Frequently Asked Questions About Research In The Fulcrum Institute[1]

January, 2006

Q1: I teach science in a Boston-area school and I am also a graduate student in the Fulcrum Institute. Does my work contribute to the science education research in the Fulcrum Institute?

A1: Yes, your contributions are very important. Fulcrum participants contribute in several significant ways to the research:

a. They answer questions about weekly lessons; this helps the Fulcrum Developers[2] improve the online lessons and face-to-face sessions of the Institute.

b. Participants and their principals take part in yearly interviews; this helps the External Evaluation[3] team understand the impact the program is having on teachers and their schools.

c. Once a year a science class you teach is videotaped by members of the Fulcrum Research Team[4]. These videotapes, approved by you for release, help the Research Team study the processes of science learning in real classrooms. They help the External Evaluation team study changes in teaching over time. Participants themselves determine whether or not tapes will be shown to others outside the project. You will always be given a copy of the tape of your class. (The tapes are used exclusively for research and professional development; they are not given to principals, superintendents or others involved in the hiring or evaluation of the respective teachers.)

d. Participants take part in the Summer Session and course launches, during which data are collected (videos of presentations and group discussions, questionnaires); this helps the Developers and Researchers improve the course and to understand how learning happens in a professional development setting.

e. Some Fulcrum teachers also volunteer to take part in activities such as interviews with scientists and science education researchers. Such interviews contribute to the research initiative of the Institute; they may also contribute to face-to-face sessions.

---

[1] Prepared by David W. Carraher, Director of Research, The Fulcrum Institute.

[2] Fulcrum Developers are the folks who put together the courses the teachers take. They include Sue Doubler (Director), Sarah Lacey, Sally Crissman, Katherine Paget, and other people at TERC in Cambridge, MA.

[3] The External Evaluator for the Fulcrum Institute is INCRE, a team of specialists in project evaluation located in Arlington, MA. It is headed by John Zuman, and includes Claudette Fongkong-Mungal

[4] Fulcrum Researchers include researchers from TERC and Tufts University: David Carraher (Director), Tracy Noble, Dan Cogan-Drew, Paul Wagoner, and 2 graduate students in Education from Tufts: Chunhua Liu, and Manasa Chakravarti.

Q2. Does the research of the Fulcrum Institute contribute to my professional development?

A2: Yes. Here are a few ways in which the research you take part in can contribute to your professional development.

a. You receive copies of your classroom videos for your own use and so you can reflect on them and learn from them. Some teachers like to share the videos with their students; others may wish to discuss them with colleagues or show examples of their classroom activities to the parents of their students. As you collect examples of teaching over the years you may wish to keep them together as a portfolio of your own teaching and development.

b. From time to time you may receive the opportunity to hold discussions with scientists or others. The discussions may be about your own classes or classes of other colleagues who have allowed their research to be discussed. Whenever you take part in an interview with a scientist, you receive a video copy of the discussion/interview which you can use for your own professional purposes.

c. Participants at the face-to-face sessions of the Fulcrum Institute may benefit from videos that teachers have chosen to share with their colleagues. (Those in cohort 1 will remember how Andre's video clips from his first-grade classroom, about forces involved when a student pushes another student in a chair, made a memorable contribution to the January, 2006 meeting.)

d. Sometimes the Research Team will share video clips of interviews with scientists or with children in order to ground discussions in Fulcrum Courses or in face to face meetings. The video clip about a young student's (Drake's) understanding of density contributed to the Summer 2005 Session of the Institute. The Alisha video made its way into Course 2 of the Institute. As the Research Team conducts future interviews with students and scientists, these will make their way into courses and presentations.

e. The Fulcrum Institute invites scientists to share ideas and reflections about research with Fulcrum participants at occasional Fulcrum Colloquia. In recent months, Dr. Tamara Ledley (TERC) and Dr. Bill Moomaw (Tufts University) gave fascinating colloquia about Global Climate change. Such presentations not only benefit the Fulcrum teachers. They provide occasions of learning for all other members of the Fulcrum Institute, including the Developers, the Researchers, and the Fulcrum Scientists[5] themselves.

[5] Fulcrum Scientists include physicists and others who contribute in diverse ways to the Institute. Fulcrum Scientists include Judah Schwartz (Principal Investigator of the Fulcrum Institute), Gary Goldstein, Roger Tobin, Esther Zirbel, and Bill Waller. Fulcrum Scientists join the Developers, Researchers, and Educators in the monthly meeting of the Science Working Group (SWG), where the scientific and pedagogical content of the Fulcrum courses undergoes intense discussion and scrutiny.

3. What I am I expected—that is, required--to do regarding research of the Fulcrum Institute?

Several things are required of all Fulcrum Participants[6]. Some of these, such as participating in the online discussions, happen automatically by virtue of your involvement in the Fulcrum courses and the face-to-face sessions. Three special kinds of contributions take place in your own school.

a. Interviews with the External Evaluator. Once, and in certain cases twice during the year [for example, in January, 2006], you will be contacted by a staff member from INCRE[7] in order to take part in an INTERVIEW. The interview, which takes one or two hours of your time, helps the External Evaluation team 'check the pulse' of the Fulcrum Institute by touching base with various agents in the Institute. (Similar check-ins are done with school administrators as well as Fulcrum Scientists, Educators[8], Researchers and Developers.) By default, the results of these interviews are anonymous. If you come across quotes from Fulcrum participants in publications or recruitment brochures, you can be certain that those teachers have given prior specific authorization for their names to be used in those contexts.

b. Classroom observations made by the External Evaluator. Each year [in 2006, during January and February], a member from INCRE will contact you to schedule classroom observations of a science class that you teach. The classroom activities are coded on a number of dimensions having to do with the use of time, the engagement of children in science, and kinds of things talked about. Teachers are not individually ranked or judged. No performance data of individual teachers or students is turned over to principals or other school administrators. At the level of individual teachers, classrooms, and schools, all data is strictly confidential. Certain conclusions will be drawn about aggregate data. For example, the External Evaluator may wish to make some general statements about how the apportionment of time spent in science classes varied throughout the project. Likewise, it may make inferences about the how the questions teachers raised in science classes underwent transformations as the teachers progressed through the Fulcrum Institute. But, as in all such cases, these are about collective changes. When specific observations are written about, they are done so without identifying the teachers, schools, and students involved.

c. Video-taping of classrooms. Once per year [in 2006, sometime between March and June], a member of the Fulcrum Research team (not the External Evaluator) will contact you in order to schedule a taping of one of your science lessons. You may determine the content of the lesson. It may or may not correspond to the science content under discussion in a Fulcrum course. The

---

[6] Fulcrum Participants are the teachers, like you, who have enrolled in the Fulcrum Institute. Terms such as "teacher" and "(graduate) student" also apply to you—you wear many hats!—but these terms are sometimes confusing. After all, the instructors of the Fulcrum online courses are also teachers. And the grade school students we so often talk about are also students. The most ambiguous term of all is "learner": this includes you, but it also applies to grade school students and each and every member of the Fulcrum Institute—researchers, developers, educators, administrators, and scientists.

[7] INCRE (http://www.incre.org/) is the External Evaluator for the Fulcrum Institute. An External Evaluator provides an independent assessment of the evolution and impact of the project on students, teachers, participating institutions (Tufts, TERC, and the participating schools and districts). This is useful for the funding agency, the National Science Foundation (http://www.nsf.gov/od/lpa/news/publicat/nsf04009/ehr/msp.htm). It is also useful for the Fulcrum Institute itself and for other science education projects committed to understanding what aspects of a program make a difference.

[8] Fulcrum Educators include participating members of Tufts University's Graduate Program in Education: Linda Beardsley (Director), Dan Cogan-Drew, Judah Schwartz, and Roxane Johnson (Project Manager). Also included are the instructors of the Fulcrum courses themselves. The instructors, from TERC, Tufts, and elsewhere, have included: Gilly Puttick, Esther Zirbel, Steve Cohen, Linda Beardsley, Sue Doubler, Sally Crissman, Roxane Johnson, and Eric Kemp-Benedikt.

video-tapes serve several purposes: (1) they become part of your personal portfolio—as mentioned earlier, you can use them as you wish; (2) they are studied by the Research Team of the Institute, in order to better understand the issues of learning and teaching specific subject matters; (3) a copy of the tape is given to the External Evaluator, who will analyze the tapes and coordinate the findings with the in-class observations (see b, above); (4) subject to your approval (see below), they may or may not be shown in research and professional development contexts or publications.

Each year the Research Team requests, through a separate document, your authorization to use the tapes in various research contexts (e.g. presentation at conferences) or in professional publications. It makes a similar request of the parents of your students.

You are free to accept or deny such a request. Likewise, a parent or guardian of any of your students is free to deny a request to show a film clip of that child. In addition, even when you do authorize filming with the purposes of eventual divulgation in research or professional development settings, you are free to change your mind after the fact. Consider, for example, a case in which you teach a science class filmed by the research team. If you feel, for instance, that the class did not meet your expectations, you might ask—after the fact—that it not be shared at conferences. That's fine. Or you may request that the Research Team return to film you on another day and use that second lesson instead. That's ok too. You are the one who decides.

So, to summarize, once a year a science lesson of each Fulcrum Participant is videotaped. But the teachers are free to determine whether or not the film will be shown to people beyond the Fulcrum Researchers and External Evaluator and, if so, under what conditions. The same holds for the parents of each and every student in your class.

4. Are there any other things expected of me regarding research of the Fulcrum Institute?

We encourage Fulcrum Participants to get involved in research in one way or another. This does not mean that you will conduct research projects just as the Fulcrum Researchers do. After all, you are a teacher, and your relation to research may tend to be somewhat different from that of a professional researcher.

As you progress through the Fulcrum courses, you will no doubt appreciate how much science teaching can benefit from a *deep familiarity with the science content*. (Many of you have known this for a long while.) But you may also find yourself increasingly thinking about issues related to *how students think about science*.

We especially encourage you to learn more about research related to this topic and to try to relate it to your own science teaching. Your insight into students' thinking—what they notice and infer, what they consider to be the fundamental ideas regarding scientific phenomena, how they think things work, what they regard as evidence for assertions, and so on—can play a crucial role in your science class. A teacher able to recognize diverse students' thinking and bring their ideas out into the open in classroom discussions—recall how masterfully Andre did this with his class of first grade students—can capitalize on many opportunities.

The Fulcrum courses will acquaint you with some of the literature and thinking about children's conceptualizations of scientific phenomena. But there are other means available:

a. You may wish to take part in interviews with science educators or scientists about your own classroom lessons. These folks are in the business of considering how scientific phenomena are conceptualized. You may find that discussing specific examples from your own classroom will help you learn more about the science, about the student's views of science, and about the options available for teaching the science to young learners.

b. You may wish to hold a discussion with a scientist or a science educator about interviews of students' reasoning. These might be interviews you yourself have conducted. Or they may be interviews undertaken by the Fulcrum Researchers or by researchers outside of the project.

c. At one of the Fulcrum face-to-face meetings, you may wish to share footage from your own lessons or from discussions such as those mentioned above in (a) and (b). In special cases, it may be worthwhile to have Fulcrum Participants make contributions at Fulcrum Colloquia. The first four Fulcrum Colloquia were given by researchers and scientists. In the future it would be nice to have Fulcrum participants contributing to colloquia.

After Course 3, the Fulcrum Institute will move to a Sustain Phase. The online courses will have ended and the emphasis will shift increasingly towards making changes in your schools. This can take several forms. You might want to form a Lesson Study group around topics related to science teaching. You may want to collect data about student reasoning and learning about science, and share that data with other teachers or parents. You might want to build web science projects that your students and those of other teachers can become involved in. You may wish to explore, with Tufts University, the possibility of supervising pre-service teachers in your science classroom. These are only some ideas. You may have some of your own. Or you may wish to discuss, with scientists, educators, or researchers, ways to improve science in your school.

5. What if I have further questions?

David Carraher (david_carraher@terc.edu and 617 873 9620) and Tracy Noble (tracy_noble@terc.edu and 617 547 0430) can answer questions you may have about research in the Fulcrum Institute. Contact them if you have ideas for possible interviews with scientists or would like to discuss research related matters.

Roxane Johnson is the Fulcrum Institute Project Manager. She can help identify people in the project you may wish to speak to—whether they be scientists, developers, educators, researchers or others. You can reach her through email (roxane.johnson@tufts.edu and 617 627 3039).

Linda Beardsley (linda.beardsley@tufts.edu and 617-627-5273) is the liaison between Tufts University's Department of Education and the various schools and school districts with which Tufts has partnerships. This includes the schools linked to the Fulcrum Institute as well as many others.

Team	Description	People involved
Fulcrum Curriculum Developers	This group puts together the courses that participants take. They prepare the online content, and determine which investigations and readings are best suited to match the goals of the content as determined by the Science Working Group.	(Director), Sarah Lacey, Sally Crissman, Katherine Paget, and other people at TERC in Cambridge, MA.
External Evaluator/INCRE	An External Evaluator provides an independent assessment of the evolution and impact of the project on students, teachers, participating institutions (Tufts, TERC, and the participating schools and districts). This is useful for the funding agency, the National Science Foundation (http://www.nsf.gov/od/lpa/news/publicat/nsf04009/ehr/msp.htm). It is also useful for the Fulcrum Institute itself and for other science education projects committed to understanding what aspects of a program make a difference.	John Zuman(Director), Claudette Fongkong-Mungal, Kristen Lewis-Warner
Fulcrum Researchers	Researchers from TERC and Tufts University look at student science learning through the use of videotapes, transcripts, and interviews. This group designs the research methodology and is interested in the	David Carraher (Director), Tracy Noble, Dan Cogan-Drew, Paul Wagoner, and 2 graduate students in Education from Tufts: Chunhua Liu, and Manasa Chakravarti.
Fulcrum Scientists	This group primarily consists of Tufts University Physicists and Astronomers who, along with Fulcrum Researchers and Educators, are an integral part of the Science Working Group (SWG), where the scientific and pedagogical content of the Fulcrum courses undergoes intense discussion and scrutiny.	Judah Schwartz (Principal Investigator of the Fulcrum Institute), Gary Goldstein, Roger Tobin, Esther Zirbel, and Bill Waller
Fulcrum Participants	The teachers, like you, who have enrolled in the Fulcrum Institute and are from various Greater Boston school districts.. Terms such as “teacher” and “(graduate) student” also apply to you—you wear many hats!—but these terms are sometimes confusing. After all, the instructors of the Fulcrum online courses are also teachers. And the grade school students we so often talk about are also students. The most ambiguous term of all is “learner”: this includes you, but it also applies to grade school students and each and every member of the Fulcrum Institute—researchers, developers, educators, administrators, and scientists.	
Fulcrum Educators	Participating members of Tufts University’s Graduate Program in Education	Linda Beardsley (Director), Dan Cogan-Drew, Judah Schwartz, and Roxane Johnson (Project Manager)
Fulcrum Course Facilitators	The instructors, for the online and face-to-face courses are primarily from, Tufts University and TERC.	Gilly Puttick, Esther Zirbel, Steve Cohen, Linda Beardsley, Sue Doubler, Sally Crissman, Roxane Johnson, and Eric Kemp-Benedikt