

TPPI: The TLT Pedagogical Perspectives Interview

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The *TLT Pedagogical Perspectives Interview* (TPPI) is a two-part semi-structured interview designed to elicit a practicing teacher's outlook on several general and specific aspects of teaching, including teaching goals, views on classroom roles, beliefs about learning, and orientation towards formative assessment, whole-class discussion, student motivation, flexible class planning, and reflective improvement of practice. We expect these aspects impact a teacher's response to the *Technology-Enhanced Formative Assessment* (TEFA) pedagogy, or to be impacted by professional development focused on TEFA. The instrument has been field-tested with 22 science and mathematics teachers at two different schools, and analysis of data collected with it is in progress.

version 1.0-rc1

1. introduction

Teacher Learning of Technology-Enhanced Formative Assessment (TLT) is a five-year, NSF-funded research project into teacher pedagogical change, in-service teacher professional development, and adoption of a specific instructional technology in secondary science. The *TLT Pedagogical Perspectives Interview* (TPPI) is a two-part, semi-structured interview protocol designed to elicit a teacher's views and perspectives on several aspects of teaching relevant to adoption and practice of the *Technology-Enhanced Formative Assessment* (TEFA) pedagogy. We have developed this instrument and included it in TLT project data collection for two reasons:

1. to help us identify how a teacher's outlook and beliefs affect her adoption and practice of TEFA, and
2. to help us identify how the TLT "intervention" impacts teachers' outlooks and beliefs.

With the TLT project, the instrument is intended for use once during baseline data collection, and once a year during the intervention.

Part A of the interview, "General views on teaching and learning", probes the respondent's sense of being a teacher: her sense of purpose, priorities, and dominant values. It probes her views on the nature of learning, on motivating students and grading, and

on the teacher's and students' roles in the classroom (both desired and actual). It also probes her priorities and primary foci of attention during lesson planning, including her inclination to plan for contingencies and adjust instruction to students' individual needs.

Part B, "Classroom interaction", attempts to elicit a picture of some of the respondent's classroom practices and ideals. It probes her priorities when starting an instructional unit with a class. It probes her inclination to use real-time formative assessment in various contexts. It probes her views on and practice of cooperative learning, providing feedback to students, and formative assessment. It probes rather intensively her orientation towards whole-class discussion (WCD), since this seems to be an important variable for TEFA adoption: her purposes and uses for WCD, her picture of "good" WCD, and her focus of attention while conducting it. It attempts to elicit her inclination towards reflecting upon and learning from practice, and towards seeing teaching as a process of continual self-improvement. It probes, very briefly and shallowly, her views on classroom response systems: either existing knowledge and expectations (baseline), or general assessment based on personal experience (post-baseline). It concludes with an open-ended solicitation for anything else the respondent wishes to add.

Although the instrument focuses on topics that we believe are relevant to TEFA, no questions explicitly refer to TEFA or assume familiarity with the pedagogy. Only a few at the end of Part B explicitly mention classroom response systems, and they do not assume more than a vague idea of what one is. Thus, the instrument could be used in non-TEFA contexts, perhaps dropping questions 19-21 from Part B.

2. developing the instrument

Our research objectives for the TPPI have evolved somewhat over time, and continue to evolve, as we improve our understanding of what aspects of our participating teachers' perspectives are both possible to probe and valuable to know. Thus, the development history of the instrument is relevant for appreciating its current design and purpose.

version 1.0

In the autumn of 2005, our subcontract team at SRI International, led by Valerie Crawford and acting in collaboration with the TLT Principal Investigators, began development of a survey instrument to assess teachers' pedagogical perspectives and orientations: the *TLT Pedagogical Perspectives Survey* (TPPS). We intended the TPPS to gauge a teacher's alignment with eight pedagogical positions we had previously articulated as foundational to the TEFA pedagogy:

1. The primary goal of instruction is a robust, durable understanding of essential subject content from which a student can reason, not “coverage” of a prescribed list of topics.
2. Learning is a multi-pass process, in which ideas must be revisited several times in varying contexts.
3. The construction of understanding is an inherently effortful process involving confusion, frustration, conflict resolution, and unlearning undesirable ideas.
4. Students learn better if empowered to become active, invested, self-aware learners.
5. Articulation of ideas and reasoning is of value to both speaker and listeners, as is contrasting positions and resolving disagreements.
6. The transmission of information is inefficient and ineffective.
7. Students’ learning trajectories are complex and idiosyncratic, so a teacher needs frequent feedback to guide instruction.
8. Students have different learning needs, styles, and rates, so instructors must adjust teaching activities to meet individual students’ needs.

We also desired the TPPS to build as much as possible on extant, validated instruments, and to use established constructs, to help us connect our research with other work, and to communicate our results to others.

During spring 2006, it became clear that the gap between established instruments and constructs and our TEFA-specific need was too large, causing the TPPS to be insufficiently precise in targeting pedagogical perspectives of interest to us. However, it was still of value for connecting our results with other research, especially in documenting whether and how the TLT intervention impacted teachers’ orientation towards accepted constructs. Thus, we decided to continue use of the TPPS, but also develop a complementary interview instrument — the TPPI — to target TEFA-specific variables more precisely.

Version 1.0 of the TPPI was created during late spring and early summer of 2006. It was primarily authored by Ian Beatty, with input from other TLT team members, especially Allan Feldman. No other instruments or literature were consulted. It consisted of only one part, with 30 questions, many of which had mandatory or optional probes and follow-up questions. This version of the protocol was used during the baseline round of data collection at School A, in summer of 2006.

versions 1.1 and 2.0

In version 1 of the TPPI, we were attempting to probe teachers' pedagogical perspectives at the level of fundamental epistemological beliefs. Our experiences conducting the baseline round of interviews at School A convinced us that eliciting reliable information about most teachers' fundamental epistemological beliefs is impractical. We found that few teachers would articulate explicit positions on these kinds of issues, at least in response to the questions we were asking; as a result, the responses we collected were insufficiently illuminating.

However, we found that the instrument did seem useful for eliciting other relevant information about the teachers interviewed, primarily general instructional "orientations", "styles", and "patterns", as well as specific overarching concerns and priorities that shaped a teacher's practice. Knowing about these has been quite helpful for building a rich profile of each participant, and for helping us understand, interpret, and triangulate data collected through other instruments. Thus, we altered our intentions somewhat, and repurposed the TPPI to more effectively and efficiently target several of these kinds of variables.

In order to preserve comparability with data collected with TPPI version 1.0, we developed 1.1 to use in subsequent rounds at School A. Version 1.1 is a minor modification of version 1.0, with clearer wording, elimination of a few truly useless questions, and addition of a few others we wanted to try.

Simultaneously, we developed a more dramatically altered version for use at School B. The redesign was led by Ian Beatty, with significant collaborative input from Allan Feldman and also from Karen St. Cyr, the primary field-worker conducting the interviews. We eliminated many questions that were no longer seen as productive, added others, and elaborated some of the most useful into sets of related questions. We also merged in some questions that were taken from, or inspired by, the *TLT Lesson Planning Interview* (TLPI) instrument, which we had decided to abandon as insufficiently productive. We improved the wording of questions, and — since the resulting set of questions was now too large for a single interview session — we divided it into two parts. The resulting instrument, dubbed version 2.0, is our current version. It is described in detail below.

history of use

Table 1 shows which version of the instrument has been used at each project site for each round, with the number of participants interviewed. (During Spring 2008 administration of the TPPI, extraordinary logistical problems prevented us from interviewing all active participants in Spring 2008. At School A, two of six active participants could not be interviewed. At School B, one of eight active participants was interviewed with only one of the two interview parts.)

| | <i>school A</i> | <i>school B</i> | <i>school C</i> |
|--------------------|-----------------------|-------------------------|-----------------|
| <i>spring 2006</i> | version 1.0 (N = 13) | — | — |
| <i>spring 2007</i> | version 1.1 (N = 10) | version 2.0 (N = 9) | — |
| <i>spring 2008</i> | version 1.1 (N = 4/6) | version 2.0 (N = 7.5/8) | ? |

Table 1: Instrument version and number of respondents for each project site and round.

3. description of the instrument

Version 2.0 of the TPPI is a two-part, semi-structured interview. The two parts are independent, and meant to be conducted at different times; they may be separated by anywhere from a day to a week or so. Each part typically requires 45-50 minutes to administer. Each part has 21 questions, many of which include mandatory or optional follow-up questions and probes; part B concludes with an additional “anything else?” question.

In the following subsections, we describe the purpose of each question or set of related questions in the instrument. The questions themselves can be found in appendix 1.

part A: general views on teaching and learning

Questions 1 to 4 of Part A probe the respondent’s sense of being a teacher: how she sees her role, responsibility, and purpose, and the goals for her students that motivate her teaching. This is the “big picture” portion of the interview: what, in the broadest sense, is the teacher trying to accomplish? We hope to ascertain whether the respondent is highly focused on content delivery and preparing students for standardized exams, or perhaps more concerned with facilitating students’ personal growth, or with developing longer-term learning capacities, or something else. With question 3, we also want to determine whether the goals a respondent has articulated are “pie in the sky” ideals divorced from what she actually accomplishes, or realistic goals that she feels are achievable. We hypothesize that the kinds of goals a teacher holds may influence her reaction to TEFA and the ways she uses it.

Question 4 is also related to the respondent’s goals and values; it probes for what tensions she feels (by which we mean alternatives that must be chosen between), and how she resolves them. We are particularly interested in the common “breadth vs. depth” (“coverage vs. comprehension”) dilemma, since pressure to cover sufficient curriculum is one of the concerns that teachers learning TEFA often articulate.

Questions 5 and six attempt to probe the respondent's epistemological views on learning, in order to identify possible consonance or dissonance with the perspective underlying TEFA.

Questions 8, 9, and 10 probe the respondent's approach to motivating students. We are interested in her orientation towards intrinsic vs. extrinsic motivation, as we believe this will impact a teacher's approach to and success with convincing students to cooperate with TEFA instruction. We are also interested in detecting whether the respondent feels obligated to "uphold a standard" while grading, or to use grades in order to maximize each students' individual learning.

Questions 11 and 12 attempt to gauge the respondent's outlook on "learning how to learn", whether she tries to help students become better learners, and what approaches she tries. We expect this to be relevant to a teacher's interest in teaching process (as opposed to content) and in meta-level communication, both key elements of TEFA.

Questions 13 to 16 probe the respondent's views of what her and students' roles in the classroom ought to be, as well as how students see them. We are looking for alignment with the roles that TEFA requires, as well as for indications of whether she believes students have a conflicting perception.

Questions 17 through 21 address lesson planning, and are based on the discontinued *TLT Lesson Planning Interview* (TLPI) instrument. Overall, we are looking for evidence that the TLT intervention has changed the respondent's approach to planning lessons. Questions 17 and 18 probe for what kinds of things the respondent focuses on while planning, and especially whether she focuses on process skills and meta-level goals. Questions 19 to 21 seek to determine whether and how she makes use of the information provided by formative assessment, especially whether she plans for "agility" and makes use of student-specific information.

part B: classroom interaction

The questions in Part B are less focused on overarching or framing perspectives and beliefs about teaching, and more focused on the respondent's interpretation of and orientation towards specific pedagogic practices.

Question 1 is an open query to elicit, with as little prompting as possible, the respondent's vision of what "ideal" teaching and learning might look like in her context. We are hoping for clues about how teacher-centered or student-centered the respondent is (at least in her aspirations), as well as biases towards frontal teaching or seat-work, whole-class or small-group interaction, etc.

Question 2 seeks to establish what the respondent focuses on achieving when beginning a new unit, since this is one common “niche” for TEFA. We are interested in whether her initial objectives align well with TEFA (making TEFA a natural fit in this situation), as well as whether her thinking about starting units evolves over time.

Question 3, 4, and 5 probe the degree to which the respondent is “student-centered” and in various situations. We hope to gauge whether the teacher is inclined to teacher-centered and content-focused responses (re-teaching, trying different approaches), student-centered and process-oriented responses (asking Socratic questions, soliciting help from other students), or use of formative assessment (asking diagnostic questions and clarifying communication). We are particularly interested in whether the respondent seems inclined to “get inside the student’s head”.

Question 6 attempts to elicit the respondent’s use of and thoughts about cooperative learning methods, since these could predispose a teacher to or against the group-learning elements of TEFA, and also color how she chooses to implement TEFA.

Questions 7 and 8 also probe the respondent’s use of formative assessment; unlike 3-5, however, they assess the use of formative assessment to help students adjust their learning actions, rather than to help the teacher adjust her teaching actions. We are interested in whether the respondent is inclined towards *prescriptive* rather than *evaluative* feedback, and whether she values frequent and timely feedback to students. We believe these orientations may affect the value a teacher perceives in TEFA.

Questions 9 through 14 address the respondent’s vision and use of whole-class discussion (WCD), which is one of TEFA’s four core practices and an aspect of mastering TEFA that many teachers struggle with. Our experience to date is that a teacher’s orientation towards and comfort with moderating WCD has a strong impact on how readily she takes to TEFA and her practice of it “looks like”. Question 9 probes how often the respondent uses WCD. Question 10 attempts to clarify what she means by “whole-class discussion”, since we have seen teachers interpret the phrase quite differently from us and from each other. Questions 11 to 13 try to develop a more detailed picture of what WCD means to her and how it runs in her class, while 12 and 14 explore her goals and values for and during WCD.

Although previous questions have probed aspects of the respondent’s orientation towards formative assessment, question 15 is the first to mention it explicitly. It asks what the term means to her, and then whether and why she uses it. Formative assessment is one of TEFA’s four core practices, so knowing about a teacher’s understanding and use of it before encountering TEFA, and how those change afterward, are of interest to us. We put this question near the end of the interview so that prompting with the term “formative assessment” won’t prime teachers’ responses to questions 2 through 15.

Questions 16 to 18 seek to assess the respondent's predisposition towards ongoing, reflective, self-directed professional development. Does she see mistakes or "classes gone bad" as a personal failure, or as a chance to learn something new about her students, the content, or pedagogy? Does she habitually reflect upon her practice and how it could be better? A teacher's outlook on these questions may influence how successful TEFA professional development is with her, and experiencing the PD may impact her thinking about them.

Questions 19 through 21 directly assess the respondent's thoughts about classroom response system (CRS) technology. This is the only portion of the instrument that is specific to TEFA or CRS. During baseline, we seek the respondent's preconceptions and expectations; thereafter, we seek opinions based on experience.

Question 22 provides the respondent with an opportunity to add any final thoughts she might have.

4. administering the interview

The TPPI has been designed for administration by a skilled and knowledgeable field-worker who understands the intent of each question, the larger context of the interview, and the TEFA pedagogy, and who is thus able to probe and redirect the respondent's replies in order to elicit the desired information. The field-worker is also empowered to adjust the wording of questions to make them flow more naturally and to acknowledge and build upon prior responses as warranted. The field-worker may even abridge or skip a question if the respondent has partially or completely addressed it in response to a prior question.

When the interview is conducted by a field-worker who is known to the respondent and is associated with the project team administering the professional development intervention, we find that respondents often offer additional insights and opinions that do not directly address the interview questions. While such tangents make the interview less efficient, they provide valuable feedback to PD staff, and can also furnish critical insights into the respondent's TEFA learning trajectory. We therefore encourage such tangents, and field-workers administering the TPPI are asked to relay them to other project staff.

General instructions to the interviewer are included in the protocol document, both as a header and interspersed throughout the questions. These are meant as a reminder and a supplement to detailed understanding of the logic and goals of the instrument, not as the field-worker's sole guidance.

We audio-record the interview, typically to a digital voice recorder; the field-worker is not expected to capture any field notes.

5. analysis of interview data

No specific or formal analysis protocol for the TPPI has been defined. We have explored a variety of qualitative analysis strategies, including both theory-driven (with a coding scheme developed from our pre-existing model for beliefs consonant with good TEFA practice) and open/grounded/emergent approaches. Karen St. Cyr and Ian Beatty have done most of this exploratory analysis.

Our current analytic method could be termed “multi-pass summarization and comparison”. The interviews are transcribed at the lexical level, and segmented by question. An analyst will then select a question and iterate through all respondent’s replies to that question; for each, he “codes” them by writing a few sentence fragments that distill the essential content of the reply. For example, here is the verbatim transcript of one respondent’s reply to question 8 of part A:

Interviewer: Um, question eight. How do you try to motivate students to learn?

Respondent: That is one of my favorite things. I do silly things to get them to learn. Um, one is I really emphasize that they need to take care of themselves and they way to take care of themselves in this class is to do what they are expected to do. Um, oh you can’t see my quote on the board. It says “Some people work to resolve things, others settle for consequences”, which is one of my, one of my guiding themes, but I do silly, you know, concrete stuff. I give them stickers, which sounds crazy but it works. Um, stickers for hundreds on their reading quizzes. They have two reading quizzes a week. I give them stickers for, um, doing something nice for someone without being asked. Um, we play games to . serve as a model for them for how to discuss and interact with their group because usually with trivia games people are going to argue about what the answer is, so they can— They have that pattern to follow when we segue to the work in a little bit. Um, I use raffle tickets, if they do their homework they get a raffle ticket. If everybody in their group does the homework they get two raffle tickets and then on Friday we have a raffle. [Laughs] And I know it sounds silly, but it really is incredibly motivating for them.

Interviewer: Yeah, incentives that work.

Respondent: They work! They’re silly and I would never think if I were outside of a high school that they would work, but I mean you sit there and this kid doesn’t do his homework and you are like you have to do it on Thursday. I only got one ticket for you, but sometimes they even arrange to call each other to remind each other.

This response was distilled to the following:

tell Ss “take care of selves by doing what is expected”; theme quote;

incentives: stickers for high quiz scores or doing something nice unasked for someone;
games to promote group interaction/argument; raffle tickets for doing HW

Once all responses to that question have been so coded, the analyst revisits each in turn, writing a brief summary that imposes a second level of abstraction. The summary written for the above example was:

theme sayings; incentives: stickers & raffle tickets for quiz scores, doing HW, good social behavior

These summaries are entered into a spreadsheet cell, where the rows of the spreadsheet represent the individual questions of the instrument, and the columns represent respondents; multiple adjacent columns are used for multiple rounds with the same respondent. By hiding specific columns and reading across a row, we can facilitate comparing responses for one round across teachers, or comparing one teacher’s responses between rounds. By reading down a column, we can get a sense of overall pattern and trends across questions for one teacher and round.

Our next analytic step is to compare response summaries in the table. To compare teachers in one round — for example, when looking at the baseline round for characteristics that might predict reaction to and success with TEFA — we hide all columns from other rounds, and study the table one row at a time. Within a row, we compare response summaries, looking for categories or bins that most responses might fall into, identifying responses that stand out as unusual, etc. For many questions, we find we can label each response as “TEFA-positive”, “neutral”, or “TEFA-negative”, with explicit criteria identified for the labeling. In these cases, we color-code cells according to their label. Although we are reluctant to assign too much importance to the labeling of any one cell, a strong pro- or anti-TEFA trend across questions for one teacher (made obvious by the color coding) seems strongly suggestive.

To look for changes in one teacher’s responses from round to round, we use a similar procedure. We hide all spreadsheet columns except for those corresponding to that teacher. Then, question by question, we compare response summaries across rounds, labeling later rounds as “no substantive change”, “slight change”, “moderate change”, or “dramatic change” relative to the prior round. We apply a color code to the cells, varying from white (no substantive change) through pale yellow (slight change) to bold, saturated yellow (dramatic change). In this way, the overall degree of change between rounds becomes clear, and we can quickly find the most significant changes to refer to in later analysis.

After this level of analysis, we turn to analytic memoing, identifying and asking ourselves speculative, interpretive questions about the meanings of gross patterns, and

also of specific details that stand out. As we do so, we begin triangulating with what other data sources tell us about these individuals.

6. plans for future development

An interview that takes a total of 90 minutes or more (over two parts) to conduct, plus time to transcribe and qualitatively analyze, clearly does not scale well. Rather than conduct the TPPI as part of baseline data collection with Schools C and D (spring/summer 2008), we hope to use what we've learned from TPPI usage to date to craft a more scalable alternative: a web-based survey of open-ended and/or Likert scales, perhaps (if necessary) supplemented by a much more brief interview. Analysis of TPPI data and creation of a scalable alternative is a high priority for summer 2008 work.

Because of the richness of the data produced, we believe the TPPI will continue to be a useful instrument in situations where scale is less of a concern. However, we expect to revise the instrument considerably based on what we learn (and fail to learn) through current and forthcoming analysis of data from the TPPI version 2, as well as through the process of creating a scalable alternative. If a TPPI version 3 is created at some point, we may consider rigorously validating it. Such work, however, is not an immediate priority for the TLT project.

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appendix 1: TPPI protocol, version 2.0

general instructions to interviewer

To the interviewer: try to stay focused on the subject's beliefs, rather than on the details of their practice. Some questions ask for examples, but in general we prefer subjects not go on and on about all the things they do in the classroom.

When a subject gives a detailed, specific example in response to a general question, try to get them to articulate what it is about that example that answers the question. Many subjects will have to think of specific examples in order to figure out an answer, but we don't want to be guessing how a story about what one student did answers a question about the subject's beliefs. We want the subject to state the belief.

Some of the questions with follow-ups require agility on the part of the interviewer, since which follow-ups make sense, how they should be phrased, and how they should be ordered depends on what the subject said in answer to the initial question.

part A. general views on teaching and learning

This is the TLT Pedagogical Perspectives Interview, Part A, with subject [code#] on [date].

Thank you for your time.

This is Part A of the interview. It contains questions about your general views on teaching and learning, not tied to any one course. It has 21 questions, plus some follow-ups to those questions. We'll be doing Part B [indicate when].

1. How do you see your responsibility and purpose as a teacher?
2. What goals do you have for your students that affect how you teach?

First see what the subject offers, and then probe using the prompts below for any areas the subject didn't mention spontaneously.

- Do you have any goals for your students as learners?
- Do you have any goals for their personal development?
- What kinds of goals do you have for their science/math content knowledge?

Steer away from listing specific topics. We want to know the nature of the subject's content goals.

- Do you have any other kinds of goals for them that you haven't mentioned yet?
3. In your actual classes and circumstances, how possible is it to achieve these goals?
 - **If unclear:** Please explain.
 - **If it is possible:** With all students, or just some of them?
 - **If vague:** Which ones?
 - **If appropriate:** Is it more possible with some classes than others?

4. Are there any general, recurring tensions or trade-offs that you face when making choices about your teaching? (What are they?)
 - **To clarify:** For example, two competing things that you'd like to accomplish, but have to choose between.
 - How do you resolve this tension?
 - Do you perceive a tension between covering enough material and covering some material in enough depth?
Probe for this if not mentioned. Can also use this as an example if subject doesn't understand what we mean by "tensions or trade-offs"; if that happens, follow up with "Do you perceive any other recurring tensions or trade-offs?"
 - **If yes:** How do you handle it?
 - **If yes:** What do you think causes this tension?
 - Are there any other recurring tensions or trade-offs that come to mind?
5. How would you describe what is involved in the process of a student really learning something?
6. For your students, what is hardest about learning the subject [or subjects] you teach?
If the subject talks about topics or portions of the content, dig for qualities or skills or characteristics instead.
 - **To probe:** Is there something about the nature of [teacher's subject] that makes it difficult for students?
 - **To probe:** How is learning your subject different than learning other subjects?
 - Do different classes or groups of students find different aspects hard?
7. What would make learning the subject(s) easier for students?
 - Is there anything else that would make it easier for them?
8. How do you try to motivate students to learn?
Push for a thorough answer.
 - Can you give me a brief example?
Try to avoid long, detailed case descriptions.
 - Can you give me a different example?
9. What are the primary benefits of assigning grades to what students do?
 - **Possible probe:** How do students benefit?
10. Do you see a tension between evaluating all students according to a uniform standard, and taking into account students' individual abilities, starting points, and effort?
 - **If yes:** How do you handle it?

11. What makes a student a good learner?

Probe for details about the characteristics.

- How often do you see this in your classes?

Ask for quantitative estimates for vague terms like “some” and “a lot”.

12. Is it possible for students to become better at learning?

- **If yes:** How?
- **If yes:** Can any student become better at learning, or just some?
- **If yes:** What can you do to help a student become better at learning?
- **If anything:** How often do you try this? Why?
- **Always:** Do you ever explicitly talk about knowledge or learning in class?

13. In a real classroom, during class time, how would you describe your primary role or roles?

14. How would you describe the students' roles and responsibilities in the classroom?

15. How do you think the students see their role?

16. How do you think they see your role?

17. When planning a class or lesson, what kinds of things do you focus on?

Dig as necessary to draw out a detailed response.

- Are there other kinds of instructional objectives you take into account when planning a class?

18. Do your plans ever purposefully target general thinking and learning skills or personal growth issues, or other things besides subject knowledge?

- **As appropriate:** How often?
- **As appropriate:** What kinds of skills?
- **As appropriate:** How do you target them?

19. Do you build flexibility into your lesson plans?

If necessary, clarify that we want to know how flexibility is incorporated into the planning.

- **If yes:** How?

20. How closely do you stick to your lesson plans, and how often do you make spontaneous changes or “wing it”?

- **To probe:** What kinds of spontaneous changes do you make?
- What sorts of things cause you to deviate from your plan?
- What are your objectives when making such changes?

21. When you plan specific lessons or activities, do you take into account your particular students' knowledge, skills, and characteristics?

- **If yes:** How does that affect your planning?
- Do you keep specific students in mind when planning?
- How do you get the knowledge about students that you use to do that?

That's the end of Part A of the interview. We'll be doing Part B [indicate when]. Thank you for your time.

part B. classroom interaction

This is the TEFA Pedagogical Perspectives Interview, Part B, with subject [code#] on [date].

Thank you for your time. This interview has 21 questions [20 for non-baseline], plus some follow-ups to those questions.

1. Imagine that really good learning is happening in one of your classes, and everything is going as perfectly as you could hope. Please describe what this looks like.

Probe to draw out additional details:

- What are the students doing?
- How are they interacting?
- What are you doing?
- Does this ever actually happen in your classes?

2. When starting out a new topic or unit, what are the most important things for you to do?

- Why?
- Is there anything else that's important to do at the beginning of a new topic?

3. If a student doesn't understand a concept, what kinds of things do you do to help him or her make sense of it?

- **If vague:** Can you give me an example of what this looks like in your classes?
- Do you do this often?

If multiple things were mentioned, probe to see which are more common.

- How does that help the student make sense of the concept?
- Is there anything else you might do?

4. When a student says something incorrect in class, how do you handle it?

Dig for details. We want to know how the teacher responds when a student articulates incorrect subject knowledge.

- What is your goal when you do that?
- Can you give me a specific example?

5. When you respond to a question that a student asks you, what considerations are on your mind?

Dig for details. We want to know, without leading, whether the teacher is focused on trying to understand the student, or on answering the question, or on evaluating the question, etc.

- **To clarify:** What kinds of thoughts run through your head?
 - **To clarify:** What kinds of questions do you ask yourself as you listen to the student's question?
6. In what kinds of ways, if any, do you have students do cooperative or peer learning?
- **If vague or general:** Can you give me an example?
 - Are there any other ways you use cooperative or peer learning?
 - How often do you use these ways?
 - Why do you use cooperative methods?
7. In what ways do you provide feedback to students?
- **If subject mentioned generalities:** Can you give me some specific examples?
 - Do you have any other ways of providing feedback?
 - Why do you use these ways?
8. What are the general characteristics of good feedback from teacher to students?
- Probe hard. Ask for more details. Ask for other characteristics. Ask for general characteristics if the subject just offers specific examples. If necessary, ask:*
- Why do these characteristics make for good feedback?
 - Are there any other general characteristics of good feedback?
 - Can you give me a specific example of good feedback from teacher to students?
9. How often do you use whole class discussion?
- A brief answer is fine, but if subject just says something vague like "a little" or "a lot", try to find out what that means in terms of classes, weeks, etc.*
10. What does the term "whole class discussion" mean to you?
- Probe as necessary to get answers to the following:*
- **If necessary to clarify:** Do you mean the whole class having one discussion together, or separate groups having their own discussions?
 - **If necessary to clarify:** Is the teacher involved always, or sometimes, or not at all?
11. What are the characteristics of good whole class discussion?
- Probe hard. Ask for more details. Ask for other characteristics. Ask for general characteristics if the subject just offers specific examples.*
- During good whole-class discussion, what are you doing?
 - During good whole-class discussion, what are the students doing?

- **If necessary to clarify:** Does the discussion consist of questions and answers, or debate, or sharing ideas, or something else?
12. What kinds of things are you trying to accomplish when you use whole class discussion?
- **If subject gave situations or contexts:** What are your objectives when you do this?
 - Why?
 - Do you have any other objectives?
13. How do you start and run a whole class discussion? Tell me about the mechanics.
- **To clarify:** If I were to watch you run a whole class discussion, what would I see?
14. While you are in the process of running a whole class discussion, what considerations are most on your mind?
- Probe for the kinds of things they pay attention to and try to optimize on: what they think about, not what they want the discussion to focus on.*
- **To clarify:** If I were sitting inside your head, what kinds of thoughts would I hear?
15. Are you familiar with the term formative assessment?
- **If yes:** What does the term mean to you?
 - **If yes:** Do you use formative assessment?
 - **If yes:** What do you use it to accomplish?
 - **If subject gave generalities:** Can you give me a specific example?
 - **If subject gave generalities:** Can you give me another example?
16. I think it's fair to assume that all teachers have experienced a class that goes very differently from how it was planned. What do you do when that happens to you?
- We mean that the lesson and the learning itself is surprising; we're not talking about external disruptions or equipment failure.*
- Do you take any action during the class?
 - After a class that went very differently from what you expected, is there anything specific you do learn from it or otherwise adjust?
17. When the way a class goes surprises you, how do you feel?
- Does the subject focus on self-criticism or on learning from the experience?*
- **To clarify:** Do you take it personally?
 - Why do you feel this way?
18. In what ways, if any, do you reflect upon and evaluate your teaching and try to improve?
- Do you ever seek or get feedback and input from other peoples?
 - From whom?
 - About what kinds of things?

19. **Baseline only:** Can you tell me, very briefly, what experience or knowledge you already have of classroom response systems like PRS?

We don't want loads of details about what they know, just: Have they used it? Seen a colleague use it? Been told about it? Read about it?

20. **Baseline:** What do you expect the benefits of using a "classroom response system" like PRS to be?

Non-baseline: What do you see as the primary benefits of using a "classroom response system" like PRS?

- How do you think it will benefit your students?
- How do you think it will benefit you?

21. **Baseline:** What do you expect the drawbacks to be?

Non-baseline: What do you see as the primary drawbacks?

22. And that's the end of the interview! Is there anything else you'd like to add that might help us understand your views on teaching and learning?

Pause to give the subject a chance to think. If the subject offers something, probe with follow-up questions if it seems relevant to this interview.

Thank you for your time.

appendix 2: TPPI protocol, version 1.1

introductory comments

To the interviewer: try to stay focused on the subject's beliefs, rather than on the details of their practice. Some questions ask for examples, but in general we want to prevent subjects from going on and on about all the things they do in the classroom.

When a subject gives a detailed, specific example in response to a general question, try to get them to articulate what it is about that example that answers the question. Many subjects will have to think of specific examples in order to figure out an answer, but we don't want to be guessing how a story about what one student did answers a question about the subject's beliefs. We want the subject to state the belief.

This is the TEFA Philosophy and Perspectives Interview with subject [code#] on [date].

Thank you for participating in this study. [Pause]

This interview has 33 questions, plus a few follow-ups to those questions.

questions

1. *How do you see your responsibility and purpose as a teacher?*
2. *How would you like your students to be different after taking a course you teach?*
 - *Can you be specific?*
 - *Are there any other ways in which you'd like them to be different? [Probe hard, push for a comprehensive response.]*
 - *Is it possible and realistic to achieve these results with your students?*
 - *Why or why not?*
 - *[If yes] With which students?*
3. *What other goals do you have for your students that motivate or shape your teaching? Do you have goals for them that are less formal, or more personal, or outside the boundaries of the subject?*
4. *What do you think makes something scientific (mathematical) knowledge rather than other types of knowledge?*
5. *What do you consider evidence that a student has learned a particular subject really well?*
6. *How do you see your roles and responsibilities in the classroom?*
7. *How do you see the students' roles and responsibilities in the classroom?*
8. *How do you try to motivate students to learn?*
 - *Why?*
9. *Can you change or impact the factors that motivate a particular student?*

- How?
 - For which students?
10. What are the general characteristics of good, helpful feedback for students?
- Can you give me an example of this?
11. What are the characteristics of good, helpful whole-class discussion?
- Can you give me an example of this?
12. Are there any general, recurring tensions or trade-offs that you face when making instructional choices? (What?)
- How do you resolve these?
 - Do you perceive a tension between covering sufficient material and covering certain material really thoroughly? *[Only ask this if it hasn't come up. You can also use it as an example of a recurring tension or trade-off if the teacher doesn't know what we mean by this; if you do that, follow up later by asking "Are there any other recurring tensions or trade-offs you face?"]*
 - If so, how do you handle it?
13. When you begin or introduce a new topic, what are the most important things that you try to do?
14. If students don't understand a concept, what kinds of things do you do to help students "make sense" of it?
15. In what ways is cooperative or peer learning among students beneficial?
16. What role do grades serve in your instruction?
- Do you see a tension between evaluating all students according to a uniform standard, and taking students' individual abilities, starting points, and effort into account?
 - If so, how do you handle it?
17. In what ways do you provide feedback to students, and why?
18. For what purposes do you use whole-class discussion?
- How do you run a whole-class discussion?
 - During classroom discussion, what kinds of considerations do you pay the most attention to?
19. When a student says something incorrect in class, how do you handle it?
- Can you give me an example?
20. What considerations are on your mind when you respond to a question that a student asks you?
21. All teachers have experienced a class not going at all how it was planned. When this happens to you, how do you feel?

- *Why do you feel that way?*
22. *Imagine a class in which really good learning is happening, and everything is going as perfectly as you could hope. Please describe what this looks like.*
 23. *What are the characteristics of a good or successful learner?*
 24. *Is it possible for students to become better learners?*
 - *[If yes] For which students?*
 - *What, if anything, can you do to help a student become better at learning?*
 - *What is the most beneficial thing a student can do to improve his or her learning?*
 25. *[Non-baseline] What do you see as the primary benefits of using a "classroom response system" and "technology enhanced formative assessment"?*
 26. *What do you see as the drawbacks?*
 27. *How satisfied are you with what you accomplish in the classroom?*
 28. *In what ways, if any, are you dissatisfied are you with what you accomplish in the classroom?*
 29. *Are there any other ways in which you are dissatisfied with teaching?*
 30. *Can you summarize for me how using a classroom response system and TEFA has changed your teaching?*
 31. *Looking back over the last year, what are the most important realizations, learnings, adjustments, or circumstantial changes that helped you to use TEFA effectively?*
 32. *We'll be starting to work with a new group of teachers next fall, from a different school. What advice would you give to those teachers about using TEFA and being a part of this project?*
 33. *What advice would you give us about working with those teachers?*
 34. *That's the end of the interview! Is there anything else you'd like to add that might help us understand your views on teaching and learning?*

Pause to give the subject a chance to think.

conclusion

Thank you for your time.

appendix 3: TPPI protocol, version 1.0

The written protocol for this version did not specify introductory or concluding comments, and it included fewer guiding comments than subsequent versions.

questions

1. How do you see your responsibility and purpose as a teacher?
2. How would you like your students to be different after the course is over?
 - (Can you be specific? Are there any other ways in which you'd like them to be different?)
[Probe hard, push for a comprehensive response.]
 - Is it possible and realistic to achieve these results with your students?
 - (Why or why not, and with which students?)
3. What other goals do you have for your students that motivate or shape your teaching? (Perhaps things that are less formal, or more personal, or outside the boundaries of the subject?)
4. What do you think makes something scientific (mathematical) knowledge rather than other types of knowledge?
5. How would you describe meaningful learning?
6. What do you consider evidence that a student has learned a particular subject really well?
7. How do you see your roles and responsibilities in the classroom?
8. How do you see the students' roles and responsibilities in the classroom?
9. How do you try to motivate students to learn, and why?
 - Can you change or impact the factors that motivate a particular student? (How? For how many students? Which ones?)
10. What are the general characteristics of good, helpful feedback for students? (Can you give me an example of this?)
11. What are the characteristics of good, helpful whole-class discussion? (Can you give me an example of this?)
12. What are your objectives for this course? What do you hope to accomplish by teaching it?
[Pick a typical course, preferably one that TEFA is being used or will be used in.]
 - If you accomplished these, what would the observable results be? What would success "look like"? (Can you give me an example from your teaching?)
13. Are there any general, recurring tensions or trade-offs that you face when making instructional choices? (What?)
 - How do you resolve these?

- Do you perceive a tension between covering sufficient material and covering certain material really thoroughly? [Only ask this if it hasn't come up. You can also use it as an example of a recurring tension or trade-off if the teacher doesn't know what we mean by this.]
 - If so, how do you handle it?
14. When you begin or introduce a new topic, what are the most important things that you try to do?
15. If students don't understand a concept, what kinds of things do you do to help students "make sense" of it?
16. In what ways is cooperative or peer learning among students beneficial?
17. What role do grades serve in your instruction?
- Do you see a tension between evaluating all students according to a uniform standard, and taking students' individual abilities, starting points, and effort into account?
 - If so, how do you handle it?
18. In what ways do you provide feedback to students, and why?
19. For what purposes do you use whole-class discussion?
- How do you run a whole-class discussion?
 - During classroom discussion, what kinds of considerations do you pay the most attention to?
20. When a student says something incorrect, how do you handle it? (Can you give me an example?)
- What considerations are on your mind when you respond to a question that a student asks you?
21. All teachers have experienced a class not going at all how it was planned. When this happens to you, how do you feel? (Why?)
22. Imagine a class in which really good learning is happening, and everything is going as perfectly as you could hope. Please describe what this looks like.
23. What are the characteristics of a good or successful learner?
- Is it possible for students to become better learners? (How? For how many students? Which ones?)
 - What, if anything, can you do to help a student become better at learning?
 - What is the most beneficial thing a student can do to improve his or her learning?
24. [Baseline] I know we haven't really talked about these yet, but if you have any thoughts or expectations about "classroom response systems" and "technology enhanced formative assessment", what do you expect the benefits of using these to be?
- What do you think the drawbacks might be?

25. *[Non-baseline]* What do you see as the primary benefits of using a "classroom response system" and "technology enhanced formative assessment"?
- What do you see as the drawbacks?
26. How satisfied are you with what you accomplish in the classroom? (Why?)
- How dissatisfied are you with what you accomplish in the classroom? (Why?)
 - Are there any other ways in which you are dissatisfied with teaching? (Please explain.)
27. How confident do you feel about your scientific or mathematical knowledge of the topics covered by this course?
- *[If less than confident]* How do you think that this affects your teaching?
28. *[Baseline]* In terms of your personal and professional objectives, what do you hope to get out of this professional development program? (Why?)
29. *[Non-baseline]* In what ways, if any, is this professional development program fulfilling your personal and professional objectives? (In what other ways would you like it to?)
- In general, how do professional development activities fit into your personal goals?
30. If you had an opportunity to choose or create site-based professional development activities, what would they be?