

Third Misconceptions Seminar Proceedings (1993)

Paper Title: **Barriers which may keep teachers from implementing what we know about identifying and dealing with students' science and mathematics misconceptions**

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Keywords: Teacher Education, Concept Formation, Educational Methods, Teaching for Conceptual Change, Inservice Teacher Education, Misconceptions, Transfer of Training, Concept Teaching, Constructivist Teaching

General School Subject:

Specific School Subject:

Students: Adult

Macintosh File Name: Stepans - Barriers

Release Date: 2-9-1994 E, 11-8-1994 I

Publisher: Misconceptions Trust

Publisher Location: Ithaca, NY

Volume Name: The Proceedings of the Third International Seminar on Misconceptions and Educational Strategies in Science and Mathematics

Publication Year: 1993

Conference Date: August 1-4, 1993

Contact Information (correct as of 12-23-2010):

Web: www.mlrg.org

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A Correct Reference Format: Author, Paper Title in The Proceedings of the Third International Seminar on Misconceptions and Educational Strategies in Science and Mathematics, Misconceptions Trust: Ithaca, NY (1993).

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Barriers which may keep teachers from implementing what we know about identifying and dealing with students' science and mathematics misconceptions

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Paper presented as part of a symposium for *Third International Seminar on Misconceptions and Educational Strategies in Science and Mathematics*, Cornell University, August 1-4, 1993.

ABSTRACT

This paper presents the perceptions of teachers who have been involved in a project that piloted an innovative in-service model (TRIAD), which is a partnership between classroom teachers, their administrators, and professional development persons (in this case, university personnel). The TRIAD project seeks to assist teachers in *becoming constructivists about their own teaching*; that is, they engage in specific activities that are designed to *create within them conceptual change about the teaching/learning process*. In this model, teachers become researchers of the teaching/learning process and directly apply what they learn. As a result, they transform their own classrooms and become agents for change in their schools and their districts. This paper focuses on teachers' perceptions of: the value and importance of the TRIAD partnership, the value of the teaching for conceptual change model (CCM), the changes they saw in their students and in themselves, the components of the model they were comfortable with and continued to use over a long period of time, and what were their perceptions of barriers that prevented or discouraged them from using various components. We will also make recommendations on possible ways to deal with these barriers.

INTRODUCTION

Continuing education and professional development are requirements for most science and mathematics teachers. After-school, evening, and weekend in-service education opportunities during the school year are typically provided by school district personnel and post-secondary institution faculty. Many of these opportunities are funded by the U. S. Department of Education through its Eisenhower program for science and mathematics education. Teachers also have opportunities to participate in summer institutes and workshops -- many of which are supported by grants from the National Science Foundation. Why are some in-service experiences more effective than others in preparing teachers to implement what is learned in the classroom? What are the barriers (obstacles) that make it difficult for them to bring change into their schools? We know from the research what teachers feel should be done, yet there is a gap between what they say they need, what we as providers of in-service opportunities seek to provide, and what they encounter in their schools.

For this study, we explored the perceptions about barriers of a group of teachers and administrators who were involved in a project that piloted the TRIAD in-service model developed at the University of Wyoming (Figure 1) (Stepans, 1989, 1990; Stepans, Miller, & Willis, 1992). The project is called TRIAD because it is a partnership between classroom teachers, their administrators, and university personnel. The model is now under implementation at 6 additional sites in Wyoming and in several other states.

The TRIAD model seeks to assist teachers in *becoming constructivists about their own teaching*; that is, they learn about, see modeled, and engage in specific activities that are designed to *create within them conceptual change about the teaching/learning process*. The TRIAD experience seeks to change what teachers teach, how they teach it, and how they assess student learning. They become *researchers* on the teaching/learning process and directly *apply* what they learn. As a result, they transform their own classrooms and become agents for change in their schools and their districts.

Unlike most in-service experiences, TRIAD takes place over 4-5 months, during the academic year. It consists of several *sessions* in which university personnel meet and work with the teachers and administrators. The sessions are separated by *intervals* of several weeks during which teachers implement the ideas, strategies, and activities in their own classrooms. All sessions are rich with interplay among all partners, sharing what they have done, what they have observed, and what they plan to do next based on these observations; asking questions; and dealing with directly relevant and applicable information, issues, and strategies.

TRIAD incorporates many characteristics of effective in-service experiences; conversely, it avoids some of the characteristics that tend to interfere with teacher implementation of research findings and in-service experiences. Rather than being a “top-down” program, it has a high degree of teacher input and control, contributing to teacher empowerment (Maeroff, 1988). Research on the teaching/learning process is made accessible through its translation into practice and through involving teachers in their own research (Kyle and Shymansky, 1988; Blosser, 1989; Stepans, 1990, 1991; Cronin-Jones, 1991). Content information is linked to effective implementation strategies. Because the teachers choose the concepts around which they will build their experiences, there is a readiness for change (Stepans, 1990). They quickly learn that the changes they are being asked to implement make sense in the context of their own classrooms (Porter and Brophy, 1988; Tobin, 1990); as a result,

there is a high level of self-motivation for implementing TRIAD components. A powerful characteristic of effective in-service experiences that is built into the TRIAD partnership is administrative support for implementation of what the teachers learn and experience. Collegiality, collaboration, practice, feedback, time for reflection, and administrator support for shared decision-making are provided (Alvarez, 1992).

THE TRIAD MODEL

TRIAD has many components, some of which we will mention here. Teachers are asked to choose a science concept they plan to teach, then interview a sample of students to determine the children's preconceptions about the concept as a basis for designing their lesson. Teachers are often astonished by the ideas they hear from the students and the *implications* of these simple interviews for their teaching. Next, the teachers examine their teaching materials, including textbooks, and compare the assumptions and presentations of the concept to the children's perceptions.

Teachers then prepare their lessons using a six-step teaching for conceptual change model (CCM), summarized in Figure 2. This model builds upon the work of many researchers (Eaton, Anderson, & Smith, 1983; Clement, 1987; Nussbaum & Novick (1981); Posner, Strike, Hewson, & Gerzog, 1982; Driver & Scanlon, 1989; Duilt, 1987; Feher & Rice, 1985; Gilbert, Osborne, & Fensham, 1982; Stepan, 1990, 1991). The CCM also acknowledges the value of the traditional learning cycle model (Atkins & Karplus, 1962) but goes beyond it in some meaningful ways.

In the CCM, students and teachers work as a team, with the teacher focused on helping students to experience conceptual change rather than on being a "presenter" of information and answers. The CCM begins with the teacher finding out students' preconceptions in relation to the concept that will be taught. In the TRIAD model, teachers observe and collect data on changes they see in the *children's* attitudes, knowledge, skills, and social interactions. Teachers also collect data on changes they see in *themselves*. Teachers engage in peer coaching and learn to work as teams, yielding additional research insights into what is happening in the classroom.

Finally, based on what they have learned from their own students and each other, the teachers evaluate their curricula. Informed by their own data, analysis, and reflection, they make decisions about the appropriateness of concepts and approaches for the children in their classrooms. Because the administrators have bought in as key partners, they are aware of the

legitimacy of the teachers' decisions and are able to support them in the changes they decide to make.

In summary, the TRIAD model incorporates the following major components: a partnership composed of teacher, administrator, and professional development person; interviewing students; teaching for conceptual change; sharing and working with colleagues; peer coaching; the teacher as a researcher (classroom-based research), identifying meaningful changes in teachers and in students; teacher journals; evaluating, revising, and developing curricula; developing leadership.

RESULTS AND DISCUSSION

In February, 1993, we interviewed 32 of the 36 elementary and middle school teachers and 3 administrators who had been involved in the TRIAD project (Figure 3). They represented 5 schools and the district administration.

The teachers were very positive about their experience, commenting on such things as: the value and importance of the partnership, the value of the teaching for conceptual change model, the changes they saw in their students (especially those who had difficulty with the traditional "textbook" approach), the changes they saw in themselves, and increased collegial sharing and collaboration.

Among the questions we asked them were three dealing with implementation and barriers to implementation of components of the TRIAD model. We asked them: (1) which components of the model were they were comfortable with and had they continued to use over a long period of time; (2) what were their perceptions of barriers that prevented or discouraged them from using various components; and (3) what were their recommendations about overcoming these barriers in order for them to implement the components. What follows is a summary of their responses to these three questions. The summary has been divided into two groups, based on the degree of administrative support reported by the teachers. The differences between the two groups are striking.

Teachers who had strong administrative support

QUESTION #1: Which components were you comfortable with and did you continue to use over a long period of time?

Partnership: The TRIAD worked most effectively when all three partners were fully invested and active. Administrator participation was critical and continued more fully at some schools than others. The teachers also wanted the university personnel to remain fully involved, even after the formal in-service experience. They emphasized several reasons: to continue modeling specific strategies and activities; to provide progressive feedback and assistance on teaching strategies and peer coaching; to help maintain the involvement of the administrators; and to increase the teachers' understanding of science concepts.

Student interviews: Most teachers commented on this component as being very valuable. It was variously described as "fun", "funny", "very exciting", "useful", and "hardest to work in." One teacher stated it was "one of the most valuable, amazing parts" of the TRIAD experience because it revealed that students "knew so much" or were "so far off base" (I-5). She also observed that she "could really identify the background experiences of children ... the level of personal experience they bring from home" through the interviews. Only a few teachers continued to use individual interviews, however. Several used group interviews, and a few used written answers, although they acknowledged a descending order of effectiveness from individual to group to written approaches (I-4).

Teaching for conceptual change model (CCM): Further study is needed to clarify teachers' use of the CCM. Many of them use it as an important classroom strategy, at least for the lessons they saw modeled and those they developed during the class phase of their involvement in TRIAD. They liked having students make, explain, and share their predictions, then test them with materials, citing the strategy as being motivating, creating "good excitement in kids" (I-7) so they "look forward to science" (I-5).

The model is apparently flexible enough to accommodate teachers as well as learners. For some teachers, it became as second nature. Many teachers were very comfortable with the CCM, noting that it also "works well with math" (I-7, I-8) and "becomes part of your style" (I-7). As another teacher stated, "It's good ... [but] ... no matter what we do we must be able to adjust it to our own style of teaching ... some parts we will incorporate and some parts not..." (I-7). Two groups commented on its effectiveness in their integrated curriculum (I-2, I-7), "being

used in all classes” (I-7). It also can help individual teachers integrate science into other areas -- “doing science but not labeling it,” thereby broadening the definition and activities of “science” (I-5). Some teachers, however, were uncomfortable with a perceived loss of structure or control using the CCM, especially with the group activities and open-endedness. Many of the teachers expressed a need for continued help from university personnel in developing more CCM lessons, primarily because they feel insecure about their own content knowledge.

Some strategies that are parts of the CCM were maintained and carried over, even if the full model wasn’t used. Questioning was a frequently mentioned carry-over to other subject areas (I-1, I-2). In fact, most of the teachers indicated they continued to emphasize questioning and “letting students lead instruction” (I-1) rather than assuming students were in tune with the teaching and the curriculum. Many teachers also continued to use the small and large group sharing and cooperative/collaborative learning techniques. Comments such as “kids helping each other was exciting and good,” and kids “listened to one another” and were able to “take more responsibility for the activities” were typical responses (I-2).

Sharing and working with other teachers: Peer interaction and collaboration (ranging from brainstorming and sharing ideas to team teaching and integrated instruction) were increased and continued in all of the schools. Formal sharing, as done in the TRIAD model, was acknowledged to be one of the most appreciated, valued, and valuable components of the experience, and many of the teachers continued it. Only those teachers whose school format permitted it were able to continue team teaching, however.

Peer coaching: Peer coaching was more successful for some teachers than others, in part because of scheduling difficulties and in part because the teachers felt they needed more assistance in developing their skill and comfort level. A few teachers continued with peer coaching, and several others wished they could.

Data collection: Some teachers continued formally collecting data on their students as they had during the course, but most of them modified it in some way or did not continue. For instance, some teachers kept notes in their lesson books on how students responded, what to do differently next time, and additional ideas. One teacher made a checklist to facilitate “kid-watching” so as not to “miss the kids” (I-2). Several teachers wished they had time to record and analyze their observations, but did not follow through.

Journals: Several teachers continued to keep journals, but most either did not keep journals or substituted “teaching notes” in their lesson plans.

Curriculum decisions: Most of the teachers continued to determine the appropriateness of their curriculum to their students based on what they learned from their own research. They criticized existing curricula and materials for being “memory-oriented” and “not real life” (I-2). Stating this component as a strong point of the project, one teacher commented that it “provides support for curriculum development and change” and that previously “evaluation was driving the curriculum” but now their administrator has agreed “to allow curriculum needs to drive assessment” (I-4). Several of the participants assisted in district curriculum revision and reported that the high school teachers on the committees “were amazed at how much we knew” (I-1). Administrators commented that this cadre of teachers provided leadership for the changes (I-3).

QUESTION #2: What were the barriers that you felt kept you from continuing to use any of the components?

Kinds of barriers: *Time* was the first, most frequent, and most emphatically presented barrier cited in all of the interview groups -- it was a unanimous choice. Overall, the teachers felt that the lack of appropriately scheduled out-of-class time during the school day prevented them from: doing their best for the children in their classes, working together, becoming reflective practitioners, and consistently using some of the TRIAD model components. *Lack of administrator involvement* in the partnership was identified as a potentially crippling barrier by all groups.

Several teachers commented that *lack of confidence in science* was a barrier to them trying new things in their classes, but that this confidence improved as a result of participating in the TRIAD project. One teacher stated a concern about “the misconceptions I may be leading students into” because of inadequate knowledge of science concepts (I-4). Many teachers felt constrained by prescribed *curricula*, mentioning as problems: lists of concepts to be “covered” (whether or not the teachers felt their students were capable of mastering them); lack of supporting information and sample lessons; and lack of materials available to the teachers, especially materials for activities packaged together with good background information about the science concepts. *Class size* was cited as a barrier, with teachers indicating that >24 students was too large and that 15-20 was an optimum size. Several teachers stated that the *next level* (especially high school) could be a barrier (e.g., checklist of skills and prerequisite

concepts students must be “exposed to,” unwillingness of upper level teachers to change teaching strategies and attitudes).

Funding was mentioned because of its relationship to increased class size, fewer aides, loss of professional days and substitute pay, and lack of classroom materials and teacher reference resources. *Parents* were considered to be barriers to implementation of changes by a few teachers. On the other hand, some teachers stated parents were pleased with the changes and that “if we can show the parents it is good for their kids, they will support it” (I-1). For most of these elementary teachers, classroom assessment and grading were not considered to be barriers; however, several cited *achievement tests* as problematic for making curricular changes because the teachers felt obliged to “teach to the tests.”

A few of the teachers mentioned that not teaching the model at the *pre-service* level was a barrier (I-1, I-4), as it is necessary to “get student teachers tuned in” (I-1). Many of the teachers also cited that *reduced presence of university personnel* in a structured way after the course ended was a barrier to implementation and to continued progress and growth. They expressed a desire for more modeling of lessons, more ideas for activities, and more assistance with science concepts, peer coaching, and lesson development. In addition to further assistance with specific components of the TRIAD, it also was apparent that the collegial interaction with university personnel was enjoyable, professionally satisfying, and highly motivating for most of the teachers.

Barriers to the partnership: As stated, lack of participation of the administrators was the primary barrier to a successful partnership. Teachers also wanted the strong participation of university personnel to continue.

Barriers to interviewing: Most of the teachers cited difficulty in finding time to conduct individual interviews because of the structure of their school day. As a result, some of them did group interviews or large group brainstorming instead. An acknowledged drawback to this substitution is that it increases the sense of risk and stress for students who are usually silent or are otherwise reluctant to expose their beliefs. As a result, the teacher may hear primarily from students who are ready volunteers or who already are able to state the “book” words for a concept. Some teachers asked students to write out their ideas, rather than explain them orally, but said they “don’t get the information they need” this way (I-2), and the writing method doesn’t work at all for some students.

Barriers to using the conceptual change teaching model (CCM): The teachers were comfortable teaching concepts they had seen modeled. Many of them felt they needed continued assistance because of the time and feedback needed for them to develop and practice their own lessons. Insecurity about their own knowledge and understanding of science concepts was a barrier. For some teachers, there was an intrinsic barrier -- they were not comfortable using this model because it was too different from their present ways of teaching.

Barriers to sharing: Time and opportunities during the school day were major barriers to sharing sessions; however, the teachers valued this component very highly and most of them found ways to continue, often on their own time. Increased communication, overall, among the teachers was an outcome of the project even for those teachers who did not continue "sharing" in the manner defined by the TRIAD project.

Barriers to peer coaching: For most teachers, time and scheduling were more important barriers than discomfort with the idea of peer coaching. Several teachers said they felt they needed more instruction and practice. Others agreed that it worked best with team teaching.

Barriers to data collection: Many teachers stated that they needed more time for writing down and thinking about their observations than was provided during the typical day; *e.g.*, short planning period, which usually was taken up with other things. One commented that it was difficult to do without the motivation of taking the course. A few of the teachers seem to have drifted from the original concept of this component; that is, actively recording and analyzing what happened in their classrooms as a research base for teaching, curriculum, and assessment decisions.

Barriers to keeping personal journals: Few teachers said they persisted in keeping journals in which to record their activities, insights, and reflections, again because of having to make choices about how to use their time. Several stated it was helpful, but felt that keeping notes in their lesson books was both efficient and useful for them. Most of them still seemed to be uncertain about the role and value of a reflective journal; not thinking of it as their own personal tool (rather than something they did for someone else) was a barrier. The teachers who maintained this component liked it.

Barriers to implementing curriculum decisions: The presence of a prescribed curriculum, the textbook, and next-level testing were mentioned. Administrative support was not a barrier to most of the teachers in this group.

QUESTION #3: What do you think could be done to overcome these barriers?

The positive involvement of the *administrator* was cited repeatedly as a critical factor for success. The teachers felt that tangible support must come from an administrator who understood, as a **participant**, that the TRIAD was “not just another activity-oriented science program” (I-1). Administrative support was deemed essential to provide: time to be professionals both within and outside of their buildings; substitute teachers when needed; opportunities for peer coaching and team teaching; support for the risk of trying new approaches, including having “an unusual looking classroom” (I-1); advocacy with other teachers, parents, the school board, and curriculum committees, especially in support of changes in curriculum and assessment; and opportunities for continued professional growth and leadership. As a result of their participation, the administrators we interviewed felt comfortable with having their teachers institute changes in their own classrooms as well as taking the lead in district curriculum development because they understood the basis for the teachers’ changes.

Unanimously, teachers agreed that they needed *release time* during the school day to implement changes in their teaching and their curricula. Some of this time could come from greater use of *assistants*, such as aides, volunteers, and college student interns to handle non-instructional duties presently assigned to teachers (*e.g.*, recess duty) and to assist in instructional preparation. Most of them also felt that the school day or week needed to be *restructured*. They needed longer preparation periods (more than the 30 minutes they presently have) as well as increased opportunities for collaborative sharing and teaching. All of these changes would permit and encourage the development of strong *teacher teams* for team planning, team teaching, peer coaching, and curriculum development. The development of effective teams would, it was expressed, reduce other barriers to implementation. Some form of departmentalization and moving kids along at their own rates as they progress also were mentioned (I-2).

A continuing, *prolonged relationship between the schools and the university* was cited as an important factor in keeping the changes progressing, helping teachers to continue growing, and expanding the model to new content areas (I-1). Several teachers alluded to the visibility of the university partner as an important incentive for them and for their administrators. A role for the community colleges is presently being explored to help meet this need.

Teachers who lacked strong administrative support

These teachers (I-6) shared some of the same comments as the others, but expressed their greatest barrier was lack of participation from their principal. The project “was not a partnership because our administrator did not get involved ... did not participate ... did not follow through.” Since “the boss did not know what was going on” it was “hard for him to support it.” All of the teachers who participated in the TRIAD project were volunteers, and this group repeatedly expressed disappointment that they had been frustrated in realizing its full potential. They identified the situation as “our problem” but stated that they “would hate to not be able to participate because our administrator did not get involved.”

It seemed that other barriers they had in implementing components of the model were exacerbated by the lack of administrative participation. For instance, they cited a lack of manipulatives and other materials, as well as time to share with each other and to conduct the student interviews. More fundamentally, however, they did not exhibit the confidence the other teachers had developed -- confidence in their use of the CCM or in their ability to make curriculum decisions. Two of them indicated they had hoped for ideas (“wows!”) they could easily plug into their teaching and to “jazz up” topics covered in the text. Two teachers were uncomfortable with the open-endedness of the teaching strategy, expressing a desire “to know what is supposed to happen,” to give “more content,” to reach “closure.”

One teacher felt “afraid to try this model” because of the need to show student performance on end-of-grade-level tests, with this pressure coming from parents who “demand to see the test scores” as well as from school and district levels. They indicated that they had little control over this aspect of their teaching. At one time they were using “observation-based assessments” but then the junior high school and high school made them change to multiple-choice tests. This intervention was resented, as represented in the comment that their school “should keep the high school out of our work.” The comment also was made that the parents are “very traditional” in their views of education, presenting a barrier to change.

In spite of the difficulties, at least one teacher has persisted in consistently using class interviews to find out students’ ideas, keeping a notebook, and sharing with other teachers, noting that there has been more “opening up” among the teachers as a result of the project. This teacher is optimistic that teachers can provide leadership, given support of their administrators and a greater emphasis on the “developmental aspects of education” than at present.

Finally, the affective disposition of this group of teachers deserves comment. In all of the other groups, there were spirited discussions, active engagement of opinions based on experiences, high morale, satisfaction, a strong sense of accomplishment, optimism, enthusiasm, and plans for future actions. The teachers clearly exhibited characteristics of empowerment. By contrast, this group of teachers portrayed discouragement, disappointment, lack of self-confidence, and a sense of disenfranchisement. It was not that these teachers were less talented or committed than their colleagues at the other schools. Their school environment (including parental attitudes) was quite different from the other schools. The largest clearly identifiable variable, however, was the lack of participation of their administrator.

SUMMARY AND CONCLUSIONS

Teachers' perceptions of major barriers to implementation of the TRIAD in-service components in this study were: (1) time during the day for interviewing students, sharing with colleagues, planning, peer coaching, collaborative teaching, lesson preparation and set-up, and developing and using various kinds of assessments; (2) lack of administrator involvement; (3) lack of confidence in science content; (4) existing curricula (including textbooks) and unavailability of key teacher reference resources; (5) class size; (6) next level requirements, expectations, and teachers; (7) funding, especially as it relates to teacher time and opportunities; (8) some parents; (9) next-level tests and standardized tests; (10) lack of teaching the model in pre-service teacher education; (11) reduced involvement by university personnel after the first year.

Assuming the presence of (1) an actively participating and strongly supportive administrator as a first requirement, teachers provided consensus on several major ways to overcome barriers: (2) providing teachers with release time during the school day, including (3) effective use of added personnel (floating substitutes, aides, college students, volunteers); (4) restructuring of the school day to provide for preparation and collaboration, including establishment of a regular team meeting time; (5) development of strong teacher teams for planning, sharing, peer coaching, curriculum development; (6) continued, intensive involvement of the university (or other professional development) partner.

Based on observations of these teachers over a two-year period and the interviews conducted for this study, it is apparent that the TRIAD is an effective in-service model. It is teacher-guided, flexible, immediately applicable, combines theory and practice, and simultaneously provides instruction, modeling, research, and application. Unlike traditional

in-service models, it does not require that teachers take notes and perform isolated activities with the expectations that they then will be able, on their own, to translate and transplant them into their classrooms. This in-service takes place on site and in context -- the instruction, transfer, practice, feedback, analysis, adjustment, and follow-up take place in the teachers' buildings, with their own students, over a prolonged period of time.

Furthermore, the changes initiated during the in-service seem to have been internalized and effectively implemented by the teachers and administrators, the exception being the school where the administrator did not become involved in the partnership. The unanimous acknowledgement that direct administrator involvement is a key factor for success corroborates both the effectiveness of the TRIAD model and the role of administrative support in overcoming barriers to in-service implementation.

Aspects of this study other than barriers will be reported in future papers. It is our intention to continue following the schools, teachers, and administrators who were involved in this project. We also will study TRIAD implementation in other states.

FIGURES

**FIGURE 1. A 6-step Conceptual Change Model (CCM) for teaching and learning
(Stepans, 1991, 1993)**

1. Students *become aware* of their own perceptions about a concept by thinking about it and making predictions (committing to an outcome) before any activity begins.
2. Students *expose their beliefs* by sharing explanations, initially in small groups and then with the entire class.
3. Students *confront their beliefs* by testing and discussing them in small groups.
4. Students work to *accommodate the concept by resolving conflicts* (if any) between their ideas (based on the revealed preconceptions and class discussion) and their observations.
5. Students *extend the concept* by trying to *make connections* between what they have learned in class and other situations, including daily life.
6. Students are encouraged to *pursue additional questions and problems* of their choice related to the concept.

Figure 2. Goals of the TRIAD in-service model

1. Making teachers aware of the research on teaching and learning in science.
2. Teaching teachers how to identify misconceptions in science in themselves, their colleagues, and that could be created by their classroom materials.
3. Teaching teachers how to assess student preconceptions and misconceptions and use this information in curriculum design.
4. Enabling teachers to apply research knowledge about how children learn.
5. Teaching teachers how to teach and assess for conceptual change, explicitly taking into account what students bring to the classroom.
6. Teaching teachers to participate in peer coaching.
7. Empowering teachers to do classroom research and apply the results to their own teaching.
8. Enabling teachers to make critical, professional decisions about what constitutes appropriate content, strategy, and assessment for teaching specific science concepts.
9. Developing strong collaborative teams in schools, with teachers, administrators, and university faculty members working together to improve the learning experiences of children.

Figure 3. Group interview sessions for the present study

Interview I (I-1):	5 teachers
Interview II (I-2):	4 teachers
Interview III (I-3):	2 administrators *
Interview IV (I-4):	4 teachers
Interview V (I-5):	3 teachers
Interview VI (I-6):	1-5 teachers **
Interview VII (I-7):	4 teachers
Interview VII (I-8):	3 teachers
Interview IX (I-9):	2 teachers
Interview X (I-10):	Debriefing with 2 administrators

* An additional administrator was interviewed individually.

** Teachers in this group had not been informed by their administrator that the interview would be a group session. As a result, they were not all present for all of the discussion.

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