in which they were *taught* math or other basic skills. Preservice and even inservice teachers' beliefs about teaching are initially formed from the perspective of a student, and because they were formed early these beliefs tend to persevere even against contradictions by the most current theories and effective teaching practices (Buchman, 1987; Calderhead & Robson, 1991; Lortie, 1975). In their teacher preparation courses, preservice teachers are introduced and trained in implementing student-centered instructional methods that are consistent with current research in cognitive psychology on the learning process.

Table 1
Correlations for Preservice Teachers' Sense of Teacher Efficacy and Variation in Practice

	Variation in Instructional Strategies	Variation in Instructional Models	Variation in Student Organization
Personal Teaching Efficacy	-.022	-.228	.292
General Teaching Efficacy	.108	.163	-.005
Combined Teaching Efficacy	.055	-.051	.277

However, even while many accept the newer methods, because their own experiences as students with school were mostly positive, their beliefs about traditional educational processes are maintained (Buchman, 1987; Calderhead & Robson, 1991; Lortie, 1975).

Their tacit beliefs are further reinforced during their student teaching experience, as was the case for Jill, Corrie, and Gail. Preservice teachers consider their field experiences as the most valuable aspect of their teacher preparation program. "Since the settings for these experiences frequently reflect traditional educational processes, teachers' initial classroom practice often supports their beliefs about teaching and learning" (Morine-Dershimer & Corrigan, 1997, p. 301). Jill reported that she hesitated to implement student-centered methods that her cooperating teacher was not familiar or even comfortable with:

> I didn't try out more 'risky' techniques like synectics because I was always being evaluated and my teacher didn't use those techniques, and I can tell that she was uncomfortable with it and, overall, it was her classroom.

Corrie's instructional decisions were also indirectly influenced by her cooperating teacher. Since direct instruction seemed highly effective when her cooperating teacher implemented it, she decided to also deliver her content using primarily direct instruction:

> She [cooperating teacher] followed very strict direct instruction. She would introduce the lesson, model it, have the kids do some guided practice work, and then let the kids work independently. And this did not vary from day to day. I ended up doing exactly what my cooperating teacher did because it worked. So my unit was primarily direct instruction.

The instructional practices that Gail witnessed during her student teaching experience were teacher-centered and served to also indirectly influence her instructional planning decisions. Gail admired her cooperating teacher, and consequently decided to deliver her content using the same teacher-centered methods her cooperating teacher had used.

Another explanation for the participants' beliefs regarding the subject area influencing instructional methods chosen, has to do with their beliefs about content. Jill, Corrie, Eliza, and Gail all expressed the belief that while some content areas, such as science and social studies, lend themselves to student-centered methods, others such as math and reading, do not. A substantial number of studies support the notion that teachers do possess beliefs about content (some even theoretical), and that such beliefs tend to shape the nature of their instructional practices (Blanton & Moorman, 1987; Brophy & Good, 1974; Nespor, 1987). For example, Rupley and Logan (1984) reported that elementary teachers' beliefs about reading affected their instructional decision-making. Mangano and Allen (1986) found that teachers approach language arts instruction differently depending on their beliefs about writing.

Preservice teachers' beliefs about content, like their beliefs about instructional

practices, have been formed during their own school experiences. Content has traditionally been viewed as facts to be memorized, with an emphasis on mastery and not necessarily on understanding. For instance,

> mathematics has traditionally been presented as a set of procedures and rules to be learned by rote to the point of automaticity, rather than as a process for solving logical and real-world problems through deductive reasoning. Reading has traditionally been approached as a process of using decoding skills to discern an author's intent, failing to take into consideration the experiences the reader brings to the comprehension process. (Morine-Dershimer & Corrigan, 1997, p. 302)

The beliefs of Jill, Corrie, Eliza, and Gail were evidenced in their instructional units. The instructional units of the four were planned for either math or language arts and reflected teacher-centered practices with very little variation of instructional methods.

Finally, Jill, Corrie, Eliza, and Gail's beliefs that certain content areas, such as math, are most effectively taught through direct instruction, can also be attributed to recent state and national policy emphases. The process-product research of the 1970s made an invaluable contribution to education by confirming the important role that teachers play in student learning. From the hundreds of teacher-effectiveness studies of the time, patterns of teacher behaviors that influence student learning were identified. The direct instruction model is based on these patterns. This model places the teacher at the center of instruction. Highly structured and teacher directed, direct instruction is designed specifically to teach basic skills in primarily reading and math (Eggen & Kauchak, 1996). However, during the 1980s, reformers criticized it for its emphasis on the acquisition of skill and facts and called for the use of student-centered methods that promote more advanced or complex learning. Today, the tide has once again turned. There is a renewed interest in direct instruction and other teacher-centered methods due to recent local and state assessment of students' minimum competency in the "basics" of reading, writing, and arithmetic.

The pressure of local and state student assessment was felt by even preservice teacher like Kristi (HE/HV), who expressed a strong belief in the value of student-centered instructional methods for all content areas. Although she was determined to implement as many student-centered practices as possible in her own classroom, Kristi realized that the pressure for coverage would hinder her efforts at more creative and student-centered lessons as indicated by the following comment: "During my student teaching, I didn't have the freedom to do as many hands-on activities as I would have liked to do because of those constraints." Based on her student teaching experience, Kristi recognized that student-centered practices are more time consuming than are teacher-centered methods such as direct instruction, which she believed might not be sufficient to achieve true understanding:

> It's true that if you want to cover a ton of information and get it out there, that direct

> instruction is probably the most efficient way to cover a lot of it, but that doesn't mean that the students are going to learn it the best, and that it's the most effective for students' understanding.

Thus, recent policy emphases on the assessment of students may perpetuate the beliefs in the value of traditional instructional practices of some prospective teachers while undermining the beliefs of other prospective teachers that are consistent with the most recent research on learning and instruction.

Developmental Ability of Students

Five of the participants noted that the developmental ability of their students was a factor in influencing their choice of instructional methods. Jill and Corrie (HE/LV) both reported that cooperative learning was ineffective with first grade students. Jill concluded that cooperative learning didn't work well with her first grade students because they were "so adult focused," and Corrie attributed the failure of cooperative learning with her at-risk first grade students to their need for structure and consistency which, she noted, cooperative learning did not provide:

> I saw how poorly cooperative learning was working and realized the benefits of consistency for these [first grade, Title I] children. The structured, day in and day out routines of direct instruction were beneficial to them. They craved consistency, stability, and routines, and that's what direct instruction, in a way, provided. They were told, and were directed, every step and they liked that.

In both cases, their beliefs may be explained through an understanding of the beliefs of preservice teachers about classroom management and control.

Preservice teachers' beliefs about classroom management and control, like their beliefs about instructional practices and about content have been formed during their own school experiences (Buchman, 1987; Calderhead & Robson, 1991; Lortie, 1975), and perpetuated by school and district policy. Although many preservice teachers begin their teacher preparation with the intent of fostering student independence and cooperation, their need to ensure appropriate student behavior, as well as control student information processing, leads them to become more controlling in their beliefs and actions (Tobin, 1990). As first grade students, neither Jill's nor Corrie's students have had much practice in cooperation and peer collaboration. Instead of attributing the seeming failure of cooperative learning to the fact that their students have not been taught cooperative learning behaviors and attitudes, Jill and Corrie decided it was a developmentally inappropriate practice for first grade students as illustrated by the following comment made by Jill: "I found that first graders could not really work together. I tried cooperative learning with them during my first placement, but it didn't work because they were so adult focused." Both Jill and Corrie abandoned their efforts at cooperative learning with their first grade students for more teacher-centered practices in order to regain control of their classrooms and ensure appropriate student behavior and learning.

Traditional beliefs about classroom management may also serve to explain why Jill (HE/LV) and Eliza (LE/LV) believed direct instruction was the most effective method to use with low-achieving seventh grade language arts students and seventh grade math students, respectively. Eliza noted that direct instruction prevented her students from getting "rowdy." Through the highly structured and teacher-directed method, she was able to control the extent of student interaction and verbal participation. Likewise, Jill, in an effort to ensure high success rates for her low-achieving students, implemented direct instruction instead of methods that promoted higher-level thinking and were intellectually more demanding, such as concept attainment:

> During my second placement, I decided that I wanted to experiment with these students [at-risk] and tried a concept attainment lesson which is much less structured than the direct instruction that they have been accustomed to, and it did not go well. At this point in time, they were reading four grades below grade level. They didn't like activities that they did not know right away what was going on. They didn't like guessing examples and nonexamples. They would rather me just tell them because they weren't willing to risk at that point. They had risked for seven years and were failing school.

Prospective teachers' beliefs regarding the developmental ability of students may also serve to explain Gail's (LE/LV) and Dina's (HE/HV) expectations for student performance and choice of instructional methods. Gail reported that student-centered methods, such as concept attainment, work more effectively with older students because young students expect to be provided with information rather than individually or collectively constructing and arriving at the information:

> I think that models like concept attainment and concept development work well with older students and I think that if I was working with older students, I would like to use those models more, but with younger kids, like third graders, they're [student-centered methods] not effective because they look to you to tell them. They are waiting for you to provide them with the information.

Similarly, Dina, with her science students, provided the high group with opportunities to think more critically about the content while providing the low group with "more hand-holding" to get them through the content. Furthermore, Dina reported that if she ever has a classroom "full of whiz kids," she would engage them in "deeper and richer" academic experiences, challenge them, and allow them greater independence.

The expectations of Gail and Dina of their students were naturally formed, meaning that in Dina's case they were based on real differences in student potential (high vs. low group) and in Gail's case on the reaction of elementary aged students toward student-centered practices such as concept attainment. Studies of teachers' naturally formed expectations demonstrate that teachers interact differently with high expectation students than they do with low expectation students (Doyle, Hancock, & Kifer, 1972; Palardy, 1969). This was true for both Dina and Gail.

Although some forms of differential treatment are appropriate at times and may represent good differentiation or individualization of instruction rather than inappropriate projection of negative expectation, there are danger signals, especially where the degree of differentiation is large and occurs on many dimensions rather than just one or two (Tomlinson, 1995). Dina provided the high group with opportunities to think critically about the content while providing the low group with "more hand-holding" to get them through the labs as well as indicating her intent to greatly challenge and foster independence in her future classroom "full of whiz kids." This suggests that Dina was merely going through the motions of teaching her low expectation students, without genuinely trying to encourage their academic progress. Likewise, by not expecting "younger" students to learn effectively through student-centered practices, Gail was perpetuating their dependence on the teacher as the possessor of knowledge and fostering a knowledge-transmission approach to learning.

Status as Student Teachers

Four of the participants indicated that their status as student teachers was a factor in influencing their choice of teaching methods. Jill (HE/LV), Eliza (LE/LV), Gail (LE/LV), and Brad (LE/HV) all noted that there were limits to the extent to which they were willing to take instructional risks during their student teaching. The following quote from Bard was typical of the four participants:

> I just want to use cooperative learning where I'm freer to take more risks like in my own classroom. I feel like there are limits while one is student teaching.

The findings suggest two possible explanations. The first has to do with the dual purpose of the student teaching experience, educational and evaluative. Guided by daily supervision, counseling, and reviews of practice, the student teacher develops many skills. At the same time, the formative and summative evaluations conducted serve as a measure of the student teacher's teaching dispositions and skills. Thus, while the participants felt encouraged to take instructional risks and even fail, they were reluctant to do so completely for fear of not impressing their cooperating teachers who also evaluated their performance.

The participants' reluctance to take instructional risks may also be explained by the mixed messages they receive from their cooperating teachers. Many cooperating teachers view the role of student teacher to be imitative rather than exploratory. They believe that student teachers are placed in their classrooms to learn from their experiences, and their expectations for the student teacher are communicated through the nature of activities student teachers are directed or permitted to do. Mixed messages consisting of "do your own thing" and "follow my lead" are implicit in not only the cooperating teachers' planning dialogue with student teachers, but also in the feedback provided to student teachers regarding their performance.

The participants' sense of efficacy may also explain why their status as student teachers was a factor in their choice of teaching methods. Three of the four participants who indicated that their student teaching status influenced their choice of teaching methods possessed a low sense of teacher efficacy. In other words, they possessed little faith in the power of teaching to overcome the influence of a student's home life and in their own abilities to improve student learning. The less confident preservice teachers are with teaching methods, the more likely they are to depend on their cooperating teachers and their methods (Oneida, 1989), as was the case for Gail (LE/LV) and Brad (LE/HV). After witnessing her cooperating teacher's success with direct instruction, Gail decided to teach her unit using the same method. This could be due to her lack of confidence in her own ability to successfully implement methods other than the direct instruction that was routinely modeled by her cooperating teacher.

Unlike highly efficacious Jill who did not implement synectics for fear that her cooperating teacher would not be comfortable with it, low efficacious Brad did not implement cooperative learning for fear that he would not successfully implement it: "I would have definitely used cooperative learning more had I felt comfortable in my own skill in implementing it." It may be easier for low efficacious preservice teachers to merely adopt the practices of their cooperating teachers rather than experiment with other methods. Although the instructional units of the 32 participants indicated that their cooperating teachers had hardly any input with regard to the instructional methods selected to deliver the content, the cooperating teacher's influence could have nevertheless been indirect for the less efficacious participants.

Subject-Matter and Pedagogical Knowledge

Participants also indicated that their knowledge of the subject matter or their knowledge of teaching methods also influenced how they delivered their content. Kristi (HE/HV) and Brad (LE/HV) reported not having implemented specific methods due to fear of incorrect implementation. Although Kristi believed in the value of the synectics instructional model, she reported not having implemented it during her student teaching experience due to not having practiced it with her peers during peer teaching:

> I really like synectics but I didn't do a synectics lesson during my student teaching because I really never had the chance to practice it during peer teaching. So during my student teaching I wasn't very comfortable with it. I know that in our models and methods course we had the opportunity to peer teach using any of the models we learned about, but I didn't try out synectics. Because I didn't get a chance to try it out, I was more leery about doing it during my student teaching.

Brad also expressed a strong belief in the benefits of cooperative learning but did not use it during his student teaching experience due to a lack of confidence in his

own ability to implement it correctly. In other words, Kristi and Brad needed more training in correct implementation of the methods they valued.

The sentiment expressed by Kristi and Brad is not surprising. The power of instructional training to alter teachers' knowledge, attitudes, and instructional skills is well established (Gage, 1984; Joyce & Showers, 1988). Since deep, systematic knowledge of practice is what distinguishes teachers who do ambitious teaching from those who are struggling to do it (Darling-Hammond, Wise, & Klein, 1995), training is an essential process for enhancing their knowledge and skill. "It is plain from the research on training," Joyce and Showers report "that teachers can be wonderful learners. They can master just about any kind of teaching strategy or implement almost any technique as long as adequate training is provided" (1988, p. 2).

Of the 32 participants in the study, seven did not plan for the use of any instructional models in their unit of instruction and 11 participants planned for the use of only one. Instructional models are the "prescriptive teaching strategies designed to accomplish particular goals" (Eggen & Kauchek, 1996, p. 11). Although the instructional models (direct instruction, concept attainment, concept development, inquiry, cooperative learning, and synectics) were introduced and modeled for the participants in their methods course, the participants were provided with only two opportunities to practice using them prior to their student teaching. Thus, with little or no practice using the models of instruction, it is possible that participants lacked the necessary skills and confidence to try them out during their student teaching. While many will argue that the student teaching experience provides the opportunity to practice the various models introduced in the methods courses, the evaluative aspect of the student teaching experience limits the extent of instructional risks taken.

Coupled with the influence of pedagogical knowledge on selection of teaching methods is also the important influence of subject-matter mastery. Like Kristi and Brad, Eliza (LE/LV) reported feeling reluctant to try out certain teaching methods. However, unlike Kristi and Brad, Eliza's hesitation was not due to a lack of confidence in her pedagogical knowledge, but rather in her content knowledge: "I really couldn't use more student-centered approaches because I wasn't confident in my math knowledge." Since Eliza lacked true understanding of the math she was teaching her students, she believed she could not use student-centered methods that would allow her students to "get beyond the surface-factual level."

The importance of subject-matter knowledge to successful teaching is well established. A summary of 30 studies by Byrn (1983) found 17 studies showing a positive relationship between teachers' subject knowledge and student achievement. Furthermore, Hawk, Coble, and Swanson (1985) found that out-of-field assignment of teachers has negative effects on student achievement. When teachers with backgrounds in math were compared to teachers with backgrounds in other subjects who had been assigned to teach math, the lack of subject-matter competence resulted in reduced teacher effectiveness. Based on her personal experience,

Eliza found this to be quite true. For most elementary preservice and inservice teachers, however, getting access to fundamental content knowledge is quite difficult. Elementary preservice and inservice teachers are not only expected to know enough about the diverse subjects they teach, they must also know about the way children respond to those subjects. Yet, little in their educational background prepares them for this expert-in-all-subjects and how-to-teach-every-subject role.

Recommendations for Practice

The qualitative data lends further support to the importance of training and the influence of the methods courses. For instance, all eight participants expressed beliefs in the need to differentiate instruction in order to meet the numerous and varied needs of their students. Thus, they recognized that students have diverse learning needs and differentiation of instruction is necessary to meet those needs. Furthermore, they all expressed a strong desire to engage students in learning. They reported preferring methods that engage their students cognitively and kinesthetically as well as ones which foster interaction among students and serve as assessment strategies. One such strategy used by the majority of the 32 participants, was the KWL (what students know, what they want to learn, and what they have learned), an instructional method typically implemented at the beginning and end of a unit to assess the knowledge students possess on a given topic. The KWL was introduced and modeled for the participants in their methods course. That the majority of the 32 participants planned for the use of KWL in their instructional units suggests that the participants believed in the value of this given method and felt confident in their ability to implement the method effectively. Although a highly effective instructional method, the KWL is not a difficult method to learn.

Other methods reported by the participants as cognitively and kinesthetically engaging and ones that promote student interaction are more challenging and difficult to acquire. As a result, even while preservice teachers may believe in the value of such methods, they will not plan for the use of such methods if they lack the skills to implement them correctly, as indicated by the qualitative evidence of this study. Thus, preservice teachers should be provided with more opportunities to practice the more challenging instructional methods. According to Joyce and Showers (1988), up to 30 trials may be required to bring a new teaching strategy under "executive control." Opportunities for practice come in a variety of forms, including peer teaching. Peer teaching, by allowing practice opportunities and feedback from peers, promotes transfer of learning to the classroom.

The second recommendation for practice concerns the student teaching experience. It is recommended that the emphasis of the lesson evaluations provided by the cooperating teacher and university supervisor be on student teachers' attempt and effort at trying out more complex methods rather than on their overall seeming success or failure at implementation. In addition, greater consideration should be taken when selecting cooperating teachers. Only experienced teachers

whose beliefs and instructional practices are consistent with current research in cognitive psychology on the learning process should be selected as cooperating teachers. Furthermore, the dialogue as well as the supervision practices of the cooperating teachers should explicitly and implicitly imply exploration rather than imitation. This will help to ensure greater consistency within the teacher education program concerning the role of the student teacher as exploratory rather than imitative.

The final recommendation for practice concerns the beliefs of preservice teachers regarding content-specific pedagogy and student cognitive and affective growth. To begin, teacher educators should be aware and help preservice teachers become aware of their beliefs that may or may not be aligned with sound learning and teaching theories. Furthermore, it is recommended that teacher education programs offer subject-specific methods courses for elementary educators such as elementary science methods, elementary math methods, and the like. Solid understanding about how to teach science is dependent upon an understanding of the misconceptions students typically hold about natural phenomena as well as on an understanding of the structure of scientific knowledge that enables guidance of student inquiry (Anderson, 1991). Understanding about how to teach math rests on knowledge of how students develop mathematical reasoning and how they construct number concepts that they can later use to solve various problems (Romberg & Carpenter, 1985). While teacher preparation programs offer such courses, too often they are short courses, not lasting more than seven weeks and lacking a peer teaching component. Meeting once every week for seven weeks is clearly not enough time to introduce and train preservice teachers in effective subject-specific teaching methods.

Recommendations for Research

As previously indicated, researchers have demonstrated that the educational beliefs (e.g., efficacy beliefs, epistemological beliefs, attribution beliefs, etc.) of inservice and preservice teachers play an important role in their acquisition and interpretation of knowledge and subsequent teaching behaviors and practices (Ashton & Webb, 1986; Czerniak & Schriver, 1994; Tracz & Gibson, 1986). More research in the area of preservice teachers' beliefs is important for education because, as Kagan (1992) noted, "the more one reads studies of teacher belief, the more strongly one suspects that this piebald of personal knowledge lies at the very heart of teaching" (p. 85). Yet, although research on inservice and preservice teachers' beliefs has been on the increase the past few years, it is still scarce.

Further insight is needed into the relationship between beliefs (e.g., efficacy beliefs and beliefs about subject-matter) as well as between efficacy beliefs and influence of the cooperating teacher. Although a statistically significant relationship between preservice teachers' efficacy beliefs and the degree of instructional variation was not found in the quantitative component of the study, the qualitative

data suggest that efficacy beliefs do influence instructional decisions. Teacher efficacy research of the past two decades has consistently linked higher teacher efficacy with higher student achievement (Armor et al., 1976; Ashton & Webb, 1986; Berman et al., 1977; Tracz & Gibson, 1986). Research to identify strategies that strengthen preservice teacher efficacy is also needed. From the few intervention studies that have been conducted, some recommendations have been suggested. For example, Guskey (1988) found that staff development programs are usually unsuccessful in bringing about attitude and belief change, but, when teachers can be talked into using an instructional method and find it successful in improving student achievement, attitude and belief changes (including increases in teachers' personal teaching efficacy) are frequently reported. Similar research should be conducted with preservice teachers during their implementation of teaching models during their student teaching experience.

The qualitative evidence from this study suggests that even when the beliefs of preservice teachers are aligned with current research in cognitive psychology on the learning process, their teaching practices may not reflect their theoretical beliefs due to the constraints imposed upon them by the complexities of the classroom as well as their status as student teachers. Research on teachers' thought processes examines whether teachers are able to implement instructional methods that are consistent with their theoretical beliefs. What may be of more practical value are studies examining how preservice and inservice teachers can apply their theoretical beliefs within the constraints imposed by the complexities of classroom life.

While the qualitative data from this current study suggests some important explanations for the reasons why a statistically significant relationship was not found between preservice teachers' efficacy and degree of instructional variation, future research similar to the current study is recommended. To begin, the study examined the efficacy beliefs and the extent of instructional variation of only 32 preservice teachers. Replicating the methodology with more preservice teachers including more males, as well as with preservice teachers working toward licensure in areas other than elementary education might shed more light on the relationship between the two variables of efficacy and instructional variation.

Notes

[1] *General* teaching efficacy refers to teachers' beliefs in the power of teaching to overcome external factors such as, home environment and student background, to positively affect learning. *Personal* teaching efficacy refers to teachers' beliefs in their own capacity to positively affect learning.

[2] Instructional *models* refers to the "prescriptive teaching strategies designed to accomplish particular instructional goals" (Eggen & Kauchak, 1996, p. 11). Teaching models include concept attainment, concept formation or development, direct instruction, cooperative learning, inquiry, and synectics. *Instructional strategies* refers to other types of instructional techniques, including demonstrations, media such as video, student presentations,

academic games, and the like. *Student organization* refers to the method of student organization utilized, by the teacher, for the purpose of instruction (e.g., whole class, small group, partners, independent, one-on-one with teacher).

References

Anderson, C. (1991). Policy implications of research on science teaching and teachers' knowledge. In M. Kennedy (Ed.), *Teaching academic subjects to diverse learners* (pp. 5-30). New York: Teachers College Press.

Anderson, R. (1959). Learning in Discussions: A resume/the authoritarian-democratic studies. *Harvard Educational Review 29,* 201-216.

Armor, D., Conry-Oseguera, P., Cox, M., King, N., McDonnell, L., Pascal, A., Pauly, E., & Zellman, G. (1976). *Analysis for the school preferred reading programs in selected Los Angeles minority schools.* (No. R-2007-LAUSD). Santa Monica, CA: The Rand Corporation.

Ashton, P., & Webb, R. (1986). *Making a difference: Teachers' sense of efficacy and student achievement.* New York: Longman.

Ashton, P., Webb, R., & Doda, C. (1983). *A study of teachers' sense of efficacy* (Final Report, Contract No. 400-79-0075). Gansville: University of Florida. National Institute of Education. (ERIC Document Reproduction Service No. ED 231 834)

Berman, P., McLaughlin, M., Bass, G., Pauly, E., & Zellman, G. (1977). *Federal programs supporting educational change. VOL. 7: Factors affecting implementation and continuation.* Santa Monica, CA: The Rand Corporation. (ERIC Document Reproduction Service No. ED 140 432)

Blanton, W. & Moorman, G. (1987). *The effects of knowledge on the instructional behavior of classroom reading teachers.* Research Report No. 7. Boone, NC: Appalachian State University, Center on Excellence in teacher Education.

Brophy, J., & Evertson, C. (1976). *Learning from teaching: A developmental perspective.* Boston, MA: Allyn & Bacon.

Buchmann, M. (1987). Teaching knowledge: The lights that teachers live by. *Oxford Review of Education, 13,* 151-164.

Byrne, C. (1983). Teacher knowledge and teacher effectiveness: A literature review theoretical analysis, and discussion of research strategy. Paper presented at the meeting of the Northeastern Educational Research Association, Ellensville, NY.

Calderhead, J. & Robson, M. (1991). Images of teaching: Student teachers' early conceptions of classroom practice. *Teaching and Teacher Education, 7,* 1-8.

Cushner, K., McClelland, A., & Safford, P. (1996). *Human diversity in education.* New York: McGraw-Hill.

Czerniak, C., & Schriver, M. (1994). An examination of preservice teachers' beliefs and behaviors as related to self-efficacy. *Journal of Science Teacher Education, 5* (3), 77-86.

Darling-Hammond, L., Wise, A., & Klein, S. (1995). *A license to teach: Building a profession for 21st -century schools.* San Francisco, CA: Westview Press.

Doyle, W., Hancock, G., & Kifer, E. (1972). Teachers' perceptions: Do they make a difference? *Journal of the Association for the Study of Perception, 7,* 21-30.

Dunn, R., & Griggs, S. (1988). *Learning styles: Quiet revolution in American secondary schools.* Reston, VA: National Association of Secondary School Principals.

Eggen, P.D., & Kauchak, D. (1996). *Strategies for teachers* (3rd ed.) Boston, MA: Allyn & Bacon.

Gage, N. (1984). What do we know about teaching effectiveness? *Phi Delta Kappan, 66* (2), 87-93.

Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York: Basic Books.

Gibson, S., & Dembo, M. (1984). Teacher efficacy: A construct validation. *Journal of Educational Psychology, 76,* 569-582.

Goodlad, J. (1984). *A place called school.* New York: McGraw-Hill.

Guskey, T. (1988). Teacher efficacy, self-concept, and attitudes toward the implementation of instructional innovation. *Teaching and Teacher Education, 4,* 63-69.

Hallahan, D., & Kauffman, J. (1997). *Exceptional children: An introduction to special education.* Boston, MA: Allyn & Bacon.

Hawk, P., Coble, C., Swanson, M. (1985). Certification: It does matter. *Journal of Teacher Education, 36* (3), 13-15.

Joyce, B., & Showers, B. (1988). *Student achievement through staff development.* New York: Longman.

Kagan, D. (1992). Implications of research on teacher belief. *Educational Psychologist, 27,* 65-90.

Keislar, E., & Shulman, L., (Eds.) (1966). *Learning by discovery: A critical appraisal.* Chicago, IL: Rand McNally.

Lortie, D. (1975). *Schoolteacher: A sociological study.* Chicago, IL: University of Chicago Press.

Mangano, N., & Allen, J. (1986). Teachers' beliefs about language arts and their effects on students' beliefs and instruction. In J. Niles & R. Lalik (Eds.), *Solving problems in literacy: Learners, teachers, and researchers.* (pp. 136-142). Rochester, NY: National Reading Conference.

Midgley, C., Feldlaufer, H., & Eccles, J. (1989). Change in teacher efficacy and student self- and task-related beliefs in mathematics during the transition to junior high school. *Journal of Educational Psychology, 81,* 247-258.

Morine-Dershimer, G., & Corrigan, S. (1997). Teacher beliefs. In H.J. Walberg & G.D. Haertel (Eds.), *Psychology and educational practice* (pp. 297-319). Berkeley, CA: McCutchan.

Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies, 19,* 317-328.

Oneida, M. (1989). *Does teacher efficacy begin with teacher education: Implications from student teacher candidates*. (ERIC Document Reproduction Service No. ED 324 273)

Palardy, J. (1969). What teachers believe-what children achieve. *Elementary School Journal, 69,* 370-374.

Patton, M. (1990). *Qualitative evaluation and research methods.* Newbury Park, CA: Sage Publications.

Peterson, P., & Walberg, H. (1979). *Research on teaching.* Berkeley, CA: McCutchan.

Romberg, M., & Carpenter, T. (1985). Research on teaching and learning mathematics. In M. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 850- 875). New York: MacMillan.

Rupley, W. & Logan, J. (1984). *Elementary teachers' beliefs about reading and knowledge of reading content: Relationships to decisions about reading outcomes*. (ERIC Document Reproduction Service No. ED 285 162).

Shuell, T. (1986). Cognitive conceptions of learning. *Review of Educational Research 56,* 411-436.

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57* (1), 1-22.

Stein, M., & Wang, M. (1988). Teacher development and school improvement: The process of teacher change. *Teaching and Teacher Education 4,* 171-187.

Tobin, K. (1990). Changing metaphors and beliefs: A master switch for teaching? *Theory into Practice*, *29* (2), 122-127.

Tomlinson, C. (1995). *How to differentiate instruction in mixed-ability classrooms.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tracz, S., & Gibson, S. (1986). Effects of efficacy on academic achievement. Paper presented at the annual meeting of the California Educational Research Association, Marina del Rey, CA.

Volkman, B., Schelffler, A., & Dana, M. (1992). Enhancing preservice teachers' self-efficacy through a field-based program of reflective practice. Paper presented at the annual meeting of the Mid-South Educational Research Association, Knoxville, TN. (ERIC Document Reproduction Service No. ED 354 232)