



Exploratorium Teacher Institute

Teacher Induction Program Overview

The Exploratorium is an interactive museum of science, art, and human perception, dedicated to fostering learning through exploration. The Teacher Institute (TI), founded in 1984, brings that mission into the classroom by helping middle school and high school teachers deepen their understanding of science concepts and enrich their teaching with hands-on, inquiry-promoting activities. The Teacher Institute offers its member teachers lifelong support in the form of science workshops, summer institutes, and personal contact with the scientists and science teachers on staff.

In 1998, in response to the growing number of new science teachers in local schools and mindful of how difficult it is to retain new teachers, the Teacher Institute created the Teacher Induction Program. The program is designed to support new science teachers in their first two years of teaching (the Beginning Teacher Program) and to train mentors and classroom coaches to work with the new teachers (the Leadership Program). It's an alarming fact that more than a third of beginning teachers leave the profession within the first few years. Research indicates that the single most effective way to prevent this exodus is by supporting the beginning teacher in those early years of teaching.

The Teacher Induction Program is unique in that it is discipline-specific and tries to match mentors and novices closely for curriculum and grade level. Although this is not always possible, a menu approach, which gives new teachers a choice of workshops on a variety of topics, access to mentors and coaches with varied expertise, and access to Exploratorium scientists, ensures that the new teachers get the kind of specific support they need. Our hypothesis was that a discipline-specific program would not only help retain new teachers but would produce effective science teaching practices earlier in a new teacher's career.

Our coaches and mentors, along with the TI staff, take a practical approach to dealing with the difficulties and challenges a new teacher faces, offering concrete support with everything from science content and pedagogy to classroom management to ordering supplies. At the same time, though, we

“In the early design of the program, it was fascinating to watch how much the veteran teachers—mentors and coaches—wanted to share with the novices, as if they could get 28 years of experience condensed into a 30-minute sit-down session! The novices were grateful but overwhelmed, the proverbial drinking from the fire-hydrant problem. Since then, the program leaders have found very clever ways for the mentors and coaches to share their expertise in bits and pieces that perfectly match what the beginning teacher is seeking.”

—Dennis Bartels
Exploratorium Executive Director

try to keep our philosophy of teaching and learning very much in the forefront. And, despite the day-to-day chaos that new teachers often experience, we hope we help them keep in mind the big ideas and ideals of our profession. For it is the awareness of being involved in a profession dedicated to the transmission and nurturing of learning and culture that unites and energizes teachers throughout their careers.

Beginning science teachers learn about the program in a number of ways. The Teacher Institute sends information to local school districts and personally contacts principals, secretaries, and science department heads to identify and recruit new science teachers. Many new teachers find information about the program on the Exploratorium Teacher Institute Web site (www.exploratorium.edu/ti). Teacher Institute alumni, including new teachers who have been through the program, encourage their peers to participate. At this point, many

of the applicants to the program have heard about it by word of mouth.



Among TI's professional community of more than 2,000 veteran science teachers are many seeking a way to pass on their accumulated wisdom and "trade secrets." Each year TI recruits applicants from this community to participate in the Leadership Program for two years. These experienced teachers, serving as mentors and coaches, embrace novice science teachers as members of the Teacher Institute professional community, help introduce them to practices of teaching science as inquiry, and help induct them into the larger guild of the science teaching profession. The veteran teachers are formally prepared

for these tasks in a four-week TI Leadership Institute. Mentors are classroom teachers who lead support group meetings and co-lead Saturday workshops. They are also available to give support by telephone or e-mail. Coaches are retired teachers or teachers on sabbatical who visit the beginning teachers in their classrooms, co-lead the workshops, and attend their new teachers' support group meetings when possible. (A program at another institution might employ one person to fulfill the roles of both mentor and coach.)

Why Experienced Teachers Become Mentors or Coaches

Many people who choose teaching as a career do so because they want to have a positive influence on their community and society at large. They want to share their love of learning and the excitement they feel about the world around them and the accomplishments of scientists, writers, artists, historians, and others. Most teachers, as they become proficient, want to pass on their knowledge to newer members of the profession. They are lifelong learners *and* lifelong teachers!

Most people who join a formal mentoring program have been informally helping new teachers and collaborating with their peers for years. They want to learn more ways to be supportive of new teachers and to discuss ideas and perspectives with others who are in similar roles. They want to become aware of new developments in science and science education, and they seek situations where they will learn alternative curriculum and management strategies. Novice teachers have recently been exposed to new research and modern

“I was interested in becoming a mentor at the Teacher Institute because I had felt so honored and *recognized* as a teacher when I came to workshops here. I wanted to share my enthusiasm and techniques for teaching science with new teachers and to welcome them into the professional group of Teacher Institute teachers.”

—a mentor

techniques for implementing curriculum, and mentors and coaches see that they can learn from the new teachers as well as share some of their experience.

Devoted teachers desire to see their profession stay vibrant; they find satisfaction in the idea of cycling knowledge and skills from older practitioners to the younger members who will carry on the traditions. They want to support new teachers and help them feel that they're valued members of a noble guild.

Mentors and coaches also hope to gain personal satisfaction from the work and from the relationships that develop with the new teachers and among themselves.

Risks and Rewards for Program Participants

Mentoring or coaching may be a desirable and natural direction for an experienced teacher to take, but it's not always an easy transition. Mentoring is new territory for the experienced educator, just as teaching is for the novice. There can be similar risks, problems, and rewards.

Mentors and coaches take risks—the risk of being rejected, of appearing out of touch, of feeling inadequate. A demonstration or model lesson might bomb, or a class may be unmanageable, leaving the coach wondering what kind of help she or he could possibly provide for the new teacher. There could also be communication problems or misunderstandings, or even personality conflicts between the mentor and the new teacher.



Mentors and coaches need to hone their communication skills before approaching the inexperienced teacher to offer help. They need to plan how to put the new teacher at ease, defusing defensiveness and resistance so they can begin to build a trusting relationship as colleagues working together.

New teachers who agree to have a mentor also take on many of the same risks.

They may be afraid to show

an incomplete or inadequate understanding of a concept. There may be equipment in the lab that they don't know how to use. (And little do they know that for many years no one else has known how to use it either!) They may feel that they can't control their class and see it as a personal failing that they're afraid to let anyone else witness.

New teachers see themselves as the helpers of their students, so they may feel uncomfortable with someone helping them. In addition, they don't know if they're doing a good or bad job—they have little experience to judge by, and they're too consumed in getting through the day to see the big picture. There can be a terrible “monster in the closet” for a new teacher, and that monster is the thought that many things are going wrong that they aren't even aware of.

For many new teachers, it's very difficult to find the time and energy for one more thing. What's more, many new teachers don't know what kind of assistance they need, especially in their first year. The numerous demands of curriculum, accountability to standards, classroom management, committee meetings, and students' individual needs are overwhelming, and all

“Starting to work as a coach was a little intimidating at first, but it soon turned out to be one of the most exciting and rewarding jobs I've had. After years in my classroom, getting to visit so many different schools and teachers was exhilarating; sharing teaching ideas and adapting them to different situations gave me a whole new perspective on the teaching profession and the amazing new teachers who are entering it.”

—a coach

seem equally important and time consuming. It takes motivation and a real commitment to the profession for a new teacher to request or consent to be mentored. Mentors and coaches must remember to respect and honor the new teacher for this commitment.

When the mentor-teacher relationship develops and grows, however, it's a rewarding experience for both. The reward for mentors is in seeing novice teachers become proficient in the art of teaching and seeing them develop confidence, become more relaxed, and even have fun! It's a thrill for a mentor when new teachers successfully use strategies and ideas she or he has helped them develop. For the beginning teacher, in addition to benefiting from the help provided, it's rewarding to have an experienced teacher available to share the joys and pains of the first years of teaching.

For both the experienced teacher and the novice, there's a new friendship with someone who shares interests and values, and there's the satisfaction of working together to develop a project or refine a technique. Novices and mentors learn from each other. And there's a mutual respect and acknowledgment of the importance of good teaching.

The Leadership Institute

The four-week Leadership Institute provides training for the mentors and coaches during the summer before they begin their work with the new teachers. The Institute sets the tone for the Leadership Program. It offers an opportunity for the participants to think deeply about teaching as a profession and as an art. The teachers who attend the Institute come from varied personal and professional backgrounds. They are different ages and have diverse opinions. As they share ideas, think about best practice, give model workshops, and remember together their own first years of teaching, they develop a group unity and a common commitment to the program's mission. They become acquainted with each other's strengths, and they ask each other for ideas and support. They see that mentoring a new teacher is a communal effort.

During the Leadership Institute, mentors and coaches learn about the history of mentoring and the unique aspects of mentoring science teachers. They generate ideas about the elements of good teaching, how to incorporate inquiry into the



curriculum, and how to help new teachers fulfill state science standards without "teaching to the test." Participants do Exploratorium activities with Teacher Institute staff, and afterward they think about how an activity could fit into and enrich science curriculum. They discuss a number of readings about educational

issues. A panel of former coaches and mentors comes one day to talk about their experiences and answer questions. All these activities are aimed at helping the mentors and coaches gain confidence in their ability to focus on the new teachers' needs and to develop the knowledge of how to assist them.

Advance questions for the panel members

- What were your hopes and goals when you began a relationship with new teachers? How did your ideas change?
- What did you find to be the common needs of new teachers? Were there differences in their issues between year one and year two? How did *your* issues change between year one and year two?
- What topics worked best for your teachers?
- What made your most effective meetings successful?
- What were the most difficult situations you encountered? How did you deal with them?
- What did you do if you felt frustrated by new teachers not communicating well?
- Did you find that it was helpful to have some generic "stuff" on hand at mentor meetings and coaching visits?

The mentors and coaches learn about their different but complementary roles and about their shared role in leading Saturday workshops for the new teachers during the school year. They generate a list of ideas for the workshops, such as lab safety, classroom management, and exciting lesson starters.

About two-thirds of the coaches and mentors choose to also attend the Leadership Institute prior to their second year in the Leadership Program. The overlap of first- and second-year participants leads to thoughtful conversations about guiding new teachers, and it helps the newer mentors and coaches begin their task with a sense of what they might encounter and how to get over some hurdles. For example, because the coaches are usually considerably older than the beginning teachers, there's the potential for missing cues or misinterpreting messages from each other. The experienced mentors and coaches have learned effective ways to communicate, and they can describe the insights they've developed.

The core experience of the Leadership Institute is the time the mentors and coaches have with about thirty new teachers building "teaching boxes." The new teachers select topics to build a set of lessons around, such as genetics or force and motion. Then two or more mentors or coaches and the new teachers who have chosen the same topic work together for a total of about 16 to 20 hours. They develop or collect curriculum, design assessments, discuss sequencing and big ideas, and collect realia for the lessons. This experience allows everyone to teach and learn, as mentors and coaches share their expertise and new teachers hone their skills. Each day the mentors and coaches have a debriefing session, discussing the accomplishments and frustrations they're experiencing in working with the new teachers. This is invaluable training for the coming two years when they will be going out alone to classrooms or overseeing groups of new teachers at support group meetings.

The first Leadership Institute, held in the summer of 1998, was very different from what it has become. That year the participants made long lists on chart paper of what new teachers should do and what they needed to know. Since then the focus has turned more to what mentors and coaches should do and know, but thinking about the needs of new teachers is still the primary theme. The Leadership Institute continues to evolve, keeping ideas that work, changing those that don't, and incorporating ideas and suggestions from previous mentors and coaches and from the new teachers in the program. This core practice of responding to the participants' feedback and applying their ideas keeps the program alive and gives the participants true ownership of its outcomes.

Structure of the Leadership Institute

The Leadership Institute is four weeks long; the hours are usually from about 11:00 a.m. to 3:30 p.m. The last three weeks of the Leadership Institute run concurrently with the classic TI Summer Institute, which offers workshops on a variety of science and mathematics topics. The novice teachers attend this institute after their first year in the Beginning Teacher Program.

During the first week of the Leadership Institute, we lay the groundwork for mentoring and coaching. Participants spend time thinking about the elements of good teaching, the needs of new teachers, and the roles of the mentor and the coach in supporting new teachers and inducting them into "the Exploratorium way"—which is to provide hands-on experiences of phenomena with simple, inexpensive materials.

We assign homework—articles about best practice in science teaching, and issues in education such as inquiry, differentiation, and English language

“It is more than building a curriculum box—it is the process of the curriculum box. I started to see the linearity of planning a lesson—how to go from A to B.”

—first-year teacher



learners—and the participants write a memoir about their first day or year of teaching. Discussions of the readings lead to understanding different perspectives on educational issues. We have found that providing time for the participants to reflect on these topics and to discuss them with each other is very valuable. Teaching is

still primarily a solitary job, and during the school year there is little time or opportunity for teachers to discuss philosophical ideas with their peers.

On Friday of the first week, the mentors and coaches read their memoirs. Telling these stories creates a feeling of community, and participants learn the power of stories in developing trust.

During the next three weeks, the mentors and coaches give model lessons for the group, they continue their discussions of best practice, and they work with the new teachers making teaching boxes.

The mentors and coaches work in pairs to present a model lesson to the group. We encourage them to work on a prototype pedagogy lesson that they might present to the new teachers in the fall. We want them to think about how to incorporate elements of experiential learning into the lesson. Afterward, the group discusses the lessons.

Mentors and coaches also read scenarios of possible situations they may encounter—based on real experiences of teachers in our program—and discuss what they would do. They triage the problems encountered in the scenario. It's important for mentors and coaches to realize that they can't fix everything, and that they will sometimes feel overwhelmed by the number of things that go wrong or by the difficult working conditions of the new teachers. (See sample Leadership Institute agenda on page 12.)

Teaching Boxes

The idea for teaching boxes came from realizing that most experienced science teachers have closets or garages full of boxes of materials used for teaching different science topics. Often these boxes have copies of the lessons to be used, background information, lists of resources, and so forth. Having mentors and new teachers work together to construct a teaching box gives them an opportunity to discuss the important ideas of a specific topic and ways to sequence and communicate those ideas.

Together, the mentors and new teachers choose activities or labs and create assessment tools based on what the teaching goals are. This gives mentors an opportunity to model how to select the most appropriate activity or lesson from among the sometimes overwhelming variety of resources available. As the mentors and new teachers work, they collect the materials and background information needed to teach the lessons, and put them in the box. We use storage boxes (12" × 15" × 10") that are available at office supply stores.

“Not having had mentoring or coaching, I got caught in a few traps. First, having to finish the curriculum meant calling on the eagers most of the time and not invoking the eight seconds of silence rule for thought before answering. Second, I was of the cultural mindset that ‘if they did it, I have to grade it.’”

—from a memoir

“I used to think that if I were a good teacher I would do these things:

- Be in love with all of my kids. I'm not.
- Never make bad decisions. I do.
- Have all the answers. I don't.
- Erase all issues of discipline. Nope.
- Always move forward. Sometimes I move backwards in one area or another.
- Always know how to help a kid. I don't.”

—from a memoir



At the Exploratorium, we emphasize doing science activities that use inexpensive (or free) and easy-to-obtain materials. Therefore, the boxes may have class sets of film canisters, drinking straws, balloons, and other common materials. The mentors and coaches emphasize concrete, hands-on experiences of phenomena and show the new teachers how to use simple materials to teach real science. The teaching box is also an important organizational structure that keeps related curriculum ideas together, and provides a place to add new activities and resources.

Every summer, we ask the new teachers, “When is your teaching box finished?” and we hope they answer “Never!” Teaching boxes are works in progress. During the

school year, the classroom coaches can help teachers organize their materials into teaching boxes at the beginning or end of a unit. (See The Teaching Box on page 21.)

New Teacher Orientation

Early in the school year we hold a Beginning Teacher Orientation Day. The morning is spent introducing all the first-year novice teachers to the Exploratorium and informing them of the program requirements and benefits—“administrivia.” At lunchtime the second-year novice teachers and the mentors and coaches arrive, and everyone has lunch together.

The new teachers sign up for fall workshops, people who will be in the same support group meet each other, and mentors and coaches introduce themselves to the new teachers and tell them what special expertise they can offer. The day helps start the year on a positive note—all the teachers feel appreciated, and the new teachers see that the Teacher Institute staff and the mentors and coaches want to do everything in their power to make their first years of teaching successful and fulfilling. (See Beginning Teacher Orientation Day agenda on page 22.)

Support Groups

One of the requirements of the Beginning Teacher Program is that the new teachers attend at least two mentor-led support groups per semester. We prefer that they attend regular meetings, and some groups meet monthly with great success. But many new teachers are overburdened and overcommitted and feel they cannot attend support group meetings that frequently.

Each mentor is assigned a group of six to ten new teachers. The groups are based on a number of variables, such as grade level, subject area, and kind of school, public or private. We’ve found an important factor in promoting attendance at the support group meetings is location. New teachers just don’t have the time to drive very far to attend group meetings. We usually pair

“I definitely used my box. . . . When it was time to bust it out, I was so relieved to have everything that I needed for the whole week right in there.”

—first-year teacher



two mentors on Orientation Day when they meet their new teachers, and they can decide whether to schedule meetings together or separately. Sometimes mentors find that they can build a relationship with their new teachers via phone or e-mail.

During the Leadership Institute we will have dis-

cussed and listed numerous possible topics for group meetings. We also have an evolving list of suggestions for meeting locations, such as at the different teachers' schools. In addition, we will have talked about the importance of valuing and protecting the confidentiality of the support group participants.

Coaching Visits

Coaches have a group of nine to eleven new teachers. The new teachers receive a minimum of two coaching visits per semester for both years. Coaching visits can take many forms, including a classroom observation, a demo lesson given by the coach, a lesson taught jointly by the coach and new teacher, or a session with the coach and new teacher planning curriculum or discussing a particular issue. As the beginning teacher and the coach form a relationship, they can better decide the most appropriate focus for a coach's visit. Planning for coaching visits and follow-up discussions can be done via e-mail, which seems to be the most effective way of communicating with the beginning teachers.

We've found that the needs of the new teachers change as they progress from year one to year two. The first-year teachers may require more visits than those teaching for their second year; however, sometimes they're more reluctant to let the coaches into their classrooms, and they don't respond to solicitations from the coaches. The coach may need to take the initiative and suggest visiting at a particular time.

Mentor and Coach Reports

Whenever a coach visits a new teacher, or a mentor has a support group meeting, he or she files a report form, which can be downloaded from the TI Web site. The forms include the date, time, location, and topics addressed. The TI Leadership Program staff read the reports to keep up with what's going on with the new teachers and the mentors and coaches. A mentor or coach can request help by checking a box on the form. Filing these reports in a timely manner is very important, as that's the way the TI staff finds out about problems that require intervention or special kinds of support, either for the new teacher, or for the mentor or coach. Also, coaches and mentors can tell the staff about notable accomplishments of the new teachers, and we can all celebrate!

New Teacher Workshops

One of the most successful components of the Teacher Induction Program is the series of workshops held during the school year. The Teacher Institute has been offering science content workshops on Saturdays for more than twenty years, and many teachers have been coming to at least one workshop a year



for a long time! But when we started the Beginning Teacher Program, it soon became evident that there were other areas, such as classroom management, lab safety, and long-term planning, in which most new teachers needed support and ideas.

Coaches and mentors work together to plan and teach the workshops. The goal is to model best practice teaching techniques at the same time as passing on

valuable information. Many topics, such as classroom management, come up every year. These reflect basic, obvious, new teacher needs. But other topics, such as grant writing or sex education for middle school, are products of a specific group of mentors and coaches. There seems to be a difference in the workshops attended by year-one and year-two new teachers, with the second-year teachers choosing fewer management-oriented offerings.

The structure of the workshops varies according to the subject matter, but the basic agenda generally includes the following:

- opening introductions
- overview
- activity
- handout
- discussion
- wrap-up and networking (sharing e-mail addresses and resources)

We've found that the new teachers are highly interested in hearing how their peers are solving problems that they share. So there's always time for discussion and networking at the end of the workshop.

The two-hour workshops are usually offered on Saturdays, after Teacher Institute content workshops. New teachers are required to attend two of these workshops per semester. Lunch is provided—sandwich fixings, chips, and so forth, and that boosts attendance. (See Sample New Teacher Workshop Topics on page 23.)

Support from the Teacher Institute Staff

Historically, Teacher Institute staff—scientists and teachers—have visited classrooms on request to work with teachers on specific science topics. Since the advent of the Beginning Teacher Program, there is a greater demand for these visits. The new teachers are encouraged to ask staff scientists questions and to use them as a resource.

The mentors and coaches, too, are encouraged to use the resources of the Teacher Institute in their work with the new teachers, whether it means



discussing a science issue, getting ideas for classroom management, or asking someone to visit a classroom. TI staff help the mentors and coaches prepare for their workshops, and they attend support group meetings when possible.

In addition, when the new coaches first go out to classrooms, a TI staff member or an experienced coach accompanies them. After the visit, the two discuss the session and prioritize the new teacher's needs and requests. It's helpful and reassuring for the new coaches to have this support at the beginning.

Midyear Coach Meetings

About twice a year, in midsemester, TI staff from the Leadership Institute meet with the coaches. The purpose of the meetings is to find out how the year is going for them, give them a chance to share stories with each other, and generally take the pulse of the program. Although there are common needs that new teachers face every year, we have also found that each year is different in tone. We encourage the coaches to notice the differences in requests and needs of the beginning teachers in year one and year two, and we ask them to share strategies that are working for them in helping the new teachers. The conversations at these meetings get to the heart of the program. Veteran teachers examine the difficulties and pleasures of passing on their expertise. They show compassion for teachers starting out in the difficult situations that many face today. They commiserate and take comfort from each other in how much work it is to initiate and nurture small changes. And they celebrate success stories. These coach meetings provide a structure for communication among the coaches and promote the sharing of their knowledge and skills.

Festivities

In December, and at the end of the school year, the Teacher Institute sponsors a party for the mentors and coaches. The main purpose of these events is to show our appreciation, but at the winter event we also ask the group to decide on a list of workshop topics for the spring semester. Mentors and coaches schmooze, talk on and off topic, and reconnect with TI.

The June party allows us to say a formal thank-you to the “graduating” mentors and coaches who have been with us for two years. We can't pay them much, but we really do respect their work!

Growth of New Teachers over the Two-Year Period

The beginning science teachers who join the Exploratorium program are enthusiastic, tend to overprepare, may plan to “cover” a topic without respect to the students' background information, schedule more teacher talking than student activity, and tend to be unfamiliar with using or organizing hands-on activities.

Some see coach visits as a possibly intimidating evaluation, and they may prepare a special lesson for the coach's visit. They are often unable to identify the kind of help they need.

By the second year, new teachers become more confident, more focused, and better able to specify what kinds of help they would like. At the end of their first year of teaching, or after their first summer workshop, many evaluate their teaching experience and decide on changes for the future or a new focus. They have accumulated more materials in their classrooms. They are less threatened by students' talking during activities and labs. Second-year teachers are more willing to share a "regular day" with the coach, who they now tend to view more as a colleague than evaluator.

Growth of Mentors and Coaches over the Two-Year Period

We see many positive changes in the new teachers during their time in the Beginning Teacher program. We also see changes, albeit more subtle, in the mentors and coaches over the two-year period. As they work with the new teachers, mentors and coaches remember what it's like to be a new teacher. Their confidence increases as they find the needs of new teachers are often similar, and that they have a repertoire of skills to offer. They notice that their own classroom management skills are broadened and reinforced as they apply them to different situations. Mentors and coaches find that their ability to work productively with colleagues is enhanced by working with the new teachers, and that their perspective on mentoring may change as well. As one mentor said, "In the second year I talked less and listened more." The experiences of the mentors and coaches and the problems that they encounter are the basis of important contributions to the Leadership Program.

**Exploratorium Teacher Institute
Leadership Institute
June 19–July 13**

Week One**Tuesday, June 19: Introduction**

11:00 a.m.	Welcome, name tags, bagels, etc.
11:30 a.m. to 12:30 p.m.	A TI staff member will go low-tech with a high-tech concept, using agar and food coloring to demonstrate gel pheresis.
12:30 p.m. to 1:00 p.m.	<p>Introductions.</p> <p>Discuss the history of mentoring, including a brief overview of the Exploratorium’s program and its unique aspects.</p> <p>Read Exploratorium founder Frank Oppenheimer’s inspiring speech, <i>Living a Fruitful Life</i>.</p>
1:00 p.m. to 1:30 p.m.	Break/lunch
1:30 p.m. to 2:00 p.m.	What constitutes good teaching? Make a list.
2:00 p.m. to 3:00 p.m.	<p>Administrivia. Go over the schedule and highlight important points:</p> <p>Memoirs: Participants are asked to write a 1–2 page memoir of their first days or first year as a teacher to be read on Friday, June 22.</p> <p>New Teacher Workshops: Starting next week, participants will work with a partner to choose a topic and develop a 30–45 minute presentation. The actual workshops during the school year will be two hours long; the purpose of this exercise is to get feedback from the group, including suggestions of things to include, and to get a feeling for presenting to other teachers.</p> <p>On Friday, June 29, mentors and coaches may present a 10–15 minute mini-lesson or activity. This is <i>optional</i>. On subsequent Fridays, mentors and coaches will attend the classic TI Summer Institute workshops to observe or help out with novice presentations.</p> <p>Iron Science Teacher Webcasts: Mentors and coaches are encouraged to join the competition for the “iron science teacher” title by creating activities using a “secret” ingredient. The Webcasts will be Fridays at noon on June 29, July 6, 13, and 20. (URL for archived Iron Science Teacher Webcasts: http://www.exploratorium.edu/webcasts/archive.php?cmd=browse&project=11.)</p> <p>On Monday, July 9, we will present a “First Day Fair.” Mentors and coaches will model or show activities that they use during the first days of the school year.</p>

The shop will be open next week, and participants may build a shop project if they wish. (Shop hours: M–F, 10 a.m.–4 p.m.)

There will be homework some days—mostly reading articles about mentoring and teaching practice that will usually be discussed the next day. Everyone is welcome to bring in resources/readings that would benefit the group.

Note that a visit to RAFT (Resource Area for Teachers) is scheduled for **July 3**. Participants are invited to present an activity or demonstration using RAFT materials, but this isn't mandatory.

3:00 p.m. to 3:30 p.m. We'll go on a floorwalk to see new exhibits.

Handouts

(See citations for selected Handouts on page 24.)

1. Agenda
2. Special Dates and Times to Remember
3. Field Trip and Pathways information
4. Frank Oppenheimer's Living a Fruitful Life speech
5. List of required elements for new teachers
6. Five Things to Expect from Mentoring and Coaching
7. Things to Remember about Mentoring
8. The Role of the Mentor
9. "Qualities of Best Practice in Teaching Science"
10. "A Science Teacher's Characteristics"
11. *Science Content Standards for California Public Schools*

Homework

- Begin writing memoir, due Friday, June 22.
- Begin reading *Science Content Standards*. California Frameworks are also available for anyone who's interested.
- Read "Best Practice" and other articles.

Wednesday, June 20: Roles of the Mentor and the Coach

11:00 a.m. to 11:15 a.m. Discuss the articles about mentoring.

11:15 a.m. to noon

Discuss the roles of mentors and coaches.

- What are the qualities of an effective mentor, and what are the expectations of mentors? Look at "Things to Remember about Mentoring" and "The Role of the Mentor" from yesterday's handouts.
- What kinds of things do we expect to see in new teachers' classrooms?
- What needs do we anticipate their having, both inside and outside of class? Begin a list.
- How can we assist beginning teachers? What are our priorities? Are they the same as the new teachers' priorities?

- What kinds of changes would indicate the new teachers are benefiting from the program?

(We'll continue this tomorrow.)

noon to 1:00 p.m.	Science Colloquium: We'll join Exploratorium staff members at the weekly colloquium to hear a talk about Pluto's status as a planet.
1:00 p.m. to 1:30 p.m.	Break/lunch
1:30 p.m. to 2:30 p.m.	The director of the Teacher Institute will talk about the Beginning Teacher Program.
2:30 p.m. to 3:00 p.m.	We'll visit the Learning Commons (library). Summer hours are M–F, 10 a.m.–4 p.m.
3:00 p.m. to 3:30 p.m.	We'll add to our “good teaching” list. We'll read some memoirs from past Institutes if time allows.

Handouts

1. “To Hypothesize or Not to Hypothesize”
2. “A Testable Prediction”
3. “Teaching Skills for a Successful Thinking Classroom”
4. “The Right Question at the Right Time”
5. “Beyond Support: Taking New Teachers Seriously as Learners”
6. “California Standards for the Teaching Profession” (edited version)
7. The Mentoring Guide
8. The Coaching Guide

Homework

- Read articles, guides
- Continue reading standards
- Continue writing memoirs

Thursday, June 21 (Summer solstice!): Coaching and Mentoring

11:00 a.m. to 11:30 a.m.	Discuss readings, in particular the “Beyond Support . . .” article, then continue yesterday's discussion about the kinds of changes we hope to see.
11:30 a.m. to 12:30 p.m.	A TI staff member will demonstrate how to make a podcast, a tool that TI is beginning to use.
12:30 p.m. to 1:00 p.m.	Make a chart of “Desired Outcomes” for new teachers, and decide which can be achieved in year one and in year two. What kind of support is needed to achieve the stated goals? Look at the “Help with Classroom . . .” handout and fill in ideas for each topic.
1:00 p.m. to 1:30 p.m.	Break/lunch

1:30 p.m. to 2:00 p.m. Introduce generic fall workshop topics for modeling. We'll schedule presentations tomorrow with mentors and coaches working in pairs. We'll make our specific list of fall offerings later.

2:00 p.m. to 3:30 p.m. Look over and discuss "Phases of First-Year Teaching." Begin to go over the Mentoring Guide and the Coaching Guide.

Look at the "California Standards for the Teaching Profession." How do these goals for teachers apply to our program? Discuss how they're used in new teacher induction programs.

Handouts

1. "The Pleasure of Finding Things Out"
2. "12 Small Steps toward Change"
3. New Teacher Needs Assessment / Typical Needs of a New Teacher
4. Ways a Mentor or Coach Can Assist a New Teacher
5. Coaching Skills / Coaching Strategies / Help with Classroom
6. "Phases of First-Year Teaching"
7. Schedule of Coaching

Homework

- Memoirs are due tomorrow!
- Readings

Friday, June 22: The Teaching Box

11:00 a.m. to 11:30 a.m. Sign up to present model workshops.

Discuss the readings. How can mentors and coaches use the New Teacher Needs Assessment?

11:30 a.m. to 12:30 p.m. The Teaching Box: What is it, why do we make it, what's its "structure"? Refer to the handout. Remember to include standards and assessments. Show models. Discuss making CDs instead of binders for boxes. How do we get supplies for the boxes? (We'll have a stock of generic supplies.)

Sign up for Teaching Box topics, at least two people per topic.

Mentors and coaches should prepare one lesson or activity to present the first day to jump-start things. (Make a list of supplies you need us to get for you.) Also collect relevant resources for the new teachers to peruse.

12:30 p.m. to 1:30 p.m. Library research time.

1:30 p.m. to 3:30 p.m. Lunch and reading memoirs at Fort Mason.

Handout

The Teaching Box

Week Two

Monday, June 25: Panel of Coaches and Mentors

11:00 a.m. to 11:30 a.m.	Check-in, questions about last week or this week. Talk a little about Michigan State University's work with us.
11:30 a.m. to 12:30 p.m.	Teaching box prep.
12:30 p.m. to 1:30 p.m.	Panel of former coaches and mentors will discuss their experiences and answer questions.
1:30 p.m. to 2:00 p.m.	Break/lunch with former coaches and mentors.
2:00 p.m. to 2:30 p.m.	Briefly discuss model workshops, then watch video of a new teacher workshop.
2:30 p.m. to 3:00 p.m.	Prepare for teaching box activity, lesson, and First Day Fair.
3:00 p.m. to 3:30 p.m.	A TI staff member will talk about curriculum guides.

Handout

Giving New Teacher Workshops

Tuesday, June 26: First Day with New Teachers

11:00 a.m. to noon	Prepare for working with the new teachers on the teaching boxes, including an introductory generic activity. By tomorrow, you should be working on contents of the boxes. There shouldn't be more than one day of discussion about the subject of the boxes.
noon to 2:00 p.m.	Begin working on the teaching boxes with the new teachers.
2:00 p.m. to 2:30 p.m.	Break/lunch
2:30 p.m. to 3:00 p.m.	TI staff members will talk about reporting forms, TI listservs "Pinhole" and "Newbies," and how to apply for college credit.
3:00 p.m. to 3:30 p.m.	Debrief the first day with the new teachers. Scenario: "Teacher A."

Handouts

1. "Teacher A"
2. Coach/Mentor report forms

Wednesday, June 27: New Teacher Workshops

11:00 a.m. to noon	Discuss adult learning and giving workshops for new teachers.
	Generate list of fall New Teacher Workshops and who will give them.
	Review Michigan State University's workshop evaluation form that the new teachers will fill out.

noon to 2:00 p.m.	Work on teaching boxes.
2:00 p.m. to 2:30 p.m.	Break/lunch
2:30 p.m. to 3:30 p.m.	A model workshop presentation and discussion.

Handout

“Adult Learning”

Thursday, June 28: Support Groups

11:00 a.m. to 11:30 a.m.	Discuss Support Groups. (Note that it's mandatory for the new teachers to attend a minimum of two support group meetings per semester.) Ideas for making them work—see Ideas for Support Group Meetings handout and the Mentoring Guide. Talk about how to contact teachers, meeting topics, schedules, and meeting places. “Master calendar” idea. The importance of reporting. (Note: We hope to have occasional meetings with mentors on Saturdays.)
11:30 a.m. to noon	A TI staff member will explain how to have online meetings with camera-equipped computers.
noon to 2:00 p.m.	Work on teaching boxes.
2:00 p.m. to 2:30 p.m.	Break/lunch
2:30 p.m. to 3:30 p.m.	Check-in regarding the status of the teaching boxes. A model workshop presentation and discussion. Introduce topics for Friday: misconceptions, assessment, hands-on science, and the multicultural classroom.

Handouts

1. Ideas for Support Group Meetings
2. Postcards, badges
3. “Modern Myths Taught as Science”
4. “Misconceptions as Barriers to Understanding Science”
5. “Misconceptions and Conceptual Change: An Introduction”
6. “Assessing Student Learning”
7. Basic Science Processes: Definitions and Indicators
8. Teacher’s Guide for a Performance Test of Measuring

Homework

Readings

Friday, June 29: Misconceptions and Assessment

10:00 a.m. to noon or 2:00 p.m. to 4:00 p.m.	Attend half-day sharathon in the classic TI Summer Institute, either morning or afternoon.
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noon to 2:00 p.m.	We'll discuss misconceptions and assessment based on the readings. A TI staff member will show how to use a camera to record New Teacher Workshops and classes.
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Week Three

Monday, July 2: New Teacher Needs

11:00 a.m. to 11:30 a.m.	Discuss new teacher needs. Refer to and update list. How to triage a new teacher's needs. Different needs between first- and second-year teachers.
11:30 a.m. to noon	Prep for box-making.
noon to 2:00 p.m.	Teaching boxes. NOTE: At 12:15, a new teacher from last year will talk about her teaching box.
2:00 p.m. to 2:30 p.m.	Break/lunch
2:30 p.m. to 2:45 p.m.	Science teaching methodology: How do we communicate what we know? How do we prioritize what information and advice we give new teachers?
2:45 p.m. to 3:30 p.m.	A model workshop presentation and discussion. Set up carpools for tomorrow's trip to RAFT. List who will be presenting there.

Handouts

1. Student-Centered Notebooks
2. Directions to RAFT

Tuesday, July 3: RAFT

9:00 a.m. to 3:00 p.m.	Meet at RAFT to buy stuff for your own classrooms or help new teachers choose things they can use. Some mentors and coaches will demonstrate activities that can be done using RAFT materials.
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Wednesday, July 4: Holiday

Thursday, July 5: Teaching Boxes and Model Workshops

11:00 a.m. to noon	Debrief visit to RAFT. Prep for working on teaching boxes. Teaching box materials lists must be turned in today!
noon to 2:00 p.m.	Work on teaching boxes.
2:00 p.m. to 2:30 p.m.	Break/lunch

2:30 p.m. to 3:30 p.m. Two model workshop presentations and discussion.

Handouts

1. "Anti-Racist Education: Pulling Together to Close the Gaps"
2. "Some Thoughts about Culture and the Preparation of Teachers for Urban Classrooms"

Friday, July 6: Hands-On Science and the Multicultural Classroom

**10:00 a.m. to noon or
2:00 p.m. to 4:00 p.m.** Attend classic TI Summer Institute workshops, either morning or afternoon.

noon to 2:00 p.m. Discuss topics of the day.

Week Four

Monday, July 9: First Day Fair

11:00 a.m. to noon. Work on teaching boxes with new teachers from morning workshops. If you're not needed, you can work on your own projects.

noon to 12:30 p.m. Prepare for First Day Fair.

12:30 p.m. to 1:30 p.m. First Day Fair.

1:30 p.m. to 2:00 p.m. Break

2:00 p.m. to 3:00 p.m. Work on teaching boxes with new teachers from afternoon workshops.

3:00 p.m. to 3:30 p.m. Debriefing.

Tuesday, July 10: Teaching Boxes and Model Workshops

11:00 a.m. to noon. Prep for working on teaching boxes.
Develop tentative support group schedules and topics list.

noon to 2:00 p.m. Work on teaching boxes. Teaching box sharing is tomorrow!

2:00 p.m. to 2:15 p.m. Break/lunch

2:15 p.m. to 3:30 p.m. Two model workshop presentations and discussion.

Wednesday, July 11: Teaching Box Sharing

11:00 a.m. to noon Get ready for the teaching box sharing.

noon to 2:00 p.m. Teaching box sharing.

2:00 p.m. to 2:30 p.m. Break/lunch

2:30 p.m. to 3:30 p.m. Debrief teaching box sharing.

Set up carpools for tomorrow's trip with Canoes in Sloughs (Save the Bay).

Handout

Directions to Canoes in Sloughs site

Thursday, July 12: Canoeing

10 a.m. to 3:00 p.m. Canoeing with Canoes in Sloughs.

Friday, July 13: Last Day

11:00 a.m. to noon Wrap-up, final lists, comments.

noon to 1:00 p.m. Iron Science Teacher.

1:00 p.m. Potluck picnic.

Thank you for coming to the Institute! We'll see you soon!

The Teaching Box

The teaching box is an organizational tool that has been used in different forms by teachers for many years. The more you teach, the more ideas and materials you will accumulate. The teaching box helps you organize your ideas and your materials, and it allows you to expand and modify the original body of work. The teaching box gives you the opportunity to create something that is totally your own, designed by you to meet the needs of your classes and curriculum. It is never “done”—it’s a work in progress!

The teaching box consists of a storage box (12" × 15" × 10") that includes the following:

- I. **A binder or CD** containing the following items in the order listed:
 - A. Title page and table of contents
 - B. Background information to review in preparation for teaching the unit
 - C. Two materials lists (also attached to inside of box top):
 1. Nonconsumable materials—those materials that are included in the box and can be used year after year
 2. Consumable materials—those materials that you will have to gather each time you teach the unit
 - D. All of the lessons in sequence
 - E. Assessment tools
 - F. Connections to the standards
 - G. Connections to other subject areas
 - H. A list of resources that might include any of the following: books, Web sites, videos or DVDs, guest speakers, and field trip destinations
- II. **The stuff:** Class sets of tools built by the teacher, demonstration equipment, samples of materials needed for lessons, posters, and CDs, slides, or other audiovisuals

**Beginning Teacher Orientation Day
Saturday, September 15**

- | | |
|-------------------------------|--|
| 9 a.m. to 10 a.m. | Breakfast, registration forms
Exhibit tour—Soap Film Painting |
| 10 a.m. to 11 a.m. | Staff introductions
Overview, program requirements, university credit
Learning Commons (library) tour
Break |
| 11 a.m. to noon | Orientation to NSF research/consent forms
Science activity—Soap Films
TI online resources: snacks (activities);
Pinhole and Newbies (listservs) |
| noon to 1:15 p.m. | Support group lunch <ul style="list-style-type: none">• <i>Set date for mentor meetings</i>• <i>Sign up for Saturday workshops</i> |
| 1:15 p.m. to 2:15 p.m. | Introduction to the “Coached Lesson Series” <ul style="list-style-type: none">• <i>What you’ll do and how you will be supported</i>• <i>January orientation</i>• <i>Pick your lesson topic</i> |
| 2:15 p.m. to 3:30 p.m. | Science supply giveaway and teaching scenarios
About communications
Questions and answers |

Sample New Teacher Workshop Topics

Classroom Management

“Taming the Paper Tiger”—Paper Management
Getting Ready for Hands-on Activities
The Unmotivated Student
Dealing with Nonacademic Problems in the
Classroom
Cooperative Learning

Labs

Lab Safety
Managing Materials and Time from One Lab
to the Next
How to Use the Equipment in Your Lab

Science Methodology

Rethinking the Scientific Method
Exciting Lesson Starters

Cross-Disciplinary Connections

Reading, Writing, and Teaching Strategies for
All Students
Literacy Strategies in the Science Classroom
Math/Science Connections
Sex Education in the Middle School

Assessment

Grading and Assessments
Assessment and Rubrics
Grading, Rubrics, and Study Skills

Planning

Unit Planning and Long-Term Planning
Planning Your Year
Getting Ready for Another Year
End-of-Year Activities
Planning for a Sub

Miscellaneous

Parent Communications
Using Technology
Shopping for Science
Perks for Teachers

Citations for Selected Handouts

Note that the handouts change somewhat from year to year, depending on the interests of the particular group.

“12 Small Steps toward Change.” In *ENC* (Eisenhower National Clearinghouse) *Focus* 7 no. 1, 2000, 38.

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Galus, Pamela J. “A Testable Prediction.” *The Science Teacher*, May 2003, 10.

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“Misconceptions as Barriers to Understanding Science.” Chapter 4 in *Science Teaching Reconsidered: A Handbook* by National Research Council. Washington, DC: National Academy Press, 1997. Also available online at <http://www.nap.edu/readingroom/books/str/4.html>.

“The Pleasure of Finding Things Out.” In *The Pleasure of Finding Things Out: The Best Short Works of Richard P. Feynman* by Richard P. Feynman. Cambridge, MA: Helix Books, 2005.

Oppenheimer, Frank. “Living a Fruitful Life.” *The Exploratorium*, March 1985, 27–28. Also available online at www.exploratorium.edu/frank/living_a_fruitful_life/living_a_fruitful_life.pdf

Pine, Jerry. “To Hypothesize or Not to Hypothesize.” In Chapter 7 of *Inquiry: Thoughts, Views, and Strategies for the K–5 Classroom*. Foundations, vol. 2. Arlington, VA: National Science Foundation, 1999. Also available online at http://www.nsf.gov/pubs/2000/nsf99148/ch_7.htm.

Science Content Standards for California Public Schools, Kindergarten Through Grade Twelve. Sacramento: California Department of Education, 2000.

Things to Remember about Mentoring. From *Mentor Teacher: A Leader’s Guide to Mentor Training*, Judith Warren Little and Linda Nelson, editors. San Francisco: Far West Laboratory for Educational Research and Development, 1990. The book is out of print, but full text is available through ERIC.

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