

TRANSITIONING FROM CULTURAL DIVERSITY TO CULTURAL COMPETENCE IN MATHEMATICS INSTRUCTION

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We report on our work to build an applied theory for intercultural competence development for mathematics teaching and learning in secondary and tertiary settings. We use research in social anthropology and communications to investigate the nature of intercultural competence development for mathematics instruction among in-service secondary mathematics teachers and college faculty participating in a university-based mathematics teacher professional development program. We present results from quantitative and qualitative inquiry into the intercultural orientations of individuals and some groups (teachers, teacher-leaders, university faculty and graduate students) and offer details on the development of case stories for use in the professional development of mathematics university teacher educators, in-service teacher leaders, and secondary school teachers.

Keywords: teacher preparation, intercultural competence, professional development, diversity

The great challenge for professional learning is that [a learning] experience occurs where design and intention collide with chance. (Shulman, 1998)

*I wanted to explain why some people seem to get a lot better at communicating across cultural boundaries while other people didn't improve at all, and I thought that if I were able to explain why this happened, educators could do a better job of preparing people for cross-cultural encounters.
(Bennett, 2004)*

Lee Shulman (1998), in reviewing the education of professionals (e.g., doctors, lawyers, teachers, clergy) in the 20th Century, noted six defining characteristics of a profession:

1. the obligations of *service* to others, as in a “calling”;
2. *understanding* of a scholarly or theoretical kind [e.g., mathematics, pedagogy];
3. a domain of skilled performance or *practice*;
4. the exercise of *judgment* under conditions of unavoidable uncertainty [e.g., instructional decision-making in classroom contexts];
5. the need for *learning from experience* as theory and practice interact; and
6. a *professional community* to monitor quality and aggregate knowledge. (p. 516)

These characteristics play out in a variety of ways throughout engagement in a chosen profession and cultural implications are woven through all six. The first is seen by many as a given (especially in light of teacher pay). The second is addressed in the college degree expectations for pre-service teachers and the continued focus of in-service teacher professional development

on learning content, pedagogy, and pedagogical content knowledge. The third and sixth points have had increasing attention in the recent past (e.g., “Mathematical Quality of Instruction” observation protocols, Hill, 2010, and the drive to develop professional learning communities, Borko, 2004). The fourth and fifth items in the list are now emerging as areas for research and foci for teacher professional development. In particular, “human judgment always incorporates both technical and moral elements, negotiating between the general and the specific, as well as between the ideal and the feasible” (Shulman, 1998, p. 519).

Given the diversity of students in the nation’s classrooms, teachers in U.S. schools are destined to have opportunities for daily cross-cultural experiences that, for most, will be fraught with unavoidable uncertainty. Now, consider the current state of the art in teacher professional education. What is overtly, clearly, and explicitly offered to pre- and in-practice teachers for being aware of the unavoidable uncertainty in their work, much less about how to make morally and contextually complex judgment calls? Not much. In part this is evidenced by the new teachers who leave the profession within a few years, citing as the reason that they feel they were not prepared for what the work is really like by the teacher education program (Keigher, 2010). If characteristic 4 is not well addressed in teacher education, then an alternative is category 5: Learn it from experience. Learning from experience requires a multifaceted mirror of reflective practice, one that teachers can use to see cross-cultural encounters *as opportunities* to learn.

Background

While the significance of diversity as a factor in the education of American children has been widely discussed for many years, the nature of “diversity” continues to evolve in U.S. classrooms (Aud, Fox, & KewalRamani, 2010). Further, while a similar diversity is evident in some school staffing (e.g., paraeducators, in-class assistants), the teacher and administrator populations continue to be more homogeneous than varied in terms of government-surveyed categories of identification and experience like race, education, and socialization (Strizek, Pittsonberger, Riordan, Lyter, & Orlofsky, 2006). Many reports from research and practice indicate that culture is a significant factor in the inequities of persistence and achievement in education (e.g., for research see Greer, Nelson-Barber, Powell, & Mukhopadhyay, 2009; practice, Equity Alliance, www.equityallianceatasu.org). From anti-racism training to culturally responsive pedagogies, teacher professional development efforts have emerged largely from the same arena as teacher education itself: psychology. Yet there is another area of the academy from which professional educators can draw great insight: anthropology (Ladson-Billings, 2001). That is, while psychology tackles teacher education through an approach that catalogues and attempts to change a teacher’s classroom *disposition* through focused reflection on *behavior*, social anthropology offers the idea of movement along a developmental continuum of *orientation* through focused reflection on *communication* in intercultural experiences. Several frameworks exist for professional contexts that involve understanding, interacting, and communicating with people across various cultures. In particular, healthcare professions and international relations groups have generated suggestions for cultural competence and communication based on theories of intercultural development and conflict resolution styles (e.g., Bennett, 1993, 2004; Hammer, 2005, 2009; Kramsch, 1998; Leininger, 2002; Wolfel, 2008). The core of the orientation-communication approach is building skill at

Short definition of culture: A dynamic social system of values, beliefs, behaviors, and norms for a specific group, organization, or other collectivity; the shared values, beliefs, behaviors, and norms are learned, internalized, and changeable by members of the society (Hammer, 2009).

establishing and maintaining relationships in culturally diverse contexts.

That is, while current teacher education focuses on how an individual teacher can build a classroom community or a professional learning community with certain target characteristics, an orientational framing to teacher education unpacks “community” – how it is defined by teacher(s), staffs and students – and applies attention to the characteristics of the relationships formed among teachers, students, staff, and their respective outside-of-school experiences. The relational considerations of orientation to the world include how we are aware of ourselves and each other, the relationships we perceive, value, and engage, and the various forms of communication we might use to build productive relationships for teaching and learning.

Though some teachers have largely monocultural classrooms, in the sense that most students share experience of a particular set of cultural-general norms and practices, the nature of “diversity” in the U.S. is shifting from such segregated monocultural circumstances to cultural heterogeneity. For example, the 21st century version of multi-cultural can mean 2, 5, even 10 different home language groups in a single classroom (Aud et al., 2010). Cobb and Hodge (2010) explored the development of equitable classroom practices by distinguishing between (a) “cultural alignment” approaches – where a teacher is supported to offer instruction in ways aligned with the homogeneous, “local” culture of students – and where the uncertainty inherent in heterogeneity is under-attended; and (b) a “classroom participation” approach where curricula derived from majority group normative policies (e.g., the *Principles and Standards for School Mathematics*, 2000) drive learning activity and the teacher is expected to provide acculturative support that “might enable particular groups of students to participate substantially in these activities” (p. 13). However, in the “classroom participation” approach, the uncertainty inherent in the heterogeneity of student (and teacher) experience is under-attended. What we offer here attends to the missing aspect of heterogeneity, dealing with the realities of negotiating the multiple cross-cultural relationships in the classroom. Our approach is through an exploration of teacher experience as a foundation for the development of case-stories. In terms of the characteristics of a profession and professional education:

As a pedagogical device, cases confront novice professionals with highly situated problems that draw together theory and practice in the moral sea of decisions to be made, actions, to be taken. Options are rarely clean; judgments must be rendered. Cases are ways of parsing experience so practitioners can examine and learn from it... and can become the basis for individual professional learning as well as a forum within which communities of professionals can store, exchange, and organize their experience. (Shulman, p. 525).

Motivating Example

To motivate later discussion, we offer the example shown in Figure 1 of a classroom interaction between two students and a professor in a discrete mathematics class. Patricia and Mark are working together to solve a graph theory prompt. Dr. Denton is walking around the room answering student questions and checking in with groups. Figure 1 gives the utterances of Dr. Denton, Patricia, and Mark along with the associated actions performed by Mark and Patricia. The example is fictionalized from teacher self-reports. We will later discuss this example of mathematical interaction using the intercultural competence framework presented in the Conceptual Framework section. Implicit in the vignette are relational comparisons among ideas. Notice that Dr. Denton is comparing what students are doing to a preferred answer in his

head. Patricia is noticing the ways Mark's answers are different from hers and from what Dr. Denton says. Mark is looking for how things are the same. Dr. Denton is relating student expressions to things in his head. Patricia is relating actions and comments to what is correct. Mark is interrelating his own work, Patricia's work, and Dr. Denton's statements and noticing in what ways they are all the same. This is a very basic example of three of the five stages in the conceptual framework of intercultural competence.

Setting: Discrete Mathematics Class.

Dr. Denton - Discrete Mathematics Professor

Patricia - Pre-service Secondary Math major

Mark - Pre-service Elementary Ed major

Problem: How many edges are there in a planar connected graph with 5 vertices and 4 faces? Draw such a graph.

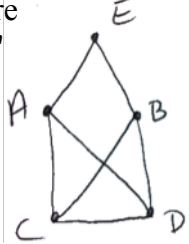
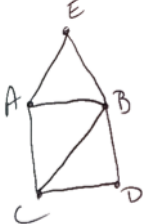
<i>Description of actions while working on the prompt.</i>	<i>Utterances</i>
Mark starts drawing vertices and connecting them.	Mark: Let's see if this even makes sense. Can we draw a picture of it?
Patricia writes Euler's Formula: (If G is a connected planar graph with V vertices, E edges, and F faces then $V - E + F = 2$), fills in values and solves.	Patricia: Let's just use the equation like we are supposed to.
Mark and Patricia look at the prompt again. Mark looks at his drawing of a pentagon and adds two interior lines. 	Patricia: Okay, I guess we do need to draw a graph.
Patricia makes a drawing with 5 vertices and connects them with 7 edges. 	Dr. Denton: If you put the four dots in a square with a dot on top like a house with a roof, it will be easy to grade.
Mark draws a new picture that looks like a "house," but two of the edges intersect. 	Mark: Do you mean like this?
Patricia and Mark look at each other's drawings while Dr. Denton is answering Mark's question.	Dr. Denton: No. You have to have a roof.
Mark erases one line and instead connects different vertices 	Patricia: Yours has 5 faces, edges aren't supposed to intersect. You have to erase one of those in the middle and make a roof line.
	Dr. Denton: Yes, Mark's drawing is right.

Figure 1. Sample interaction from a Discrete Mathematics class.

Conceptual Framework

The working definition of “culture” (box on page 1), can include professional and classroom environments as well as personal or home experience. Our work to build an applied theory for intercultural competence development for mathematics teaching and learning in secondary and tertiary settings is based on the *Developmental Model of Intercultural Sensitivity* (Bennett & Bennett, 2004). As a developmental model, it ranges from monocultural to intercultural orientations with descriptions of the transitions among intermediate orientations. Figure 2 gives the five orientations and images that we use below as visual metaphors in describing the model.



Figure 2a.



Figure 2b.



Figure 2c.

Denial → Polarization → Minimization → Acceptance → Adaptation

Figure 2. Stages and visual metaphors for the intercultural development continuum.

The left endpoint of the developmental continuum of orientations is a lens for perceiving the world based in the assumption “Everybody is like me.” Though called “denial” by Hammer et al., the orientation might more appropriately be called “innocent” or “bemused.” A person with this orientation to culture may become aware of observable differences (e.g., distinctions in food or dress) but not notice more complex difference (e.g., in values, beliefs, or communication norms) and will avoid or express disinterest in cultural difference. A hint of this can be seen in Dr. Denton’s focus on a particular representation as the referent in relating to students’ efforts.

The transition to the next orientation comes with the recognition of self as distinct from “other” through a noticing of difference, as in awareness of light and dark in viewing a situation (e.g., Figure 2a). The “polarization” orientation is driven by the assimilative assumption “Everybody *should* be like me/my group” and is an orientation that views cultural differences in terms of “us” and “them.” Polarization can take the form of “defense” or “reversal.” Defense includes a sense of belonging to a group along with an uncritical view towards the values and practices of that group and an overly critical view of other groups. Reversal is a negatively judging approach to evaluating the values and practices of one’s own group and an uncritical view of those perceived as “other.” Patricia displays characteristics of polarization in her constant comparison of her answer to Mark’s answer and to Dr. Denton’s verbal cues. Patricia focuses on the differences between the answers.

Transitioning to the next level of development involves noticing commonalities beneath the surface differences, in particular a growing awareness of norms. This middle orientation is “minimization,” a lens for experience based on the idea, “Despite some differences, we really are

all the same, deep down,” and attends to similarity and universals (e.g., biological similarities – we all have to eat and sleep; and presumed universal values – we all know what good and evil are and the difference between them). The minimization orientation will, however, be blind to deeper recognition and appreciation of difference (e.g., Figure 2b, literally a “colorblind” view, what someone who has red/green colorblindness perceives). While feelings of sympathy (sorrow or joy for the experiences of someone else) are possible in polarization, a minimization orientation will tend to ethnocentric views that are not relationally dependent. For example, empathy might be confused for sympathy – a person with a largely minimization orientation may perceive feelings to be shared or common with a group of people without attempting an external validation of the perception with a relationally appropriate source (e.g., multiple members of the group). Mark’s approach shows him seeking out ways in which his answer is similar to Patricia’s and Dr. Denton’s. A focus on commonality can bring everyone to a feeling of shared understanding but ignores subtle differences. In mathematics, this can lead to several potential problems. For instance, two people working together on a problem may have the same mathematical idea in mind but may not communicate effectively about the idea because of where each person focuses communication effort (e.g., on what is identical to their thought, or what is correct, or what is similar). As another example, at a meta-cognitive level, inattention to nuance may mean the difference between being stymied because a problem situation has no commonality with previous experience and the risk-taking of conjecturing a new and successful solution strategy by putting together old approaches in new ways.

Through increased attention to nuance in the differences that exist within noticed commonalities, one begins the transition from a minimization orientation to the “acceptance” orientation. Here, the word “acceptance” is used in its socio-cultural sense – the action or process of consenting to receive (rather than its psychological one – believe or come to recognize as valid or correct). Someone with an acceptance orientation has both some mindfulness of self as having a culture and awareness of moving among multiple cultures (plural). While an acceptance orientation supports empathy, awareness of difference, and the importance of relative context, how to respond and what to respond in-the-moment of interaction with others is still elusive.

The transition to “adaptation” involves developing culture-general frameworks for perception and behavior shifts that are responsive to a full spectrum of detail in an intercultural interaction (e.g., the detailed and contextualized view in Figure 2c along with a concomitant awareness that one’s own perceptions (inside the frame) are limited and the whole picture is bigger than what we perceive). Adaptation is an orientation wherein one may shift cultural perspective, without losing or violating one’s authentic self, and adjust communication and behavior in culturally appropriate ways.

Figure 3 shows the five orientations of this intercultural competence framework along with the shifts that occur in the transition from one orientation to the next. The movement along the continuum is not direct or linear. Folding back to previous orientations (particularly in times of stress) is common. Also, the time spent in learning about self and others during transitions and folding back hold value in developing more lenses through which one can view culture.

Knowing one’s orientation, or the normative orientation of a group, can inform K-12 teacher and collegiate teacher work. In particular, we are researchers in a university-based project made up of several programs for in-service secondary mathematics teachers. Participants in the project include in-service teachers in a “mathematics for teaching” masters program, expert in-service teachers in a teacher leadership program, collegiate instructors for these programs, and mathematics education graduate students and faculty who are researchers on the project. Here we

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report on our early work to identify and build intercultural competence.

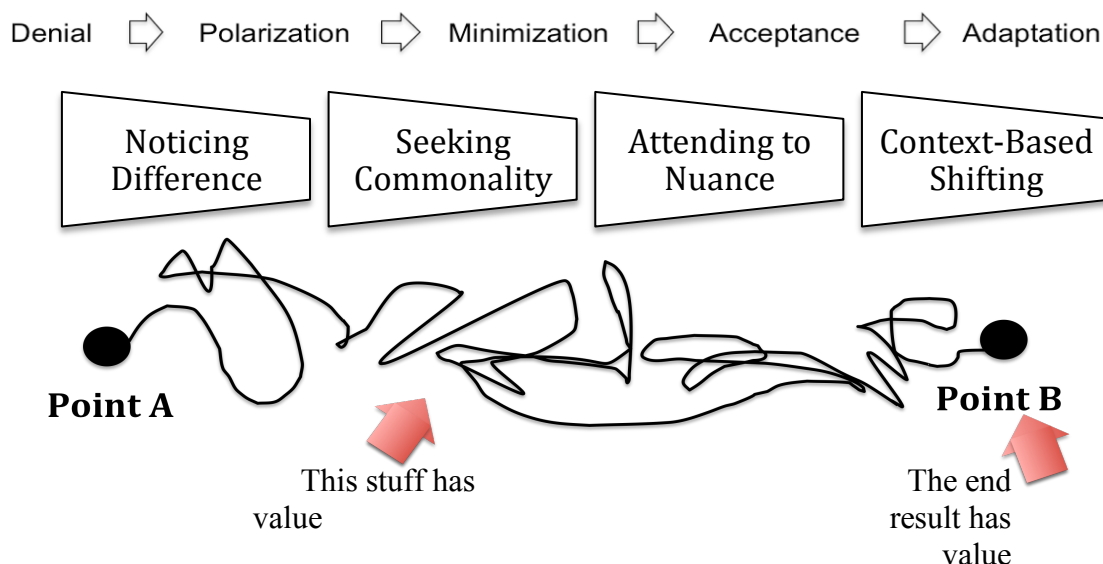


Figure 3. The transitions among stages in the continuum.

Research Question

What is the nature of intercultural competence development for mathematics instruction among university faculty and in-service secondary mathematics teachers participating in a university-based mathematics teacher professional development program?

Research Methods

Participants (26 in-service K-12 teachers and teacher leaders; 18 university faculty and grad students) completed the *Intercultural Development Inventory* (IDI), a reliable and valid method that identifies a person's intercultural orientation and elicits recent experiences and immediate cultural competence development goals (50 Likert-like items and 4 open response; Hammer, 2009). Each report from the IDI includes responses to the open-ended items along with quantitative information about *developmental orientation* (the orientation most likely at work in day-to-day interactions with others), *perceived orientation* (the orientation that a respondent perceives themselves to be working within) as well as *trailing orientations* (one or more fallback orientations likely to come into play in situations high in conflict or stress) and *leading orientation* (often aligned with perceived orientation, this is at the leading edge of someone's intercultural competence and the target for development). Two of the 4 open-ended items ask for respondents to tell stories: one involving an intercultural exchange that seemed to go well and one that did not go well.

From the IDI profiles we have a quantitative overview and, from the answers to the open-ended questions, material to help us in generating stories of intercultural challenges in teaching

mathematics. The stories are the foundation for case study work with teachers and teacher educators. Our goal is cases that call up developmental, perceived, and leading orientations and provide space for discussing them and the transitions of awareness among them.

Results

In Figure 4 are the distributions among orientations for three groups who completed the IDI. As a group, the teachers' orientation was normatively in polarization while the teacher leaders, as a group, were largely at the lower end of minimization and the university folk were largely in minimization. As part of the research process, we conducted group profile debriefing sessions with teachers, teacher leaders, and university staff. When debriefing, three common goals emerged among all three groups of participants:

- (1) build *awareness of self as having a cultural lens for viewing the world*;
- (2) find guidance in the transitions through minimization and into acceptance, particularly how to *be mindful of one's cultural filter(s) for interacting with the world* (e.g., in the classroom, with colleagues, with other education stakeholders);
- (3) engage in *building a knowledge base about equity*, including knowledge about culturally normative values and distinguishing these from essentializing or stereotyping approaches.

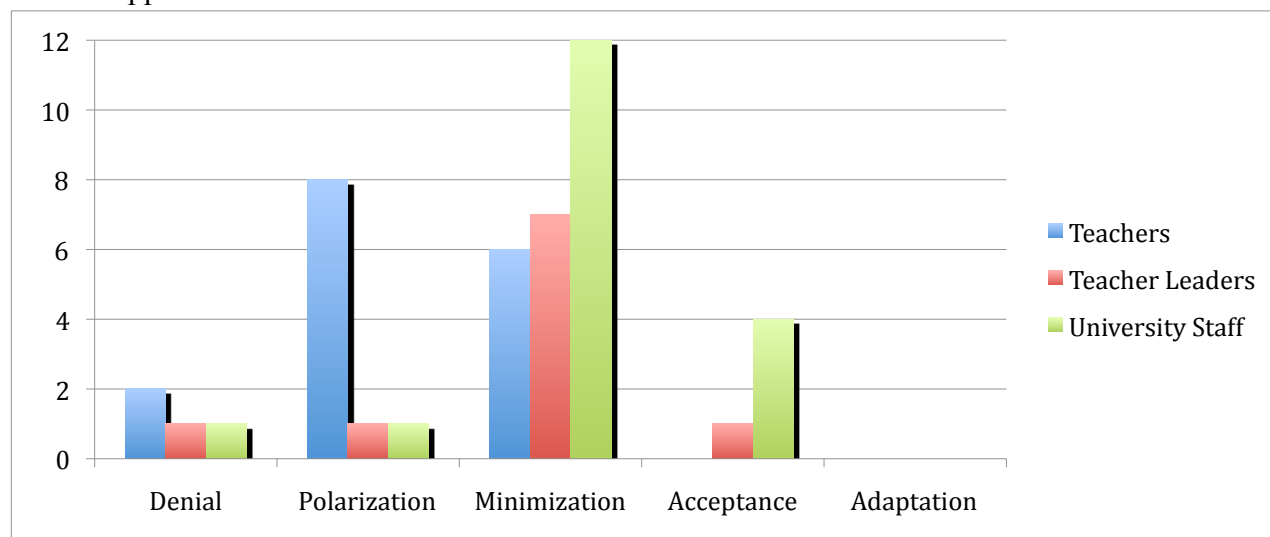


Figure 4. Distribution of Participant Developmental Orientations

Given the profile results, we see ourselves as having at least three different orientations for the case materials we are constructing: polarization, minimization, and acceptance. The statistical center of the teachers was at polarization. By putting the teacher character, Dr. Denton, in denial, we created a character who we were not expecting teachers or university staff to identify with, instead, they might recognize an earlier self (e.g., a trailing orientation that may arise during times of stress).

A case is not just a short story, it is a context-rich description in words, images, or both, of a dilemma, challenge, or epitome (e.g., authentic good or not-so-good practice). An effective case generates dissonance between what case users thought they knew to be true and what they are witnessing. Such cognitive dissonance is the basis on which new understanding is constructed. Associated with a vignette, to make a case, are prompts for the reader/viewer that depend on the content of the vignette, the degree to which it is experienced as intellectually/psychologically intricate, and the method of response (e.g., writing, discussing) (Seguin & Ambrosio; 2002).

Case prompts are especially effective if they draw the attention of the case user to four key areas of consideration and reflection:

1. *Framing*. Analyze different interpretations of the conflict, problem, or situation.
2. *Strategizing*. Evaluate the actions of the case participants and of oneself; consider how intentions are turned into actions in a variety of ways.
3. *Connecting*. Identify and relate personal experiences to the case experience.
4. *Forecasting*. Predict the consequences of actions, or inactions, for case participants and self-in-the-situation for the immediate and further future.

Prompts may call upon the reader to engage in complex synthesis, evaluation, and analysis of multiple sources of information, but can also be as simple as: Describe the problem, as you see it, in as much detail as possible. What might you do to deal with such a situation? Illustrate your strategy with specific examples from the vignette or personal experience. What, if any, would be the risks and the consequences of your strategy?

Building on What Occurred in the RUME 2011 Conference Session

Our goal at the conference was to share at least one potential-case situation with the audience and get feedback on possible IDI-based case prompts. That is, ideas for framing, strategizing, connecting, and forecasting in the context of the intercultural development continuum. In particular, we talked about the ways one might use the matrix in Figure 5 – an unpacking of the story about Dr. Denton, Patricia, and Mark – to generate and guide discussion that would grapple with difference, commonality, nuance, and context (i.e., the types of attention involved in the transition among stages, see Figure 3).

The example offered earlier in Figure 1 gives a description of the actions and comments made by Dr. Denton, Patricia, and Mark. Figure 5 below offers more detail for that scenario. The column on the left gives a description of the actions being performed by the two students. The three additional columns offer the scenario from each perspective. Bold font indicates utterances made, and the italicized font designates thoughts. This unpacking of the scenario allows for an in-depth look at the interactions of the intercultural competence orientations. As Patricia talks about how Mark's graph is different, Mark is noticing how it is similar but can be adapted to be the same as Patricia's graph. The bottom row offers alternative endings to the scenario showing the perspectives if each person operated in their leading orientation.

Session participants found the conceptual framework and consideration of Figure 5 useful in at least two ways. In the context of the case, it helped to organize their thoughts and perceptions of the case materials. Moreover, it helped them be reflective about themselves in situations in which they had participated. Additionally, several participants noted a feeling of recognition, that they saw themselves and saw colleagues in the descriptions (both those in the conceptual framework, Figures 2 and 3, and the illustrations in the characters in Figure 5). Several remarked that it was helpful in thinking about interactions and relationship building to pay attention to the transition activities: noting difference, seeing commonality, seeking nuance, and paying attention to the multiple orientations that may be participating in any interaction.

Description of actions while working on the prompt.	Dr. Denton - Discrete Mathematics Professor; Denial	Patricia - Pre-service Secondary Math; Polarization	Elem
Mark starts drawing vertices and connecting them to understand the problem.	<i>Why are you drawing?</i>	<i>But there's an equation, why would you do guess and check? [interprets drawing as guessing]</i>	Let's sense. C it?
Patricia writes Euler's Formula, $V - E + F = 2$, fills in values and solves.	<i>Yes, now you are doing it correctly.</i>	Let's just use the equation like we are supposed to.	<i>Ok, and how picture.</i>
Mark and Patricia look at the prompt again. Mark looks at his drawing of a pentagon.	<i>They found there are 7 edges. There's really only one way to draw this, I should be able to go on to the next group soon.</i>	Okay, I guess we do need to draw a graph.	<i>Let's be a pen So I'll jo</i>
Patricia makes a drawing with 5 vertices and connects them with 7 edges.	If you put the four dots in a square with a dot on top like a house with a roof, it will be easy to grade.	<i>I could do it that way, but I put the last dot on the right of the square, because it made sense to me.</i>	<i>I tho Denton : sure. I b</i>
Mark draws a new picture that looks like a "house," but two of the edges intersect.	<i>What you are doing does not make any sense.</i>	<i>But that's not right, we need 4 faces. That's got 5. Look, I already drew it right.</i>	Do y
Patricia and Mark look at each other's drawings while Dr. Denton is answering Mark's question.	No. You have to have a roof.	<i>Okay, what did you do wrong? Edges can't intersect!</i>	<i>How does she can see where is</i>
Mark erases line AD and instead connects A and B.	<i>Yes, that would make it correct.</i>	Yours has 5 faces. Edges aren't supposed to intersect. You have to erase one of those in the middle and make a roof line.	<i>Oh, . different like a ro</i>
Conclusion	Yes, Mark's drawing is right.	<i>So to make mine right, I would need to rotate it.</i>	<i>So re and hers Mine's j really th graph w edges.</i>
Alternate ending	<i>Technically you are correct, but I would prefer it drawn my way. [This represents a leading orientation of polarization.]</i>	<i>I like the one I drew; it's just rotated. It's not that different. [This represents a leading orientation of minimization.]</i>	<i>I wo. there ar how you [Thi. orientati</i>

Figure 5. Matrix of actions, thoughts, utterances that unpacks the interaction in Figure 1.

Implications and Applications for Research and Practice

What help in transitioning to global and ethnorelative mindsets can a teacher educator offer teachers (and teachers offer to students) if their own developmental orientation is more monocultural than intercultural? The challenge for any instructor is: how do I teach so that all students have opportunities to learn (not just the students with whom I experience cultural or orientational alignment)? The question applies to researchers as well: how do I research so that I get the perspectives of others (who may have a different orientation from my own)?

One way of addressing these questions, as theory developers, is through the nascent efforts reported here aimed at professional characteristic 5: we start with cases grounded in teacher reports of their classroom realities. On the other side of the same coin, for practitioners, we attend to theory by anchoring case activities (e.g., the points for discussion) in intercultural competence development for mathematics instruction.

Most mathematics educators juggle two identities, as problem-solver – one who can do mathematics – and as one who can teach it. So, in terms of the IDI, two future research possibilities occur to us. One is asking teachers and professors to take the IDI with a focus on *mathematics* as the culture being assumed as primary in answering each item. Then, having completed the survey wearing the “math hat,” in order to cultivate information for more mathematical scenarios such as the one in Figures 1 and 5, it might be beneficial to have a question at the end of the IDI that is explicit in asking for connections between culture and mathematics in the classroom. For example, a story such as the example used here could be provided and a prompt would ask respondents to (1) comment on the story and (2) offer their own story. This would help to build further professional development scenarios and materials.

We are now revisiting our protocols. After all, if researchers have a minimization orientation where similarities are central, do research questions and instruments adequately capture the views and practices of teachers whose core communication about practice is focused on differences from a polarization orientation (or vice versa)? Similarly, when conducting research using observation protocols, the intercultural orientation(s) of protocols shape interpretations and frustrations with data gathered. We continue to learn about difference, commonality, and nuance ourselves as researchers.

Questions for the Reader

1. Consider the story of Helen in the appendix. What kinds of refocusing might we do to foreground the intersection of the culture of secondary mathematics, of textbooks, and of a teacher, with the framing of an assignment?
2. In an editorial, Ball, Goffney, and Bass (2005) have argued that in addition to teachers being culturally aware, that it is important for students to build adaptive competence in the culture of mathematics:

In a democratic society, how disagreements are reconciled is crucial. But mathematics offers one set of experiences and norms for doing so, and other academic studies and experiences provide others. In literature, differences of interpretation need not be reconciled, in mathematics common consensus matters. In this way, mathematics contributes to young people’s capacity for participation in a diverse society in which conflicts are not only an inescapable part of life, but their resolution, in disciplined ways, is a major source of growing new knowledge and practice. ... Important to our argument is that these skills and practices that are central to mathematical work are ones that can contribute to the cultivation of

skills, habits, and dispositions for participation in a diverse democracy.

How might this perspective need to be revised or framed to be accessible to a teacher with a denial orientation? A polarization orientation? A minimization orientation?

3. In what ways might the cases we have discussed be useful OR need to be revised to be productive with pre-service teachers?

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References

- Aud, S., Fox, M., & KewalRamani, A. (2010). *Status and Trends in the Education of Racial and Ethnic Groups* (Tech. Report; NCES 2010-015). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- Bennett, M. J. (2004). Becoming interculturally competent. In J. Wurzel (Ed.), *Towards multiculturalism: A reader in multicultural education* (2nd ed., pp. 62–77). Newton, MA: Intercultural Resource Corporation.
- Bennett, M. J. (1993). Towards ethnorelativism: A developmental model of intercultural sensitivity. In R. M. Paige (Ed.), *Education for the intercultural experience* (2nd ed., pp. 21-71) Yarmouth ME: Intercultural Press.
- Bennett, J. M. & Bennett, M. J. (2004). Developing intercultural sensitivity: An integrative approach to global and domestic diversity. In D. Landis, J. M. Bennett, & M. J. Bennett (Eds.), *Handbook of intercultural training* (pp. 147–165). Thousand Oaks, CA: Sage.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, 33(8).
- DeJaeghere, J. G., & Cao, Y. (2009). Developing U.S. teachers' intercultural competence: Does professional development matter? *International Journal of Intercultural Relations*, 33, 437-337.
- Gay, G. (2000). *Culturally responsive teaching: Theory, research, and practice*. New York: Teachers College.
- Gay, G. (2002). Preparing for culturally responsive teaching. *Journal of Teacher Education* 53, 106-116.
- Greer, B., Nelson-Barber, S., Powell, A., & Mukhopadhyay, S. (2009)(Eds.), *Culturally responsive mathematics education*. Mahwah, NJ: Erlbaum.
- Hammer, M. R. (2005). The Intercultural Conflict Style Inventory: A conceptual framework and measure of intercultural conflict approaches, *International Journal of Intercultural Research*, 29, 675–695.
- Hammer, M. R. (2009). Solving problems and resolving conflict using the intercultural conflict style model and inventory. In M. A. Moodian (Ed.), *Contemporary leadership and intercultural competence: Exploring the cross-cultural dynamics within organizations* (pp. 219-232). Thousand Oaks, CA: Sage.

- Keigher, A. (2010). *Teacher Attrition and Mobility: Results From the 2008–09 Teacher Follow-up Survey* (NCES 2010-353). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved February 28, 2011 from <http://nces.ed.gov/pubsearch>.
- Kramsch, C. (1998). *Language and Culture*. New York: Oxford University Press.
- Leininger, M. (2002). Culture care theory: A major contribution to advance transcultural nursing knowledge and practices. *Journal of Transcultural Nursing* 13(3), 189-192.
- Seguin, C. A., & Ambrosio, A. L. (2002). Multicultural vignettes for teacher preparation. *Multicultural Perspectives*, 4(4), 10-16.
- Shulman, L. S. (1998). Theory, practice, and the education of professionals. *The Elementary School Journal*, 98(5), 511-526.
- Strizek, G.A., Pittsonberger, J.L., Riordan, K.E., Lyter, D.M., & Orlofsky, G.F. (2006). *Characteristics of Schools, Districts, Teachers, Principals, and School Libraries in the United States: 2003-04 Schools and Staffing Survey* (Tech. Report; NCES 2006-313 Revised). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- U.S. Army Training and Doctrine Command Culture Center, *Culture Education and Training Strategy for the U.S. Army*. Fort Huachuca, AZ: U.S. Army Intelligence Center, 2007.
- Wolfel, R. (2008). *Culture Cubed: Towards Three-Part Definition of Intercultural Competence* (Tech. Report). Center for Languages, Cultures, and Regional Studies Position Paper, U.S. Military Academy. West Point, NY. Retrieved February 20, 2009 from www.dean.usma.edu/centers/clcrs/

Appendix: Helen's Story

Example Case Story. Helen is a public high school mathematics teacher in a socio-economically and culturally diverse community. She is teaching a consumer mathematics class with mostly seniors. Helen wants all her students to believe they have what it takes to succeed in college so she has each student create a personal career portfolio. The assignment asks students to choose a job and a place to live after college. The portfolio is a report of research about living and working in this potential future career: starting pay for the job in that location, education required for that job, the cost of living in that location – which includes creating a budget for housing, utilities, transportation, food, and leisure. Included in the grading rubric are points for turning in a rough draft. Helen's intention is to provide three opportunities for students: (1) to see themselves as college graduates (2) to work with real-world numbers in creating a budget, (3) to receive feedback on a draft, with the expectation that the final report will have a higher score. Helen asks the class how the assignment is going and several student express frustration and confusion. She announces, again, that she will be available after school to help and is disappointed that students do not take advantage of this opportunity. Helen gets frustrated when several students who are not doing well already do not turn in a draft and do not come for help. She thinks to herself "If the students are struggling, why aren't they coming to my room for help?!" In speaking to one of her colleagues, she mentions her frustration.

[Pause here and discuss what elements of the transition from polarization to minimization might help Helen, what questions might need to be asked (and why) along with what advice Helen might be ready to hear and act on for refocusing of her attention in the situation.]

Helen's colleague Lee offered her own experience from high school, explaining that

“going to office hours” in her middle school was as a form of punishment for misbehavior or low grades. In her first year of high school, the idea of going to office hours voluntarily made no sense to her: “Why would someone purposely take what amounted to an oral exam? Just to let the teacher know what she did not know and then be criticized for not knowing it?” Helen’s first reaction was to dismiss Lee’s story. “That’s not what my office hours are like, that’s not what *I* do!” Lee nodded and said, “Yes, I know. But I’m not completely sure how I learned that what it meant in high school to seek help from a teacher could be different from what it meant in middle school. In fact, the first time I went to an office hour in *college* it was because I was invited with two other people to have coffee in Professor Bladen’s office – it was his sneaky way of getting us to the office so we could see what an office hour was like. And I’ve heard students talk about different reasons for not going to get help from teachers – like having a job during or working with parents or friends instead or because there was difficulty communicating with the teacher. So, I’m not sure why your current batch of students is not coming to your office, but there are probably lots of good reasons. Good to them, I mean.” Helen shook her head, “That’s too bad. Students should feel comfortable going to the teacher for help. Well, I can’t help them if they don’t come to see me. And, they won’t come see me.”

In the given story, Helen has a developmental orientation of polarization–defense. When working within a polarization orientation, what constitutes an “opportunity” is often decided with little or no consultation with the potential beneficiaries about whether it is seen as an opportunity. It could be that some of what Lee suggests is true, or that students in Helen’s class were uncomfortable with her seeing their development process, or something else entirely. Discuss, again, what elements of the transition from polarization to minimization might help Helen, what questions might need to be asked (and why) along with what advice Helen might be ready to hear and act on for refocusing of her attention in the situation.