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PUBLIC STORIES OF MATHEMATICS EDUCATORS

Voices, Echoes, and Narratives: Multidimensional Experiences of Three Teachers Immersed in Ethnomathematical Encounters in Morocco

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For reasons that perhaps only phenomenological methodologies can illustrate clearly and precisely, reflecting upon our sensitively subjective lived experiences in a foreign culture is nearly an impossible endeavor. To attempt an "honest" description for any particular event we encountered while being acculturated into a rich, vibrant context, falling victim to our preconceived notions and encountering the constraints of textualizing the meanings of our experiences seem inevitable. In describing lived experience, Van Manen (1997), quoting Dilthey, writes:

> A lived experience does not confront me as something perceived or represented; it is not given to me, but the reality of lived experience is there-for-me because I have reflexive awareness of it, because I possess it immediately as belonging to me in some sense. Only in thought does it become objective. (p. 35)

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The following narratives (i.e., storytelling) represent our best attempt to describe the individual and collective lived experiences of a group of mathematics educators—three mathematics education graduate students (and their professor)—engaged in an ethnomathematical cultural immersion experience. Here, we chose storytelling as a somewhat natural method to recount our lived experiences and to create a reasonable order out of the many vivid encounters we witnessed while culturally immersed in Morocco. Our narratives emerged in attempt to grasp subjective essences of our collective experiences as we embarked on making meaning of our exposure to ethnomathematical practices. While narrating each of our lived experiences separately, our collective reflections are meant to be teleological—that is, a modest lexicon of purposeful achievements that consolidate to give a single perspective of what it meant to be acculturated into the Moroccan culture.

Our cultural immersion experience was part of a graduate-level, mathematics education course that we were enrolled in during the summer semester 2010 at Georgia State University, Atlanta. The course provided an introduction to ethnomathematics, which combines aspects of mathematics, mathematics education, sociology, psychology, anthropology, and linguistics (D'Ambrosio, 2001). The cultural immersion component of the course included a site visit to the city of Fez in Morocco to conduct field observations to explore the ethnomathematical ideas that transpire in the daily practices of craftspeople and practitioners on the streets of the Old City.

Fez, the oldest city in Morocco, differs from other cities by its divided metropolis, which includes New Fez (Fez-el-Djedida or Ville Nouvelle) and Old Fez (Fez-el-Bali or Medina). New Fez was built in the 14th century, while Old Fez was founded in the 9th century by the first Muslim dynasty to rule Morocco, the Idrissids. Most people of Fez continue to live in the Medina, Fez-el-Bali instead of moving to the Ville Nouvelle, which is more modern and urban. Within the Medina is an awe-inspiring marketplace—a maze of narrowing, cobblestoned streets lined with small shops and street merchants—selling anything from fresh Moroccan spices to hand-made cedar wood mirror frames. In the Medina, we were allowed to choose an ethnomathematical context as an observation setting such as a tile factory, metalwork gallery, embroidery atelier, or a carpentry shop in which to conduct our observations. Our journeys began as we witnessed breaths of vibrant cultural nuances that flooded our senses and rendered visible deep personal experiences.

Three Narratives

We're in Africa!

It has been several weeks since I returned from my first trip to the land of my genetic and spiritual ancestors. When I first learned of an opportunity to visit

Africa and participate in an ethnographic study abroad that investigated ethnomathematics, I knew that such a prospect does not happen often for a high school mathematics teacher. As far back as I can remember my interests have been global and international. Nonetheless, I never became aware of a program that would satisfy my academic, cultural, historical, ancestral, and spiritual needs while attending classes during my summer break. For me, this trip became a high priority on my to-do-list.

As an African American, words are inadequate to describe the thrill and the sense of privilege to land and walk on the continent of my fore-parents. I consistently reminded my classmates—as I reminded myself—with a steady periodic refrain of: "We're in Africa. We're in Africa. We're in Africa!" Although my words cannot adequately describe this indelible experience, my senses were flooded with the architecture, sounds, and smells of a place that fulfilled a longing deep within my soul. My challenge was to stay focused and remind myself that this trip was about conducting research that would be meaningful as well as purposeful to mathematics education and ethnomathematics in particular.

The real coursework data collection did not start until we reached Fez; our flight landed in Casablanca. While in Casablanca, I relaxed a bit and simply became a sponge and absorbed. I was able to pray in the largest mosque that I have ever visited, reflecting on the fact that I was making prayer in Africa. I could touch and read some of the calligraphy decorating the tile work of Masjid Hassan El Thani. After misplacing and recovering my digital camera, an experience that reminded me of the core goodness that still exists in human beings, I was ready to settle down, steady my focus, and prepare myself for Fez where the physical and mental work would be done.

Good people were the norm in Fez. The family that hosted us, the professional tour guide, our awesome driver, and the wonderful family that made us feel like family as we visited, ate, prayed, and talked, all played an essential role in enhancing my experience as well as enriching my spoken Arabic vocabulary. The consecutive days of dry, mosquito-free heat were priceless. The shards of ice in the Sidi Ali bottled water actually converted a devout juice drinker like myself to the tasteless refreshing benefits of pure African water.

As a Muslim, the seamless transition from tile work (the site of my ethnomathematics observations) to prayer and returning to work is a freedom that mere words cannot convey, particularly when compared to experiences in the United States where explanation and justification often become linked to performance of the afternoon prayers. In summary, I would encourage any and all students to participate in a study abroad experience. Subsequent writings will delve more into the mathematics and the ethnomathematical aspects of my ethnographic study. For this narrative, I will simply state, as I did on all of my post cards sent to the United States, I am so glad that my first trip to Africa was in Morocco.

Found in Translation

As I reflect upon my summer experience, I sometimes find myself tempering my retellings with calm and reserve for fear of being labeled as "weird" or "strange" by my listeners. Even my most impassioned communications fall fumbled and inadequate. The dilemma for me is that, while I believe that any expression—whether in photographs, conversations, or pages—is in a number of ways inadequate, I cannot escape the compulsion to share my experience in Fez, Morocco. Although I had travelled internationally, I had never visited Morocco or any other African country. Nor did I know a great deal about the country or its cultures. My ignorance fueled some level of apprehension and anxiety. How would I manage in a foreign setting? The answer would be provided within a few short days.

During our first tour in the Medina, we witnessed artisans and craftspeople diligently and meticulously working in their ateliers. After the tour, I narrowed my focus on a small carpentry shop and instantly decided to conduct all my observations there. The selection was interesting in that I could hardly communicate with my hosts. The two master carpenters and their five young apprentices spoke Arabic and, to some degree, French. I speak no Arabic. Additionally, the only French to which I had been exposed is that which fulfilled my foreign language requirement in high school and in college over twenty years ago—and none since. Despite this obstacle, I decided that I would observe the activities in the carpentry shop of Ahmad and Hisham. This decision was influenced by the mastery in their (hand) craftsmanship. More so, it was inspired by their hospitality. I sensed that they were open to my presence and that they would attempt to provide access to how they were thinking and conceptualizing.

Indeed, my hosts were generous in their attempts to share whatever they could of their craft and skill, and in their embracing me as a guest. Yet, I felt what might be every ethnographer's consideration: "My presence is an imposition." Without the tools of common language, I became particularly vulnerable and grew slightly uneasy. Would they rescind their invitation? Would they regret their hospitality?

These concerns were alleviated as I was invited to enjoy and participate in their humanity. I was given space and offered the only seat in an already crowded setting. As I witnessed a team—master carpenters and their apprentices—work, their concentration was palpable. Despite their focus on their work, I never was ignored. Through the broken French that I would try to revive, we spoke of poverty, income, occupation, family, and education. And when language failed, patient gestures often accompanied and sometimes supplanted our words. I did not forget my primary purpose of examining the mathematical ideas that emerged or were accessed in the shop. Those conversations followed more of an expected and traditional trajectory.

Although a language barrier muted a number of verbal expressions, our attempts to reach out, to inquire, to engage, and to share were never attenuated. On one day, master carpenters Ahmad and Hisham bought and shared their meal of fish, bread, sauce, and melons with me before any of the apprentices were allowed food. We ate and laughed. I was no longer an intruder—at least not at this moment. And this moment was among the many that I would remember most fondly. It would be a gesture that I was resolved to reciprocate. A couple of days later, I would provide fruit and water to the people at the shop. This gesture was neither an obligation nor a burden, but a commitment to a community that had opened itself to me. That commitment and bonding continue in my trajectory as a mathematics educator and as a mathematics education doctoral student.

In the aftermath of this experience, I have become more sensitive to the power of difference and its influence upon students and their teachers in the mathematics classrooms in the United States. The conspicuous phenotypic differences of complexion, and hair texture contributed to my feelings of apprehension. With every distinctly American utterance and through my African American presence, I was ever mindful of the portraits—both as American and as African American—that I presented. Differences in ethnicity, ideology, and religion became pronounced as cultural markers became highlighted. I tried to be careful of the characterizations that my actions, gestures, and speech might reify. I also came to consider the characterizations that I had unconsciously imposed on my surroundings.

These are among the issues that mathematics educators must contemplate, for these considerations present and unmask significant implications. Implicit in my attempts to negotiate what I perceived to be stereotypes of me were reflections of my own preconceptions about my new environment and its inhabitants. In other words, the fact that I tried to manage my behavior and speech while in a foreign culture implies that I hold certain conceptualizations of how one may perceive my actions. This type of dilemma in some ways parallels the experiences of students and educators who have dissimilar cultural heritages, yet perhaps comparable goals for student outcomes. In the midst of recognizing such discontinuities, both teachers and students risk a paralyzing fear of making mistakes and the vulnerability of having those mistakes exposed. Although many of these mistakes occur because of sincere efforts or the lack of them to bridge communication between persons or groups of people, the far greater error lies in either side remaining comfortably immobile.

Everything I Know, I Learned from a Student

Since I became a teacher, people often ask me if I will pursue a doctoral degree. I never thought about the answer to this question; I simply responded with "No." When asked "Why not?" my response has always been, "Because I'm al-

lergic to research," and with a chuckle and a wink I'm able to end the "Dr. McQueen" conversation right there. Until last summer, I was quite comfortable being disillusioned with the subjectivity of writing, and I had not yet been inspired by a topic I deemed worthy of the work that any substantive research commands. Then I registered for a class that was dedicated to the discipline of ethnomathematics and during the course of the semester I became inspired in ways I truly never imagined.

I learned of the ethnomathematics course through the advertisement of an opportunity to spend a week in Fez, Morocco, which was all the information I needed to register. Even after I realized that those who took the trip would be conducting research, the excitement I felt about the chance to travel to Africa fully eclipsed any misgivings I had toward participating in research. More than anything, I thought about the tremendous opportunity to set foot on African soil—an experience that many African Americans wish for but too often never have. Traveling to the continent of my ancestors has always been a bullet item on my bucket list, yet I was unsure if I would ever be emotionally prepared to make such a personally profound journey. Part of me saw the trip to Morocco as a way to visit the Motherland without risking the emotional breakdown that a trip to Senegal or Ghana may trigger. To my surprise, the experiences I had in Morocco left impressions on my mind and spirit that reshaped the passion and level of dedication I have to the practice of teaching.

A 13-hour layover in a foreign country can seem tedious and overwhelming. Fill the time with rich and impromptu teaching and learning experiences and you wind up wondering where the time went. One such experience took place as we were in line waiting for the commuter plane that would take us from Casablanca to Fez. My colleagues and I had spent several hours basking in all that Casablanca had to offer. We ate lunch less than 100 feet from the Atlantic Ocean, spent time at the breath-taking Masjid Hassan El Thani, and bargained with merchants along the city streets. Once we returned to the airport, a colleague and I had a passionate debate about the current state of task-based mathematics standards we are now mandated to follow, a conversation that I continue to ponder to this day. The four of us (my two classmates, our professor, and me) were so engrossed in the discourse that we barely heard the boarding call. Nevertheless, we eventually did respond to the boarding call, gathering our luggage and filing into the line with the other passengers bound for Fez.

As we waited, to the left of me was a group of adolescent boys, ages 10–13, who were sitting on the floor playing a card game. The boys and the game immediately caught my attention and before I knew it I had put down all of my belongings and approached the circle to watch. Within minutes, I was asking questions about card choice and strategy and after a few questions they invited me to play. I was a bit reluctant to join initially because I was unsure of the gender dynamic at

play. I was afraid that my presence as an adult woman would be offensive to any parents of the boys whose circle I had joined. I noticed an older man close by who watched my interaction with the boys. Eventually, he made his presence known as the father to one of the boys and later came to serve as a translator only when there was a communication barrier between the group playing cards and me.

Learning how to play a card game with a group of young Moroccan boys was an extremely valuable experience for several reasons. The random experience took place at the heels of a well-meaning, yet rather intense intellectual debate about the current state of mathematics curriculum in Georgia and its impact on students. This incident ignited within me a predisposition to believe that we all possess the innate ability to learn and to teach; that the teaching and learning of children occur best when adults meet them where they are and are not afraid to be taught something themselves. One of the boys in particular absolutely came to life when I asked if he could show me how to play the game. Although he was a little hesitant because of the language barrier, he took great care and pride in making sure I understood each play and constantly gave me praise when I made the right move; by watching him, the other boys began to engage with me the same way. It struck a chord with me that allowing the boys the opportunity to become the "teacher" could have been a very empowering experience for them.

I was awfully touched and encouraged by the experience at the Casablanca Airport because it reminded me that teaching and learning might take place anywhere, with anyone. The notion that being willing to engage in a teachable moment is perhaps the only prerequisite for learning to take place, and that the role of teacher and student can be interchangeable within a learning experience resonated with me on the flight to Fez. I realized that I was becoming more inspired by what my stay in Fez had to offer and shockingly found myself anticipating the work in research that awaited me in the Medina.

While in Fez, I chose to do my ethnomathematical field experience in two sites: a bronze shop and an embroidery atelier that is housed inside an embroidery school. The Maison du Bronze, a one-room shop, larger than most in the Medina, displayed and sold finely carved bronze, silver, and wood crafts. The walls of Maison du Bronze were covered from floor to ceiling with metal artwork, bronze and silver mirrors, and plates of all sizes. Most of these items were made of bronze, while some, such as the tea kettles, were made using *nonshoor*, a blend of copper, silver, and tin. The two show tables erected in the middle of the shop held items made of bronze and *patina*, a substance used by the artisans to give the items a more antiquated look. Behind the tables was an open case filled with Berber daggers and Berber *syouf* (swords).

The artisans of Maison du Bronze were two male Arabs. During the observation, both bronze artisans were working on the same large bronze plate in a small corner of the workshop. The artifacts used by both artisans were a *matara-*

kat takleedia (hammer), needle, and chisel. The needle was to create *Filikian* work, or designs made by a series of tiny dots; the chisel was used to make groove designs. Both artisans described that there were two types of patterns usually created for bronze work inspired by either Berber or Arab designs. Later, they explained that the Arab designs represent nature, as they take on a floral design full of connected curves, many deriving from the Arab Henna designs. The Berber motifs are more geometric in nature and highly symmetric.

A second site that I observed was the only embroidery school in the Medina, a two-story space with the showroom and atelier on the bottom floor and the school on the second floor. The showroom was visible upon entrance and displayed neatly folded and hand-made tablecloths, napkins, handkerchiefs, and pillows. To the side of the showroom was the artisans' workspace where more work was displayed on the walls, a large glass table in the middle of the workspace, two wall shelves holding inventory, and an L-shaped bench used by the women who worked on the embroidery.

Both embroidery artisans, Smehan and Kinza, began embroidery work at the age of seven. Sitting against a small pillow on a cloth-covered bench, both were working on the border of a large tablecloth using a *murma* (circular, wooden hoop used to hold the white cotton cloth in place), a needle, and *ketha demse* (thread made of cactus leaves). Kinza was creating the main motif of her tablecloth, a design originating from Fez called *zushlena*. The expertise demonstrated by Kinza and Smehan, neither of who finished high school, was a testament to the vocational learning and knowledge that are celebrated in other countries. The concepts of symmetry and geometric dilations were continuously stressed when describing the nature of the designs depicted in the bronze and embroidery work. The intricate and highly graphic and geometric designs executed by Kinza and Smehan were phenomenal with miniscule stitches, only a few millimeters in size. Young girls, who are taught the art of embroidery at the school, are taught to count each thread. This is an extremely time-consuming technique, which requires mathematical precision and much concentration and patience, as there is no reverse side to the design.

The vivid learning experiences and phenomena I encountered and lived during my time in Morocco not only resonate with me as fond memories but also have ignited a new passion. I returned to the United States an advocate for authentic situated mathematics learning experiences having observed and witnessed firsthand rich and insightful results. Instructional activities designed so that students are actively learning within an authentic situation are most ideal to ensure that concept retention and mastery take place. I will be forever grateful to my gracious young teachers at the airport in Casablanca—Kinza, Smehan, and Abdul—for exposing me to such authentic situated learning experiences, as I am henceforth committed to create as many as I can for my students.

Collective Closing Thoughts

Our lived experiences yielded three important insights into the ethnomathematical practices of the craftspersons and artisans in the Medina. First, there is a condensed amount of tacit knowledge gained and used by each artisan. Tacit knowledge involves learning a skill but not in a way that can be written down. Each artisan described that they ascertain the knowledge needed for their craft through their lived personal experience. As there are no patterns used, and very little direct instruction given, there is a tacit aspect of their mathematical knowledge as well. With tacit knowledge, people are not often aware of the knowledge they possess or how this knowledge can be valuable to others.

Second, the cultural connection proliferating in the craftwork is undeniable. In most art forms, there is a clear influence from intimate aspects of the Moroccan culture on the motifs and patterns that thrive in the design of most of the handmade crafts. In a Berber motif, any sign has a magical or prophylactic meaning. The women, who would use them, originally when weaving rugs, to protect their feminine mores that they essentialize as being distinct and uncontrolled by masculine polity, always conceal the real meaning. These secrets are transmitted from the mother to the daughter over hundreds of generations. Within Berber motifs, the art of making symmetrical combination from simple forms emerges to personify the "world" that is depicted in whatever is created in a harmoniously balanced order.

Finally, the connection to and motivation drawn from the craftspersons' spiritual practices are noteworthy. Many of the same designs used in crafts are also found on walls and ceilings of the mosques within the city, symbolizing the continuity of faith and its appearance in the everyday lives of Muslims. Moreover, the way in which the artisans appeared effortlessly excellent in their craftwork can be explicably tied to the never-ending desire to perfect their work as an act of sincere obedience and unconditional worship of God.

As we contemplate these personal reflections, the mathematics education community wrestles with its own perceptions and conceptions. Such understandings are linked to contested issues of *what* counts as mathematics, mathematical activity, and mathematical ideas—along with *who* decides. As Western educators, we are knowingly confined by mandates and guidelines intended to aid us in adequately exposing our students to quality mathematics teaching and learning experiences. Many of us cry out for more time to be able to introduce our pupils to alternate theories and practices, with hopes that even a glimpse may ignite a spark within some of our struggling students or fuel the flame carried by those already excelling. As we reflect on our collective experience, we are compelled to contemplate how each aspect has seared an impression on our teaching practices and what we deem as meaningful mathematical learning. In addition, we can allow

each separate and specific aspect of our encounters in Morocco to guide us in how we motivate our students in constructing their own sense-making experiences in the classrooms. Whether it is the risk-taking journey to new soil, the patience and perseverance needed to communicate through language barriers, or a commitment to unparalleled work ethic and pride, we are now the beholders of many precious nuggets that can be shared with our students as a means to help them become better learners. Experiencing the ethnomathematics of the craftspeople consecrated in context allowed us to fathom the value and richness of knowledge as gestalt inextricably weaved into people's everyday life, fervently evolving and collectively maintained in the cause of survival. We are evermore committed to finding and creating as many teachable moments as possible through which to share our vivid encounters with such knowledge and constantly look forward to our opportunities to do so in the future.

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