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Synthesis of Research on Teachers' Reflective Thinking

The value of teachers' own interpretations of their work now supplements technical views of teaching, and researchers are exploring three elements of reflection—cognition, critical thinking, and narrative inquiry undertaken by teachers themselves.

R*eflective thinking* is not a new idea—Dewey (1933) referred to it in his early works—but only a handful of researchers and practitioners were using the term until Schon (1983, 1987) began to write about reflective practice in education and other professions. Now, those who have always believed in the importance of the critical and analytical thinking of teachers are rallying around the idea.

This shift toward an interest in reflective thinking has come about partly as a reaction to the overly technical and simplistic view of teaching that dominated the 1980s. Gradually, however, experts in supervision, staff development, and teacher education have begun to recognize that teaching is a complex, situation-specific, and dilemma-ridden endeavor. Recently they have begun to study teachers' values and philosophies in the face of their everyday dilemmas. Today, professional knowledge is seen as coming both from sources outside the teacher and from the teachers' own interpretations of their everyday experiences.

It is difficult to pin down the exact meaning of the term *reflection*. Most who use the term would probably agree that the opposite of reflective action is the mindless following of unexamined practices or principles. But within that agreement, there is quite a range of opinion regarding what reflection is and what it looks like in action.

This article presents three elements that are important in teachers' reflective thinking. The first is the cognitive element, which describes how teachers process information and make decisions. The second, the critical element, focuses on the substance that drives the thinking—experiences, goals, values, and social implications. The final element of reflection, teachers' narratives, refers to teachers' own interpretations of the events that occur within their particular contexts.

The Cognitive Element of Reflection

The cognitive part of teacher reflection focuses on how teachers use knowledge in their planning and decision making. Shulman (1987) has described six categories of knowledge: (1) content/subject-matter knowledge; (2) pedagogical methods and theory; (3) curriculum; (4) characteristics of learners; (5) teaching contexts; and (6) educational purposes, ends, and aims. Shulman's idea of "pedagogical content knowledge," which encompasses the first three categories, refers to how teachers portray important ideas specific to their content. These representations (or metaphors) enable the teacher to convey complex ideas in ways that bring meaning to students.

Most cognitive researchers have not delved deeply into how teachers think about the last two categories of the knowledge base: teaching contexts and educational purposes, ends, and aims. They usually stick with what Van Manen (1977) calls the *technical* level of reflection, where the ethical and moral purposes of education remain unexamined.

Another focus of cognitive research is how the knowledge base is organized. One current model depicts information as organized into a network of related facts, concepts, generalizations, and experiences. These organized structures, called *schemata*, constitute the individual's comprehension of the world and allow a large body of information to be stored and accessed very rapidly (Anderson 1984, Berliner 1986). Comparisons of novice and expert teachers' interpretations of classroom events indicate that experts have deeper, richly connected schemata to draw upon when making a decision. In contrast, novices tend to have leaner, less developed schemata, presumably because of lack of experience (Leinhardt and Greeno 1986).

For example, Carter and her colleagues (1988) studied how experts, novices, and aspiring teachers perceive visual information about classrooms. She observed that experts were "better able to weigh the import of one piece of visual information against another, to form connections among pieces of information, and to represent management and instructional situations into meaningful problem units" (p. 25). This ability was attributed to the more elaborate, complex, and interconnected schemata of the experts. These schemata first help determine which events merit attention and, second, trigger other relevant information from memory so the teacher can determine an appropriate response.

A key factor in the thinking of experts appears to be "automaticity." Certain routines (sequences of responses) are automatically stimulated by a situation and put into action with little conscious attention by the teacher. This enables the teacher to perform some behaviors unconsciously while attending to those events that are more novel or important (Carter et al. 1988). These automatic scripts for action are probably stored as schemata.

Borko and Livingston (1989) compared the planning, teaching, and post-lesson reflections of novice and expert teachers in their program at the University of Maryland. During the act of teaching, the novices encountered problems when attempts to be responsive to students led them away from scripted lesson plans. They appeared unable to hook back into their schema for the lesson and had to re-create a meaningful plan on the spot—an unnerving process when more than 20 students are waiting expectantly for the teacher to "get his act together." In contrast to the novices, experts were able to improvise quite naturally from sketchy plans, probably because (1) many of the routines and the content were available in memory as automatic scripts and (2) their rich schemata allowed the experts to quickly consider cues in the environment and access appropriate strategies.

Schemata do not automatically appear in a teacher's mind; they are constructed through experience.

Schemata do not automatically appear in a teacher's mind; they are constructed through experience. Constructivist theory (Greeno et al. 1979) indicates that individuals are constantly creating their own meaning out of what is perceived. This is a dual process of assimilation (fitting the new in with the old) and accommodation (changing the old mental organization to incorporate the new) (Piaget 1978). Therefore, the experiences, values, and beliefs stored in memory certainly have influence on how a new piece of information is perceived and interpreted. Such "culturally based filters" have been investigated by Hollingsworth (1990) and others (Ross 1990), with the result that teacher educators are now giving more attention to how preconceptions about the aims of education can influence what college students do (and do not!) learn from teacher education programs.

Lampert and Clark (1990) believe schema theory may give too little importance to context factors. They refer to "situated cognition," which suggests that knowledge is constructed through interaction between the mind and the context surrounding the problem. Thus, rather than apply a generalized schema (learned rules, principles, or concepts) to a problem, teachers may make a case-by-case response to the particulars of a problem. If this is accurate, then greater opportunities need to be provided for future teachers to "anchor" their knowledge and experience in rich educational contexts.

A third topic investigated by cognitive researchers is teachers' metacognition—self-regulated, purpose-driven behavior. The reflective teacher monitors the effect of an action taken as well as the cognitive processes employed to make decisions. These cognitive processes involve making inferences, or tentative hypotheses. Dewey (1933) observed wisely that it is not our belief in inferences that misleads us, but our belief in *untested* inferences. Upon encountering a novel situation, a teacher attends to it, makes inferences, and then mentally tests them by looking for similarities and differences apparent in this situation and comparing them with events and ideas (schemata) stored in memory. Expert/novice studies by Leinhardt and Greeno (1986) indicate that experts engage in such self-regulated, purpose-driven behavior more than do novices.

Research on Promoting Cognitive Reflection

The studies summarized above contrasted novices with experts. More recent studies purport simply to identify teacher education activities that promote reflective thought. One example is CITE (Collaboration for the Improvement of Teacher Education), part of a four-year undergraduate program at Eastern Michigan University (EMU) (Sparks-Langer et al. 1990). Structured field experiences, micro-teaching, one week of classroom teaching, journals, and writing assignments help pre-student-teachers analyze, question, and reflect on the issues presented in courses. Professors model reflective questioning and discourse through textbook selections[1], teaching methods, and class assignments.

The evaluations of CITE have produced a framework for assessing the reflective thinking displayed during a short interview about a recent teaching event (Simmons et al. 1989). The framework has seven levels: (1) no description; (2) simple, lay person description; (3) labeling of events with pedagogical concepts; (4) explanation using only tradition or personal preference; (5) explanation using pedagogical principles; (6) explanation using pedagogical principles and context; and (7) explanation with ethical/moral considerations. The progression of levels shows a growing sophistication in teachers' schemata, from technical concepts and rules to contextual and ethical thinking.

In the studies reported below, the research team coded transcripts of all interviews and achieved satisfactory reliability. Of the 16 *average* and *above average* (rating made by professors) CITE students studied at the end of the program, 10 were functioning at level 6, contextual thinking. Of the eight *below average* students, only one was able to function at this level.

In another study of CITE, Grinberg (1989) contrasted a class of CITE students with a similar group not enrolled in CITE. While both groups were initially equal on the reflective thinking scores and other factors the CITE students subsequently achieved significantly higher ratings on their reflective thinking. The courses with guided field experiences apparetly promoted greater reflection than did the courses without the field experiences.

In a study of the reflective thinking produced by an inservice program, Pasch and his colleagues (1990) used the CITE framework to evaluate teachers who were studying the ideas of Madeline Hunter. Interviews were conducted before training, after training but before coaching, and after both training ***and*** coaching. There was no difference between the pre-training and post-training reflective thinking scores; after coaching, however, these scores rose significantly, with a mean score of 5.1 (explanation using pedagogical principles). Thus, coaching may help to promote reflection.

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Morine-Dershimer (1989) examined the development of knowledge about teaching associated with a secondary-level methods course that included extensive micro-teaching. At the beginning and the end of the course, students were asked to construct concept maps representing their views of teacher planning. There was a strong increase in the number of main categories used in the maps and a slight increase in the number of levels of subordinate concepts used in the main categories. Thus, the course activities seemed effective in developing richer conceptual networks (schemata), more like those of experts.

Finally, Hollingsworth (1990) conducted a longitudinal study to investigate changes in the knowledge and beliefs of 10 teachers about reading instruction before, during, and after a fifth-year teacher education program. She hoped that the program would help teachers shift attention away from technical concerns with student activities and toward a greater interest in student learning. She found little change until the second or third year of teaching, which, she believes, is when the scripts for the everyday management and activities became automatic, allowing the teachers to focus on student outcomes.

Summary of Research on Cognitive Reflection

One conclusion drawn from the cognitive research is that we should teach novices the schemata of experts. But acting on this conclusion could subvert the lessons learned from constructivism (each of us must construct our own meaning) and from "situated cognition" (expert teachers probably draw on their own contextually developed knowledge and prior case-experience to develop their own wisdom of practice.) It would also, perhaps, short-circuit the development of professional self-regulated judgement. Research can inform us about how complex and uncertain teaching is, but it "cannot describe the sorts of decisions teachers should be taught to make in any particular situation" (Lampert and Clark 1990, p. 29).

In critical reflection, the moral and ethical aspects of social compassion and justice are considered along with the means and the ends.

The Critical Element of Reflection

While the cognitive element of reflection emphasizes how teachers make decisions, the critical approach stresses the substance that drives the thinking—the experiences, beliefs, sociopolitical values, and goals of teachers. Critical reflection is often contrasted with what Van Manen (1977) refers to as technical reflection, where the teacher considers the best means to reach an unexamined end. For example, a teacher may choose a particular room arrangement to maintain control, without consideration of the other possible effects. In critical reflection, the moral and ethical aspects of social compassion and justice are considered along with the means and the ends. For instance, the teacher may choose a seating arrangement that facilitates cooperative learning in the hope of fostering a more equitable, accepting society.

To understand critical reflection, it is important to look at two orientations to reflective thinking, Schon's concept of reflective action (1983, 1987) and critical theory (McLaren 1989, Tom 1985). Both have highlighted the importance of teachers' thinking about the dilemmas of teaching and the social outcomes of education.

Schon (1983) first analyzed the work of architects and other professionals to see how they reflected on their actions. Surprisingly, he found little emphasis on traditional problem solving. Instead of using a rational process of selecting the best solution for an agreed-upon goal, these professionals engaged in an open debate about the nature of the decisions, the value of the goals, and the ultimate implications of the actions. Schon referred to this reflective dialog as *problem setting*. Among teachers (and others) he also found artistic comfort with ambiguity, no-one-right-answer thinking, and recognition of the nonlinear, uncertain complexity of professional practice.

Schon does not refer to a cognitive knowledge base for teaching: rather, he refers to an "appreciation system."

Schon (1987) believes that while teachers acquire some professional knowledge from "packaged" educational principles and skills, the bulk of their learning comes through continuous action and reflection on everyday problems. Further, he contends that the information gained from this experience is often tacit and difficult to analyze. Schon does not refer to a cognitive knowledge base for teaching; rather, he refers to an "appreciation system." This system contains the teacher's repertoire of theories, practices, knowledge, and values, which influence how situations are defined, what is noticed, and the kinds of questions and decisions teachers will form about particular actions.

Many who use the term *teacher reflection* (for example, Smyth 1989) think of it in terms of critical theory. McLaren (1989) observed that "critical pedagogy attempts to provide teachers and researchers with a better means of understanding the role that schools actually play within a race-, class-, and gender-divided society" (p. 163). When teacher educators help teachers examine the issues of ethics, morals, and justice in education, they are opening up discourse about the role of schools in a democratic society. Teachers then begin to question common practices such as tracking, ability grouping, competitive grading, and behavioral control. They begin to clarify their own beliefs about the purposes of education and to critically examine teaching methods and materials to look for the hidden lessons about equity and power that might lie therein. We see in critical pedagogy, as in Schon's work, a reaction against an antiseptic, value-free, purely rational view of teaching and learning.

Critical theorists see knowledge as socially constructed, that is, constructed symbolically by the mind through social interaction with others. This knowledge is determined by the surrounding culture, context, customs, and historical era (McLaren 1989). In contrast to cognitive constructivism, this approach places more importance on life values and morals, for example, concepts of justice, ideas about the purpose of the individual in a democracy, ethics related to the treatment of students, and so on. All of these are heavily dependent on the social milieu in which the teacher develops.

What are the thinking processes of a critical reflective practitioner? To (over)simplify, as teachers describe, analyze, and make inferences about classroom events, they are creating their own pedagogical principles. These "short-range theories" (Smyth 1989) help make sense of what is going on and guide further action. Ross (1990) has extended the ideas of Schon, Van Manen, and others into five components of reflective thinking: (1) recognizing an educational dilemma, (2) responding to a dilemma by recognizing both the similarities to other situations and the special qualities of the particular situation, (3) framing and reframing the dilemma, (4) experimenting with the dilemma to discover the consequences and implications of various solutions, (5) examining the intended and unintended consequences of an implemented solution and evaluating the solution by determining whether the consequences are desirable or not (p. 22).

When teachers examine the issues of ethics, morals, and justice in education, they are opening up discourse about the role of schools in a democratic society.

The first three of these items echo Schon's process of problem framing. The fourth and fifth bring us to a key thinking process in critical pedagogy (McLaren 1989)—the examination of the relationship between power and knowledge. Knowledge should be examined "for the way it misrepresents or marginalizes particular views of the world" (p. 183). That is, many accepted explanations are biased in favor of the group in power at the time when the ideas were formed. Teachers, then, need to convey the concept of teaching and learning as a process of inquiry into the problematic by asking questions such as *If we use this process or content, what is the long-term effect on* *students' values, and thus on society?* Through such questions emerges a "language of hope" for bringing about greater social equity.

Research on Promoting Critical Reflection

Teacher education programs at universities are addressing the goal of critical reflection (only a few will be summarized here). Most program designers have found that it is relatively easy to promote technical and practical reflection and more difficult to achieve critical reflection. Ross (1989) evaluated the effects of a course in Research on Elementary Education as part of a five-year teacher preparation program (PROTEACH). The professor fostered reflection by helping students examine their own socially constructed beliefs about schools and teaching. For example, she required action research projects and 'theory-to-practice' papers from students. She also used research-based teaching techniques and critical discussions of students' learning from those methods.

To assess students' thinking, Ross assigned each of 134 theory-to-practice papers a level of reflection, from *1* (low: description with little analysis of context or multiple perspectives) to *3* (high: multiple perspectives with recognition of pervasive impact of teachers' actions). Most papers were rated *1* or *2*. Ross interpreted these findings in a developmental light: "perhaps, even though students demonstrated a low or moderate level of reflection, the development of this knowledge is essential for future reflection" (p. 29).

After several studies of the PROTEACH program, Ross and her colleagues (in press) believe that "change in perspective" is the basis of the development of reflective practice. Future teachers are led to construct their own perspectives by drawing on their past and present personal and professional experiences in schools; theoretical knowledge base; self-image and efficacy; and their interactions with peers, mentors, supervisors, and children in school. Such multidimensional perspectives are probably built gradually through extensive reflective dialogs that help teachers comprehend both the immediate and the long-term ethical and moral aspects of their work.

In the CITE evaluation studies referred to earlier (Sparks-Langer et al. 1990), most students were using principles and contextual clues to make sense of their experiences. Yet, few students displayed level-7 (ethical/moral) thinking, probably because at that point, the program did not have a coherent, critical-theorist orientation in the social foundations courses. (As the critical perspective has been integrated more thoroughly, we are beginning to see more evidence of such thinking in our students.)

In critical pedagogy, we see a reaction against an antiseptic, value-free, purely rational view of teaching and learning.

At Catholic University, Ciriello, Valli, and Taylor (in press) have designed a teacher preparation program around the concept of critical reflection. The program includes professors' modeling their own thinking processes, students' self-critiques of assignments, action research, and journal writing. Students' responses to questionnaires indicated that action research helped them to value both the context of teaching and systematic thinking about complex phonomena. Further, students expanded their vision of teaching to include moral responsibility and the need to challenge taken-for-granted practices.

Summary of Research on Critical Reflection

The programs studied have been quite successful in identifying methods that promote technical reflection about methods, principles, outcomes, and contexts for pupil learning. They have had limited success in promoting critical reflection. However, they have contributed much by proposing frameworks that describe types of reflective thinking (for example, Ross 1990, Sparks-Langer et al. 1990) and through providing several techniques for developing reflective thought. These techniques include structured journal writing, critical dialog, examination of multiple perspectives, field experiences, and action research. In spite of this progress, we are not completely clear on how one best promotes or assesses teacher reflection about political, ethical, and moral values, beliefs, and attitudes.

Another difficulty in studying the development of critical reflection arises from the mismatch of research paradigms. Concrete cognitive models have often been used to assess what is essentially a dilemma-ridden, uncertain, changeable thing—teachers' thinking. We at EMU have concluded that our level-7 (ethical/moral) thinking is not necessarily an endpoint on a continuum but rather a separate phenomenon that must be studied with in-depth qualitative and interpretive methods. The next approach to reflection—teachers' narratives—illustrates this view.

Teachers' Narratives: The Third Element of Reflection

Cochran-Smith and Lytle (1990), writing about teacher research, contended, "what is missing from the knowledge base of teaching, therefore, are the voices of the teachers themselves, the questions teachers ask, the ways teachers use writing and intentional talk in their work lives, and the interpretive frames teachers use to understand and improve their own classroom practices" (p. 2). This is the essence of the narrative part of reflection. While a teacher's narrative may include cognitive or critical aspects, the emphasis is on the teacher's own interpretations of the *context* in which professional decisions are made. Such narratives can be a powerful force in heightening teachers' awareness of their own professional reasoning.

Many terms and concepts are joined together in this view of reflection: case studies of the tacit wisdom that guides practice (Shulman 1987), the inclusion of craft knowledge in teacher assessment practices (Leinhardt 1990), the legitimacy of viewing teaching as art (Eisner 1982, Kagan 1988), defining teaching as improvisational performance (Yinger 1987), teacher action research (Cochran-Smith and Lytle 1990), and the appearance of qualitative studies using narrative inquiry (Connelly and Clandinin 1990). The common thread through all these is the emphasis on the validity of teachers' judgments drawn from their own experiences. This view is sympathetic with Schon's notion of "giving reason" because it is the teachers themselves whose voices comprise the story.

Here we describe in greater detail only two of the many ideas listed above: narrative stories and the artistic/aesthetic view of teaching. Connelly and Clandinin (1990) suggest that humans are essentially storytelling organisms. Thus, stories written by and about teachers form the basis of narrative inquiry. The participants in such inquiry construct and reconstruct narrative plots to gain a deeper understanding of their experience. In this view, therefore, the process of reflective thinking is seen as narratives or stories, with settings, plots, and characters.

Stories written by and about teachers form the basis of narrative inquiry.

Kagan (1988), writing from the artistic/aesthetic tradition, concludes that the cognitive-schemata model of teachers' thinking is so patterned, sensitive to environment, and flexible that teaching could be easily viewed as an act of artistic composition. She cites Eisner's (1982) reminder that the term *context* comes from the Latin *contexere*, to weave together. Thus, as a teacher works through the hierarchical planning net, a weaving together of meaning is created. This view of teaching as artistry echos Yinger's (1987) notion of teaching as improvisational performance. A teacher may begin with broad guidelines for a lesson, but the actual teaching moves are artfully improvised in response to the students and the context.

In narrative inquiry, the participants construct and reconstruct narrative plots to gain a deeper understanding of their experience.

Research on Promoting Narrative Reflection

A common theme in the narrative element of reflection is the emphasis on *naturalistic* studies. In contrast to experimental and quantitative studies that manipulate factors in order to produce generalizations, naturalistic studies explore the meanings and interpretations teachers give to their everyday lives. As educational researchers recognize the complexity of teaching and of learning to teach, more and more studies are turning to such qualitative methods.

Action research (Elliott 1985) can be a powerful vehicle for encouraging teachers to tell their own stories. In such research, a teacher identifies questions, plans actions, and collects information about the phenomenon under study. An example of this approach is Lampert's (1990) three-year study of her own teaching of 5th grade math. Her goal was to "make knowing mathematics in the classroom more like knowing mathematics in the discipline" (p. 59). Lampert presented her research "in terms of a story about learning and knowing mathematics in the social setting of the classroom" (p. 33). Her study of her own teaching and her students' learning prompted her to conclude that, though her students met her goals, there was still much to learn.

Another example of action research is provided by Colton and others (1989). As part of the CITE project, a small group of teachers and professors met for six half-days to explore the notion of teacher reflection and to conduct inquiry into their own practice. One teacher's journal (Morris-Curtin 1990) and final reflections provide a vivid story of the benefits:

> I think the most notable change for me was the ability to start backing away from the need to get an immediate solution to a problem. Instead, by using the problem solving/reflective framing format, I really feel like I'm giving the wealth of knowledge I possess about my profession a chance to come more fully into play. . . . There is something magical and very personal in all of this. Like finally finding just the right word for a poem you've worked on for ages. Teaching, like any other art form, comes from a special place within us (p. 5).

Using collaborative action research methods (Oja 1989), Canning (1990), engaged student teachers in describing and analyzing their own efforts to become reflective. In addition to writing about the experiences occurring around them, student teachers also considered themselves as objects of reflection. By providing questions, supportive feedback, and affirmations, Canning helped students find their "own voices" as they engaged in open-minded, responsible, and wholehearted reflection on their student teaching experiences.

Summary of Research on Narrative Reflection

Three major benefits are realized from teachers' narratives. First, these studies give us insights into what motivates a teacher's actions and an appreciation for the complexity of teachers' everyday lives. Second, teachers' narratives provide us many detailed cases of teaching dilemmas and events (for instance, Shulman and Cobert 1987).

Highlights of Research on Teachers' Reflective Thinking

Several implications can be derived from this review of research on teachers' reflective thinking:

★ Teacher educators can foster growth in cognitive reflection through microteaching with post-teaching reflection journals, teaching with self-analysis of video/audiotapes, action research observation and analysis of selected teaching episodes, coaching, and assessment and discussion of student learning.

★ Critical reflection may be promoted through close examination of cases that illustrate particular aspects of context, pedagogy, content, ethical/moral dilemmas, and other elements of teaching and learning that will help teachers develop a rich, flexible repertoire of ideas, attitudes, and skills.

★ Teachers need opportunities to construct their own narrative context-based meaning from information provided by research, theoretical frameworks, or outside experts.

★ A person's preconceptions of teaching, learning, and the purposes of schooling will influence greatly how he or she interprets courses, workshops, and personal teaching experiences. These beliefs must be examined critically from various perspectives to allow for a flexible and thoughtful approach to teaching.

★ Future research needs to explore how teachers interpret, give meaning to, and make decisions about their experiences in schools. Teachers themselves will need to be included as co-investigators in such research.

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Richert (in press) has used such cases successfully to develop reflective thinking in teachers. The third, and most valuable benefit is the insight gained by teachers themselves as a result of this self-inquiry.

In one sense, the emphasis on critical and narrative teacher reflection is a bridge into a new way of thinking about research on teaching. Since many researchers who study the process of learning to teach were trained in the experimental and quantitative research tradition, this can be a tough leap. Yet, as we have seen here, researchers have forged collaborations with teachers and are truly listening and learning from their stories (for example, Huberman 1990).

Much to Learn

In this review, we have described three aspects of reflection important to teachers' professional thinking. Most researchers in teacher education now recognize the important role of context, case-knowledge, deliberation of educational aims/ends, prior beliefs, wisdom-through-action, and cognitive complexity in teachers' reflective thinking.

As we fit together the cognitive, critical, and narrative elements of teachers' reflective thinking, we find that we are moved to "reframe" our images of teacher education and supervision. No longer is direct teaching or "training" necessarily the best mode for professional staff development. University course work and unstructured student teaching experiences are inadequate. Certainly, first-year teachers are woefully without the support that would allow them to move out of novice-like practice. We hope the ideas presented here provide guideposts that can help us design developmentally appropriate growth experiences for teachers at all levels and that we continue this journey with teachers as co-inquirers into the mysterious process of reflective professional thinking.☐

[1] The textbook, *Teaching as Decision Making*, was written by five faculty in the CITE program at EMU: Pasch, Sparks-Langer, Gardner, Starko, and Moody. It promotes a practical, reflective orientation to methods of teaching and is published by Longman.

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