Teaching Discussion among Graduate Mathematics Teaching Assistants: Elements contributing to teaching discourse

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Abstract

Concern regarding the quality of undergraduate mathematics instruction has drawn attention to the professional development of graduate mathematics teaching assistants (GMTAs), who often fill the role of instructor rather than assistant. Consequently, many programs have been developed to support GMTAs teaching development. Often these programs rely upon teaching dialogue among GMTAs; hence, the successful preparation of GMTAs in part depends upon their ability to carry out productive discussion regarding teaching.

During one discussion-based GMTA professional development program, we studied GMTAs' discourse about teaching. Through this study, we identified various elements on which GMTAs relied to contribute to teaching discussions. These included past and current teaching experiences, discussions with peers and faculty, cognitive concepts developed through their apprenticeship of observation, and interests and skills that they personally bring with them. GMTAs utilized these elements differently throughout their discussions, such as for clarification, justification, and control. This paper/presentation details these elements, their roles, and resulting implications.

Background

Graduate Mathematics Teaching Assistants (GMTAs) have become an integral part of undergraduate mathematics instruction (Belnap & Allred, 2006). Contrary to their title "assistant," according to recent surveys about half of GMTAs teach their own classes (Belnap & Allred, 2006), serving as the instructor or record for 14% of pre-college, 10% of introductory, and 7% of calculus level mathematics classes (Lutzer, Rodi, Kirkman, & Maxwell, 2005). As instructors of record, they teach 8% - 13% of students in undergraduate mathematics classes in the United States (Lutzer et al., 2005).

Accompanying this involvement is a growing interest in preparing and supporting GMTAs as teachers. Belnap and Allred (2006) found that most mathematics departments provide formal programs that train, orient, or provide professional development for their GMTAs; some have even integrated multiple programs into complex systems to support their GMTAs' development.

Unfortunately, in spite of the large number of programs provided, there is (and has been) little research addressing the professional development of GMTAs (Belnap & Allred, 2006; Speer, Gutmann, & Murphy, 2005; Carroll, 1980). To gauge effectiveness of programs, inform their implementation in varied contexts, and understand how to improve them, we still need reserach that examines programs in detail and that helps us understand their underpinnings (Belnap & Allred, 2006; Speer et al., 2005).

In our current research agenda, this is what we have set-out to do. Existing departmental preparation programs vary greatly in their approaches, often incorporating some combination of these activities: micro-teaching (simulated teaching experiences), case discussions (e.g. Friedburg et al., 2001), question/answer panels, course meetings, and group teaching discussions (Belnap & Allred, 2006). All of these have a common element; they all rely on dialog among GMTAs about teaching. This means that to some degree, the success

and/or effectiveness of departmental programs rely on the ability of GMTAs to successfully engage in and contribute to discussions about teaching with their peers. This leads to the question: How can we empower GMTAs to contribute positively to such discussions?

Context and Methodology

The VOPS research study, initiated fall semester 2006, is an ongoing, longitudinal, qualitative research study aimed at understanding and developing a form of professional development involving Video Observations with Peer-feedback Sessions (VOPS). During the first year of the study, we noticed that participants seemed to rely upon different things from their experience and background in order to contribute to the discussions. To understand what these elements were and how GMTAs utilized them, we formulated two research questions and began intense analysis to better understand what empowered GMTAs to contribute to the discussions. This paper reports on results from the analysis of one session of the VOPS program, addressing our two research questions: What elements (*things*) do GMTAs draw upon in order to contribute to teaching discussions? and How do they utilize these elements to contribute to the discussions?

Departmental Context

The department in which we initiated both the VOPS program and the VOPS study was a department of mathematics education housed within a college of science at a large western university. The department was small, consisting of about 15 full time faculty and 12 graduate students–most of whom were full time and all of whom were in the MA program, which was the department's only graduate degree. The department had responsibility for the secondary education program, but regularly provided service to the mathematics department and college of education by teaching mathematics content courses.

Most of the graduate students in the department received financial aid during their

two-year degrees through paid teaching assistantships, as do graduate students in many mathematics departments. Individual teaching responsibilities varied each semester, but generally consisted of either teaching multiple lab/discussion sections for a large lecture course or being the sole instructor for one or two classes. Assigned courses included typical introductory level mathematics classes (e.g. College Algebra, Trigonometry, Business Calculus, or Calculus) and the mathematics content courses for preservice elementary school teachers. Because these assignments are typical of graduate mathematics teaching assistants in mathematics departments and because most of these courses were administered and supervised by the mathematics department, we classified these students as GMTAs.

Because of the involvement of GMTAs in teaching, the department felt the need to provide them with some form of ongoing teaching support or professional development. Prior to the VOPS program, the department's only form of formal training or professional development was an annual GMTA seminar, provided in conjunction with the department of mathematics. This was a typical *orientation program*, as classified by Belnap and Allred (2006), lasting eight hours a day for three days just prior to start of GMTAs' responsibilities. Although there were components that addressed pedagogy, grading, and lesson planning, as well as a microteaching session, it did not provide any ongoing teaching support or development opportunities for the GMTAs.

Using the vernacular of Belnap and Allred (2006), we decided to meet the mathematics education department's needs by designing an *establishment program*, which would then function in conjunction with the existing *orientation program* as a *sustained professional development system*. Thus the initial orientation program would provide the GMTAs with an introduction to their responsibilities as GMTAs in the department, and the new *establishment program* would provide ongoing support and professional development, giving them continual opportunities to develop their teaching practices and improve as instructors.

To do this, we considered the individual needs of the GMTAs. We assumed that

GMTAs in the department were not typical of GMTAs in mathematics departments, for several reasons. First, the GMTAs all had prior degrees in mathematics education. This meant that, although not as extensive as an undergraduate mathematics major, the GMTAs would have had significant experience with undergraduate mathematics. Additionally, they would have taken a number of education courses, which should have included courses on methodologies of teaching (e.g. pedagogy, lesson planning, and classroom management). Second, the GMTAs in the department usually had at least one year of K-12 teaching experience; thus they were not novice teachers, although they may not have taught the same material that they would be expected to teach as GMTAs.

To meet these specific needs, we wanted a program tailored to non-novice instructors. In his yearlong case study of GMTAs, Belnap (2005) found that GMTAs with prior teaching experience were highly critical of the departmental programs provided them. They desired that their programs be closely connected with their current teaching assignments, make effective use of time, add something unique to their experience, and be at a higher level than typical introductory teaching direction/orientations. We took this into account when designing the VOPS program.

VOPS Program

The main purpose of the VOPS program was to provide GMTAs with a flexible form of professional development, with few rules or consequences. We designed the VOPS program to achieve three main goals: first, to encourage a community of teaching among GMTAs; second, to provide an opportunity for participants to receive instructional feedback; and third, to encourage discussions about teaching among the GMTAs.

To meet departmental and GMTA needs, we designed the VOPS program as a year-long, discussion-based *establishment program* (Belnap & Allred, 2006), adapted from the Video Clubs described by Sherin (2000) and Sherin and Han (2004). VOPS consisted of

weekly 50 minute sessions, in which GMTAs would discuss teaching, using classroom video footage as a catalyst for the discussions. Each session transpired as follows: first, a featured GMTA would provide background on the clip to be shown; second, participants would watch a clip containing about 15-20 minutes of classroom instruction/activities and third, the remaining 25-30 minutes would be spent providing feedback on the teaching viewed or discussing other teaching topics that arose.

Each clip shown consisted of segments of actual classroom instruction from a participant volunteer's class. Each week, one GMTA volunteered to have his/her class videotaped. The volunteer was then provided with a copy of the tape and the option of selecting 15-20 minutes worth of video from the class. The selections were edited into a video clip, to be shown at the upcoming session. When volunteers declined to select the clip, the faculty participant (researcher) selected the clip, choosing segments representative of the activities and instruction that took place.

To meet the program's goals, the faculty participant played the role of discussion monitor, rather than facilitator. During the first session, the faculty member acted as facilitator, directing much of the discussion and actively participating. As a result, we noticed that GMTAs did not openly participate and did not initiate threads of discussion. By changing this role to monitor, wherein the faculty member refrained from taking a leadership role, there was an immediate change in the discussion dynamics. GMTAs participated openly and were much more involved in the discussions. They took control of the discussion, including its flow, its nature, and its content.

The resulting VOPS structure matched departmental and GMTA needs. Because of the small group size, all GMTAs' had multiple opportunities to receive feedback and discuss their teaching with their peers, linking the experience closely to their current teaching assignments. Furthermore, the unfacilitated nature of the discussion encouraged GMTA participation and gave the GMTAs control over the level of content discussed; this also

made the video clips act more as a catalyst for discussion, rather than the sole focus of discussion. GMTAs also were able to discuss anything they felt appropriate, tailoring the sessions to their own needs/desires.

Participants

During this pilot year, participation in the VOPS program was voluntary. The first semester, fall semester 2006 (in which the focus session took place), six participants regularly attended: five GMTAs (called Ann, Liz, Lyndsey, Maud, and Sarah) and a faculty monitor (the study's principal investigator).

In some sense, this was an "ideal" situation for seeing what potential such a program could have. As experienced teachers, participants had experience teaching, reflecting on, and probably even discussing teaching. Having had educational degrees, they are likely to have discussed teaching before and observed other teachers during practicum experience. So, we expected to see productive discussion, from which we could identify what they drew upon that empowered them as participants in peer-to-peer teaching discussions.

Data Collection

The primary data source arose from videotapes of the sessions. Each week, we videotaped the discussions that took place during the VOPS. We then transcribed the sessions. These transcripts served as the primary data source, with videotapes used to clarify problematic passages through occasionally important nonverbal cues. This paper focuses on the analysis of the transcript and video from the second VOPS.

Preliminary findings were presented to participants in end-of-semester interviews. This allowed us an opportunity to member-check some results. Additionally, participants completed questionnaires at the beginning of each semester. Through these questionnaires, we determined background information, schedules, and teaching assignments.

Data Analysis and Results

As mentioned, the focus of this paper and our first major objective in the VOPS study was to address two research questions: What elements (*things*) do GMTAs draw upon in order to contribute to teaching discussions? and, How do they utilize these elements to contribute to the discussions?

In order to address these questions, we conducted three phases of analysis on one session's transcript. The first phase focused on the first research question; we determined what things participants relied on as they participated in the discussion. The second phase focused on identifying the function that each contribution played in the discussion's development. The third phase focused on comparing results from the first two phases, in order to identify how GMTAs utilized each element in the discussion.

A description of these phases and relevant results now follows. A portion of sequence 11 (in tables 1 and 2) is provided and referenced throughout to illustrate the frameworks described. For space considerations, the GMTAs referred to as Ann, Maud, Lyndsey, Liz and Sarah are referenced by initials (A, M, L, Lz, and S respectively).

What elements do GMTAs draw upon to contribute to teaching discussion?

Our first analysis centered on identifying elements that GMTAs drew upon as they contributed to the discussion. In order to develop theory that accurately reflected the data, we used a Grounded Theory (Strauss & Corbin, 1998) and constant comparison method of analysis.

We first took the transcript and divided it up into individual contributions (*turns* speaking). Starting with a block of text, we took all of the participants' contributions and searched for evidence that participants were relying upon something in order to contribute to the discussion. When we found such evidence, we annotated the contribution with a phrase describing on what the participant was drawing. Once we had completed the block

of text, we clustered the statements by similarities in our annotations. Resulting clusters were not mutually exclusive. Next, we conceptualized the groups and formed categories, using observed attributes and properties to create descriptions and definitions. We then took the resulting framework and applied it recursively to subsequent blocks of text, adjusting the categories and definitions until we had completed the session. At that point, we recoded the transcript, negotiating differences until we reached a consensus. During this process, we merged categories that had similar themes and subdivided some categories, which had clear sub-themes.

The resulting framework consists of eight different conceptual elements (categories). These are: *Student Perspective*, *Commonalities*, *Classroom Experiences*, *Teaching Discussions*, *General Concepts*, *Teaching Reflections*, *Pedagogical Creativity*, and *Instructional Inquisitiveness*.

The category *Student Perspective* refers to an ability to identify with, understand, or see things from the perspective of a student. We placed statements in this category if there was evidence that the contributor used this ability in order to understand how students would think, experience, or perceive things. Sometimes the contributor evidenced this by speaking of students in the first-person voice, but this was not always the case.

Sequence 11 (in table 1) shows examples of Student Perspective. Ann draws upon a student perspective in the end of L111. Here she hypothesizes regarding what she thinks the students in her class must have experienced, that they just could not handle any more of the topic. Lyndsey also demonstrates the use of a student perspective in L119 and L121, when she speaks about how it would be difficult (as a student) to be forced to continue doing mathematics beyond some point.

Commonalities was a more abstract category, referring to the level to which participants share common or have uncommon thoughts, ideas, experience, or other things. We did not code all evidences of commonality in this category; we only coded statements in this

...		...	...
L104	Instr.Inquis.	M:	Do you think that's a key to like teaching stuff like that?
L105	Class.Exper.	M:	Like I just remember observing Judith's class when they were doing the cat task which went FOR-EVER.
L106	Class.Exper. Common.	A:	That went too long. And I think that they decided that—I think she and Hannah decided that they weren't going to.
L107	Common.	M:	They're not going to do that again.
L108	Common.	A:	Well, I think they just, like they've changed up their curriculum, just a little bit. Not a lot, but like–
L109	Gen.Concepts	M:	We live in such a sound-byte world that I don't–if–and I don't want to say that they can't or that they shouldn't do this, but maybe they need to be trained to concentrate on one task or like to think about one thing for a long time. (muffled)
L110	Common. Instr.Inquis.	M:	Do you do that, where you like, switch gears?
L111	Tch.Discuss. Class.Exper. Stud.Persp.	A:	Well I talked to Sarah about this after this class, because I was like, "Oh, this is terrible." And it was just like there was no energy in the class. There were times, and actually he caught some times when there were energy–there were times when there really was no energy. Like it was (pause) dead. (chuckles) And, um, I think it was because the same topic, they were just DONE with that topic; and you like shut-off your brain; you know, you just, there's just not ANY MORE of that topic that you can take, for THAT time period.
L112		Lz:	Right, but maybe when you come back to it, like today or like just you know–
L113		A:	Yeah.
L114	Gen.Concepts	Lz:	–after today, they'll have been thinking about it and might have some different ideas.
L115		A:	That's true. That's true.
L116	Class.Exper.	M:	Yeah, like that's what happens to me, where I, I'm working on something and then I can't think about it anymore, so I take a break. But while I'm doing something else, I think about it still and I go back and make notes.
L117		A:	Yeah.
L118		M:	Like your brain still works on it. If you're not–
L119	Stud.Persp.	L:	It's just hard to be forced to–
L120		M:	–if you're not forced to–
L121	Stud.Persp.	L:	–keep producing.
L122		A&M:	Yeah.
...		...	...

Table 1: Elements drawn upon in sequence 11

category if there was evidence that the level of commonality was expressly *used* or *relied upon* to accomplish something in the dialogue. Drawing on this meant that the participant's contribution relied on the fact that there was something common, or that it relied on the fact that there was something uncommon.

For example, in sequence 10 (not shown), GMTAs are discussing a pedagogical approach to keeping student involved and Maud simply says, "That's liek what David had us do in 661, last time," referencing a common class the GMTAs were taking, with out further detail. Here, Maud utilized the commonality of their class espereince to provide an instance of how turning discussion back to groups increased student involvement, with little explanation; she relied on the commonality to convey the details. On the other hand, in L110 of sequence 11, Maud askes if Ann makes changes in her classroom activities; this question derives its ability to elicit a detailed response from the fact that Maud is not familiar with Ann's class, that they do not have that common experience; thus in L110, Maud's statement falls into the category of Commonality, because it relies on a *lack of* commonality in their experience to elicit a response.

Classroom Experiences refers to the utilization of any concrete, explicitly classroom experience. Statements were categorized as drawing upon classroom experiences if there was clear reference to or evidence that the contribution was based on specific classroom experiences. This includes experiences in which the contributor was a teacher or an observer, as well as those in which the contributor was a student.

Examples of classroom experiences are quite plentiful. Throughout sequence 11, GMTAs draw upon classroom experiences. In L105 and L106, Maud and Ann reference experiences in which they observed a task that went too long. In L111, Ann draws upon her experience teaching a class. Finally, in L116, Maud talks about her experiences in such detail that it is clear that she has specific experiences that underly her comments.

The category *Teaching Discussions* refers to discussions regarding teaching, that they

have had with other individuals, prior to the current session. Items were thus categorized if there was clear evidence that the contribution came from such a source. For example, Ann makes it clear that she spoke with Sarah about the videotaped class prior to the session (in the beginning of L111) and that L111 stemmed from that discussion.

Like Commonalities, *General Concepts* was another abstract category. This element refers to cognitive constructs that participants have developed, which center around teaching. This includes one's "apprenticeship of observation" as described by Lortie (1975). It also extends beyond, to include other (even recent) experiences which have been integrated into their views, beliefs, and/or mental schemas. Such cognitive images include their concepts of teachers and students; they also include relevant beliefs, views, values, and expectations. We classified contributions in this category if there was evidence of underlying assumptions or ideas, without explicit connection to specific events or experiences.

Maud exemplifies this well in L109. There, she makes a general statement that students may need to be trained to concentrate longer on tasks. Underlying her statement are expectations or views regarding students, their current abilities and/or attention spans as well as what can/should be done about it. Since there is no explicit connection to specific experience or events, we infer this to draw upon her General Concepts.

In L104, Liz also shows this. Her statement relies on the idea that students actually *will* continue thinking about a task if you leave it, an idea not explicitly linked to concrete experiences, hence coded General Concepts.

The element *Teaching Reflections* refers to personal reflections on teaching by the contributor, prior to the session. We only placed statements in this category if there was explicit reference or implication that the contribution stemmed from such a reflection. This category seems elusive, since participants may not always provide the verbal references necessary to identify it. Some examples do occur. In sequence 10 (not shown), Ann states, "I think that's something that I haven't done actually, something I thought of this morning."

The final phrase shows evidence that her subsequent contribution came from a reflection on her teaching, one prior to the session.

Pedagogical Creativity refers to the skill of generating pedagogical ideas, that is being able to problem solve or generate ideas and approaches regarding teaching. Statements fell in this category if they generated or constructed some pedagogical idea, with no accompanying evidence that the participant had experienced it before; otherwise, it would indicate drawing upon something else, such as general concepts, classroom experience, or another source.

Instructional Inquisitiveness refers to an integration of a participant's motivation and ability to inquire or ask questions with the apparent goal of extending or deepening their content, pedagogical, or pedagogical content knowledge. Contributions fit into this category if they represented an inquiry regarding teaching; we inferred that such were due to a desire to learn more about instruction.

Maud draws upon this in L104 and L110. In those contributions, she inquires about teaching related topics, presumably with the intent of deepening or clarifying her own knowledge of teaching.

The elements referenced above represent a collection of resources upon which participants drew as they chose to participate in teaching discussions. As such, it is entirely possible for participants to rely on multiple elements within a single contribution (e.g. L106 and L111).

What function do GMTAs' contributions play in the discussion?

As described, the first layer of analysis allowed us to take each individual contribution and identify what elements GMTAs drew upon to make that contribution. To then determine how each element was used to contribute to the discussion, we first set out to identify the role the contribution played in the discussion.

As we describe in (Belnap & Withers, 2008), we accomplished this by developing the Framework for Conceptualized Function (FCF). First, we divided the session's transcript into sequences—sequences are essentially blocks of discussion that address a task or topic. Because of the discussion's complexity, we incorporated two frameworks and various techniques (Belnap & Withers, 2008). With sequences identified, we then identified the dominant task of each sequence; the sequence and this task represented the interpretive context for each contribution's function. Finally, using a Grounded Theory (Strauss & Corbin, 1998) and constant comparative approach of analysis, we developed the FCF.

As detailed in (Belnap & Withers, 2008), the FCF provides a way of identifying the function of individual contributions relative to the dominant task and surrounding contributions. The FCF describes 16 categories of function, of five main types: Building Blocks, Alterations, Validations, Variable Functions, and Simple Responses. Below, we provide only a brief description of these categories, because a much more detailed description, with examples, is provided in (Belnap & Withers, 2008).

Of the 16 functions, three of them functions as Building Blocks: *suggestions*, *propositions*, and *information*. Statements having these functions provided substantive content from which the discussion built. Other contributions built upon the information that these statements provide. Distinctions among the three stem from how they relate to the dominant task and what they contribute. *Suggestions* directly address the dominant task; *propositions* do not, but contribute to the ideas and development of the discussion; and *information* only provides contextual or background information (at best).

The functions *extension (extend)*, *modification (modify)*, and *clarification (clarify)* serve as content *Alterations*; they alter the content of other contributions. *Extensions* add new ideas, dimensions, or content to a prior contribution with the same functional effect. *Modifications* change some substantial ideas in a prior contribution, presenting it with the same functional effect. *Clarifications* provide an instance, illustration, or clarification of a

prior contribution.

Validations consist of functions that affect the perceived or actual validity/truth of other contributions. These include *justification (justify)*, *invalidation (invalidate)*, *confirmation (confirm)*, *qualification (qualify)*, and *evaluation (evaluate)*. *Justifications* tell *why* a contribution is true/valid. *Invalidations* explicitly discredit, contradict, or weaken a prior contribution. *Confirmations* assert the validity/truth of a prior contribution without explanation or example. *Qualifications* do not invalidate a contribution, but limit its scope or applicability. *Evaluations* pass judgment on a contribution's meaning.

Variable Functions include functions that derive their role from the contributions to which they connect. These include *continuation (continue)*, *incompletion (incomplete)*, *request*, and *restatement (restate)*. *Continuations* extend a contributor's own prior contribution, with the same function. *Incompletions* are incomplete thoughts or statements. *Requests* explicitly solicit different types of contributions. *Restatements* are partial or complete revoicings of prior contributions, including paraphrasing and rewording.

Simple Responses is itself a category of its own. Statements function in this capacity if they simply convey agreement, acceptance, or acknowledgment, without functioning in any of the other roles described above.

As noted by the verb and noun forms of their names, all of the functions listed (except for Building Blocks and Simple Responses) directly connect with or act on other contributions. Thus the FCF provides a way of describing the function of each contribution and how the contributions relate/link to one another to form the structure of the sequence. So, we used the FCF to identify the role of each contribution, preparing us to address our second research question. Table 2 shows sequence 11, coded using the FCF. Pairs of codes indicate the function, followed by the object of that function. As examples: in L112, Liz offers an incomplete suggestion; in L114, she continues that suggestion; in L115, Ann confirms the suggestion; and in L116, Maud clarifies it, by providing an instance of it.

	Sequence 11:		*Task—How to keep students mentally involved with the content during class activities*
...		...	...
L104	Req.Confirm. Clar.-Info.	M:	Do you think that's a key to like teaching stuff like that?
L105		M:	Like I just remember observing Judith's class when they were doing the cat task which went FOR-EVER.
L106	Info.-Clarif.	A:	That went too long. And I think that they decided that—I think she and Hannah decided that they weren't going to.
L107	Conf.-Info.	M:	They're not going to do that again.
L108	Mod.-Info.	A:	Well, I think they just, like they've changed up their curriculum, just a little bit. Not a lot, but like–
L109	Suggestion	M:	We live in such a sound-byte world that I don't–if–and I don't want to say that they can't or that they shouldn't do this, but maybe they need to be trained to concentrate on one task or like to think about one thing for a long time. (muffled)
L110	Req.Confirm.	M:	Do you do that, where you like, switch gears?
L111	Proposition	A:	Well I talked to Sarah about this after this class, because I was like, "Oh, this is terrible." And it was just like there was no energy in the class. There were times, and actually he caught some times when there were energy–there were times when there really was no energy. Like it was (pause) dead. (chuckles) And, um, I think it was because the same topic, they were just DONE with that topic; and you like shut-off your brain; you know, you just, there's just not ANY MORE of that topic that you can take, for THAT time period.
L112	Inc.(Suggest.)	Lz:	Right, but maybe when you come back to it, like today or like just you know–
L113	Simp.Rsp.	A:	Yeah.
L114	Cont.-Sug.	Lz:	–after today, they'll have been thinking about it and might have some different ideas.
L115	Conf.-Sug.	A:	That's true. That's true.
L116	Clarif.-Sug.	M:	Yeah, like that's what happens to me, where I, I'm working on something and then I can't think about it anymore, so I take a break. But while I'm doing something else, I think about it still and I go back and make notes.
L117	Simp.Rsp.	A:	Yeah.
L118	Justif.-Sug.	M:	Like your brain still works on it. If you're not–
L119	Extnd.-Jst.	L:	It's just hard to be forced to–
L120	Cont.-Just.	M:	–if you're not forced to–
L121	Cont.-Ext.	L:	–keep producing.
L122	Simp.Rsp.	A&M:	Yeah.
...		...	...

Table 2: FCF coding for sequence 11

Sequence 11							
L104:	Instr.Inquis.	—	Req.Conf.	L110:	Instr.Inquis.	—	Req.-Conf.
L105:	Class.Exper.	—	Clarif.-Req.	L111:	Tch.Discuss.	—	Proposition
L106:	Class.Exper.	—	Info.-Clarif.	L111:	Class.Exper.	—	Proposition
L106:	Common.	—	Info.-Clarif.	L111:	Stud.Persp.	—	Proposition
L107:	Common.	—	Cont.-Info.	L114:	Gen.Conc.	—	Cont.Sug.
L108:	Common.	—	Mod.-Conf.	L116:	Class.Exper.	—	Clarif.Sug.
L109:	Gen.Conc.	—	Suggestion	L119:	Stud.Persp.	—	Extd.Justif.
L110:	Common.	—	Req.-Confirm	L121:	Stud.Persp.	—	Cont.-Ext.

Table 3: Element-function pairs for part of sequence 11

How do GMTAs utilize these elements to contribute to the discussions?

There were four major ways in which GMTAs drew the identified elements in order to contribute to the discussions: first, GMTAs contributed ideas or content to the discussions, serving as building blocks or the discussion; second, they provided clarification or instantiations of ideas or other contributions; third, they directly addressed the validity of other contributions, discrediting, invalidating, qualifying, or justifying contributions; and fourth, they provided requests, eliciting (or attempting to elicit) responses and conversation from their peers. GMTAs did these things not only by providing novel, stand-alone contributions, but also by modifying, continuing, extending, or restating prior contributions.

We identified how elements were used by examining connections between identified elements and functions. Taking each contribution (or part thereof), we formed element-function pairs by pairing the element being utilized with the function of the statements in which it was utilized. Then, to look at the role of the statements in the discussion, we removed some of the structural information. We did so by looking at each statement's essential role in the conversation, without concern for whether it was a modification, continuation, extension, or restatement; we did this by interpreting such functions by the function of the contributions on which they acted. For instance, table 3 provides the element-function pairs for sequence 11. In this sequence, L106 functions to provide information following up on

the clarification in L105; L107 continues this contribution, providing additional information; thus, the essential function of both L106 and L107 is that of providing information. In a similar way, the L108, L114, L119, and L121 function essentially as confirmation, suggestion, justification, and justification (respectively).

Together, the elements and essential functions provide a view of what elements GMTAs are drawing upon and how they are utilizing them to contribute to the discussion. For example, we see that in sequence 11 (table 3) GMTAs drew upon classroom experience in three of the four ways; they used it to contribute ideas/content (e.g. L106 and L111) and provide clarification/instantiation (e.g. L105 and L116). They also drew upon student perspective in order to contribute ideas/content (e.g. L111) and address validity of other contributions (e.g. L119 and L121).

We noticed that GMTAs drew upon all of the eight elements in ways that generally overlapped. Table 4 summarizes the way that we saw elements utilized in the session and sequences analyzed; rows represent the eight elements identified; and columns represent the four roles that statements played (as described above): a) contribute ideas/content, b) provide clarification/instantiation, c) address validity, and d) provide requests.

	Content	Clarification	Validity	Requests
Student Perspective	3	2	6	0
Commonality	20	10	13	7
Classroom Experience	19	16	14	1
Teaching Discussion	6	2	3	0
General Concepts	7	2	6	0
Teaching Reflection	2	0	3	0
Pedagogical Creativity	9	1	1	0
Instructional Inquisitiveness	0	0	0	7

Table 4: How GMTAs utilized each element during the session.

Overall, we found that GMTAs drew upon a variety of elements as they contributed to the discussion. They utilized each in various ways. As shown in the table, most elements

were utilized in various ways throughout the discussion. Commonality and Classroom experiences were utilized most frequently, being utilized in all four ways. The other elements (except for Instructional Inquisitiveness) were utilized in at least two or three ways.

Even though most elements were utilized in multiple ways, each seemed to have one way in which it was most often utilized, although some seemed to have secondary and tertiary uses almost as common. Commonality, Classroom Experience, Teaching Discussion, General Concepts, and Pedagogical Creativity were most often utilized to provide the underlying content for the discussion; Student Perspective and Teaching Reflection were most often utilized to address the validity within the discussion; and Instructional inquisitiveness was (probably by nature) only seen in requests for responses. Commonality, Classroom Experience, General Concepts, and Teaching Reflection all had an almost equally dominant secondary function; for Commonality and General Concepts this was addressing validity; for Classroom Experience this was providing clarification/instantiation; and for Teaching Reflection, it was providing content. Finally, Classroom Experience had a strong tertiary use, that of addressing validity.

Likely due to the way in which it arose, Instructional Inquisitiveness was only evident in being used to request responses for participation. For it, it was useful and informative to look at the nature of those requests, by looking at what type of response it requested. Of the seven requests, four were requests for confirmation, two were requests for suggestions, and one was a request for clarification.

Discussion

Looking back at our analysis and results, one thing that is apparent to us is that the VOPS discussion was characterized by numerous efforts to establish content, but with a profound lack of inquiry. This is evident by the fact that GMTAs drew upon their resources in order to provide, add to, or modify the substantive content of the discussion. On the

other hand, GMTAs did not draw upon much in order to inquire regarding teaching; in fact, little inquiry took place at all. In the analysis, we found only ten instances of requests, six of which were simply requests for confirmation; two were requests for suggestions; and two were requests for clarification. Thus, on the whole, discussion centered on providing content and deliberating on that content.

The VOPS discussion could also be described as based heavily on GMTAs' experiences, with high intervention by the levels of commonality present among GMTAs. As we say, commonality and classroom experience were relied upon equally by the GMTAs, and these by far more often than other elements.

This may be due to the large number of classes and experiences that the participants had in common; for instance, they had similar teaching backgrounds, were taking or had taken the same classes, and some had even observed the same teachers. Furthermore, some of these classes involved different forms of non-traditional pedagogy. We do not believe that the overwhelming presence of classroom experiences was simply due to the presence of the clip, especially since the experiences drawn upon were diverse in type (including experiences as teacher, student, and observer) and were not usually directly connected to the class that was videotaped.

Whatever the reason, it is interesting to note that the participants did not directly draw upon their general concepts in generating their contributions. It is possible that individual views and beliefs may not have been considered authoritative evidence to support opinions or decisions on a group level; however, nothing was said explicitly to deter such contributions or require more concrete contributions. So, although views, beliefs, and cognitive constructs may influence their contributions, more concrete experiences appeared to be more directly presented in discussion.

This suggests that a program, such as VOPS, may have the potential to create teaching discussion which encourages participants to draw on elements other than their appren-

ticeship of observation. It may thus be possible for such a program to be used to challenge tacitly held beliefs, provided that this pattern of elemental use holds in different contexts (e.g. different departments or GMTAs with different backgrounds).

This is definitely something that would have to be determined through further research, because there are a number of pertinent, unresolved questions that arise from this study. In particular, we do not know what led to this nature of discussion. It is conceivable that the type of discussion that we noticed was due to the participant selection (all having prior K-12 teaching experience and degrees), their level of familiarity with the course and their assignments, the nature of the class viewed (a non-traditionally structured elementary education content class verses a traditional entry-level courses), personal traits or social patterns among the participants, the nature of the classes participants were concurrently taking, or even the current teaching assignments of participating GMTAs.

Our results may also be due to the pooled nature of our results. It is possible and even probable that individual sequences may differ in nature. This is one direction that we are currently going with our analysis. We are now looking at individual sequences to determine what similarities and differences exist among them and to see if they can be characterized.

We also plan to extend our analysis to different sessions and contexts. We already have data to analyze allowing us to contrast VOPS discussion with the same group of GMTAs after weeks of experience in the session and after teaching assignments have changed. We have data to analyze among GMTAs with homogenous assignments. We also have data to look at taken from among more typical GMTA populations (having no prior teaching experience or education degrees) having VOPS discussions, as well as carrying out discussion in another type of program (case discussions).

One thing is clear, GMTAs do draw upon elements that, in theory are accessible to departmental professional development programs. The questions remain: How can these elements be accessed? and How should they be accessed in order to provide GMTAs with

the best experience and teaching development opportunities that we can provide? This are the questions we continue to pursue.

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