CHAPTER IV

TEACHERS, STUDENTS, AND SCHOOLS:

FIVE DIFFERENT CLASSROOMS, FIVE DIFFERENT APPROACHES

Examining the five classrooms mentioned in the previous chapter provides an opportunity to gather valuable information about reteaching – in structure, implementation, variability, and assessments. Though each of the five locations outlined the instructional practices of five fifth grade teachers to meet the prescribed mathematics objectives adopted by the school district, each story provides a unique perspective in implementing reteaching strategies, particularly in the three locations using the Web-based EDU materials for additional practice. The following descriptions highlight two different perspectives. The first perspective addresses each school's unique environment, the individual teacher's struggles within the classroom, and the overall observations that transpired during one spring semester. The second addresses particular students within each of those environments and their interactions, successes, and failures throughout the reteaching process. These dual perspectives offer a voice to reteaching and illustrate the potential impact on learning mathematics. These are the descriptions.

Megan's Classroom at School #1

From the outside, the first elementary school exemplifies its Midwestern community's expansion over the past seventy years. Originally, this elementary school the community, it is now tucked away between a residential and small commercial area of town, with a hospital inconspicuously concealing this gem from the more heavily

traveled streets in the area. The building reflects the distinctive appearance of the 1930s era during which it was constructed, displaying the colonial revival architectural style that can be seen in the residential houses throughout the neighborhood. The centrally positioned spire atop this brick structure points the direction to the school's entrance, inviting the community to come forth and join in this dynamic learning environment.

Throughout the years, the exterior of the building has adapted to the growing needs of the entire community. Two separate additions were constructed during the early and mid 1950s, still the school has maintained its original identity by blending each addition project into the school's existing structure. The traditional emphasis on maintaining the school's identity has been tested over the past decade, visible in the four portable buildings that now reside adjacent to the school. These portable buildings are one approach the district has taken regarding increased student population, indicating the expansion the city and more specifically the local neighborhood has seen over the past two decades.

The surrounding neighborhood's expansion has had an impact on the school over the years, indicative of the recent growing student population. From the academic years 2003-2006, the school has seen a 7.6% increase in student population, with 451 students in attendance in 2006-07. This increase is still short of the 510 students who attended in 2002-03, but still reflects an upswing in attendance patterns even after the district's recent efforts to build additional elementary schools to address potential overcrowding.

The school population appears stable in spite of growth. For the 2006-07 school year, 89.21% of the student population lived within the official boundary. The mobility index, 0.175, depicts the community as being stable; the growth suggests that it is young.

Though the exterior shell and attendance patterns tell an interesting tale in and of themselves, the vibrant surroundings within the walls suggest dynamic instructional environments. When one enters the building, a variety of student art projects greets the community. These include simple, colored, life-sized cutouts of the younger students to complex, detailed pictures created by those in the upper grades. All of this hangs on the lower half of the walls, indicating that the students play within their community. Each students' artifact was neatly affixed to the wall with a small strip of masking tape, binding their work to the alternating dark to light tiles. In contrast to the structure and organization portrayed throughout this area dedicated to the students' artwork, the upper half of the walls were painted a bright white color, juxtaposing the symbolism of structure the brick tiles provide to the reaching of hopes and dreams if one looks skyward. Neatly blocked out in the corner of the entrance is a bright, bold blue painted area with the same white letters indicating that "*Character Counts*" – giving an indication that teaching values in and out of the class is also of great concern.

This inviting, still dynamic contrast within these first few steps of the entrance neatly guides every visitor toward the front office where visitors must sign in using a computer-based record system. Though the office was not in the least unusual, this particular elementary school's office gives the appearance of the central hub of a typical school, where goings on such as parents picking up sick children, tardy students checking in and declaring their lunch preferences, and teachers gathering supplies for their daily lessons and grabbing a quick cup of coffee take place. An administrative support person greets people as they walk in, acknowledging their presence and soliciting information about their respective destinations. She asks every person to fill out a nametag, a badge,

per se, to welcome the visitor in the building and to notify the students and staff that proper check in has taken place.

An initial visit to School #1 was to meet with Megan and discuss the guidelines, timelines, consent forms, and procedures for this qualitative study. This half hour visit was at the end of the instructional day, providing an opportunity to view the school without interfering with instruction. Megan's classroom is located in the far "wing" of the school, furthest away from the front entrance. The walk down the hallway provided further information about the daily life of a typical student. The additional art display of Presidents and holidays, posters announcing an upcoming musical concert, and open doors to classrooms portrayed a vibrant, active learning community. Several teachers were discussing specific students and their classroom behaviors that occurred during the day. Other teachers were walking towards the office with a very quick, intent stride as if they had an important meeting to attend. Though the teachers' actions along the hallway were themselves noteworthy, it was the last corridor traveled to get to Megan's room that stood out. The last few rooms on that path share a community hallway, with Megan's room being last and positioned near an emergency exit. Each classroom along this corridor can be classified as an open room; only a half-brick wall separates the room from the outer corridor, creating a limited barrier between classroom and hall activities. This open environment is even more distinctive in that none of the rooms have doors attached. At first, this appears more inviting, with limited barriers to invite students into the classroom. However, as future visits would indicate, this common hallway is conducive to a fair amount of distraction to students as people move back and forth between rooms.

As Megan and I began to discuss in more detail the research study, she began to show signs of a teacher who not only is passionate about her profession, but also who cares about her students. She shared how her fifth grade students' backgrounds were indicative to the entire school – where over half (51.10%) qualify for the district's free-and-reduced lunch program. Megan added that many of her students come from lower-waged, dual-income households, where parents who have little post-secondary experience choose to work multiple jobs, which decreases the amount of involvement with their son or daughter's education. Thus, when Megan acknowledged some of the students with behavioral problems, she seemed to circle back to her earlier comments addressing the difficulty of getting some parents involved in the educational process, creating a potential barrier to the individual student's learning simply because home/living environments might not appear as supportive to the student regarding academic success.

About fifteen minutes into our conversation, Megan addressed the intent in the initial email request and use of EDU. She was quite apologetic about opting out of this portion of the study and felt compelled to share that her reluctance to use the Web-based system was not due to her technology skills. Rather, her concern simply recognized the realistic availability students had to the technology because of their socio-economic background. Megan felt that most did not have the tools at home to practice, though she had no supporting data to confirm this fear. Additionally, access issues within the school were discussed including the limited availability of the computer facilities for each teacher and an unreliable wireless network, particularly within her classroom. This portion of the discussion stood out, as it illustrated a possible unconsidered digital divide

(Metcalf, 2007; Martin and Robinson, 2007; Czerniewicz, 2004; Lewin, Mavers, and Somekh, 2003) influence on this study and helped influence technology strategies deployed within the other participating schools.

As our conversation continued, Megan's vocal inflection and intonation spoke volumes to the rationale behind her participation and the dedication to her students. She shared many brief stories of individual students, their families, and their learning difficulties in her classroom. She further shared her frustrations of her college pre-service preparation program, particularly in the area of mathematics. The demands for elementary educators to be subject-matter experts in several curriculum areas are substantial and she acknowledged that mathematics was always one of her weakest subjects. Over the years, she had learned to adapt to meet the demands of the district by utilizing many of the distributed curriculum materials, but she felt that more experience working with the curriculum when she was in college would have prepared her to develop and modify her own instruction. She continued to acknowledge additional shortcomings. The sense of passion emerging during her conversation bespoke her sense of purpose as an educator – to prepare her students to the best of her ability and guide them toward a brighter future. Participating in this study seemed to Megan to afford an opportunity to improve her teaching; her willingness to volunteer gave her the sense of a safe environment in which to be critiqued.

One final area of concern that our initial conversation addressed was any potential bias Megan might bring to this study. Several years earlier, Megan had been a student in an instructional technology class taught by me at the local university. Additionally, concurrent to when the invitations for participation were sent out, Megan had a close

family friend enrolled in the same course. Though this study created a moment to reconnect and revisit her professional goals and her progress over these several years, the potential bias was openly discussed with clear expectations shared by both parties. We decided that an open, continual exchange of ideas would occur, giving her a better snapshot of her students' progress, and me an opportunity to view her strategies for reteaching. Our conversation concluded with shared pleasantries and her extending her students' excitement about participating in the study. Megan had shared with her students several of her own stories of college, an initiative she implemented to get the students and their families to begin thinking about post-secondary educational opportunities, even at such a young age. She felt that many of them had begun to see the value of a post-secondary degree. She also recognized that those previously mentioned students who had repeated behavioral problems would most likely not participate, simply because of the limited connection their parents had in their son or daughter's education.

As I left that day, I felt confident of the adaptable boundaries we had set. We decided that the upcoming observations would initially place me at the back of the classroom, limiting the possible distraction a visitor might initially bring to the environment. The subject matter also suggested a large number of students would need to be retaught. This was due to an introduction of geometric concepts – something not studied in well over a year by these students. Megan's previous experiences teaching this chapter showed that the combination of terminology and application often overwhelmed students, and this year's class had showed similar trends. It was a result of this potentially large number of students that Megan encouraged assisting students when applicable – creating another strand to continue and extend an open dialogue throughout the study.

It was an extremely cold, wet late February day when the classroom observation of Megan's reteaching lesson began. The weather was particularly noteworthy because of the difficulty driving to the school. The school's location along the arterial streets made parking quite difficult as the early morning snowfall remained unplowed. Still, additional evidence the impact weather brings to this school could be seen in the quantity of thick winter coats, snowsuits and boots arbitrarily strung throughout the long corridor to Megan's classroom, outlining the previously unnoticed hooks and storage for the students. My journey to the classroom confirmed my previous hypothesis that the open classrooms might be a distraction to the students, particularly as my shoes squeaked while walking along the hallway, turning students' heads along the way. Though the initial challenge of arriving a few minutes early was a mighty feat, there was still ample time to briefly revisit my previous discussion with Megan during her planning period. Megan reiterated the pent up anticipation of her students about participating in this study as she handed over the signed consent forms. Megan took a few minutes to collect her thoughts, and then left the room to gather her students – who were down the hall during her planning time.

I quickly made sketches of the layout of the room, noting the organization and structure Megan had in place throughout her classroom. Three neatly aligned rows of individual student desks faced a whiteboard and thus defined the front of Megan's classroom. Each row had a cluster of two or three desks adjacent to each other with an apparent missing desk in between, providing a gap between the clusters – possible areas where discipline concerns might exist or simply a pathway for Megan to move freely between the students. An overhead projector, positioned at the front-center of the room,

would later illuminate the instructional methods Megan would most often employ. Included was a screen that could be lowered or raised, occasionally acting as a theatre curtain to the whiteboard and allowing Megan's early whiteboard preparation to be concealed and revealed appropriately during her instruction.

Megan's classroom also provided additional stations consisting of larger tables strategically placed on the perimeter of the room. One station in the front-right corner had a faux wall built of bookshelves thereby creating a safe haven for students to find a quite spot to read one of the many books. Another station, located in the very front, not only provided an occasional spot where two to four students could work together, but also served as a staging area for Megan to keep her notes and handouts during instruction.

Another table positioned in the back of the room provided a place to discipline an individual student. At other times, Megan worked one-on-one with students at this place. A larger area consisting of two tables was placed back-to-back at the rear of the room, right behind the student desks. This, too, provided a safe haven, for one-to-one instruction, and occasionally expanded to include group activities.

Juxtaposed in the midst of this strategic student area was Megan's work area, located in the front of the room, just to the left of the overhead projector. In a similar fashion as the student's reading corner, Megan had positioned a table and desk in an L-shaped arrangement, with a large file cabinet off to the side blocking out her makeshift office. A personal computer appeared to be the hinge holding the "L" together, providing Megan quick and easy access to grades and email.

The half wall along the entrance into the classroom consisted of a series of shelves and cabinets. A sink and drinking fountain provided an in-class resolution when

students need “a drink of water” or a need to wash their hands during an in-class activity. Wooden passes, one labeled “boys” and the other “girls,” sat next to the sink along with a clipboard and sign-in sheet – artifacts used when students went to the restroom. Located along the back wall adjacent to the shelves and cabinets were two computer carts. These were positioned at an angle suggesting a mini computer lab for students needing just-in-time support.

One final initial observation noted the limited natural light in the room. The classroom has a long set of windows along the back wall, each of which has an inserted partition that hides the light and extends the wall. Megan used this space for additional instructional materials, such as posters and notes reminding students of key concepts like number placement and geometric figures. Megan later explained that these partitions were inserted for two primary reasons. On this cold February day, any additional barrier between the room and window kept the room just a bit warmer. Likely more important, however, was that a vandalism incident earlier in the year had prompted the school to place metal inserts in all similar windows.

My focus on the physical aspects of the room waned quickly as Megan led the first group of students back to the classroom. I could sense a shared anticipation as she held them up at the entrance, waiting for several stragglers lagging behind. A few students, though, boldly took it upon themselves to find their location, with the rest of the class quickly following after Megan’s instruction. Once they were all seated, reteaching commenced by addressing the performance on the previous day's exam. Megan talked about each of the four objectives assessed on the overhead and whiteboard, asking periodic questions that typified the repartee of teacher-student interactions. Students

would raise their hands to participate in the discussion, giving a sense of the ebb and flow between students and teacher. However, most students seldom participated in this exchange, indicating a possible student engagement factor at the forefront of this study.

After Megan addressed the four objectives, she then redistributed the exams to each student, directing them to move to their "testing spots." This term had three different interpretations based upon the students' scores. One group had not finished the exam. Another had to retest some of the objectives. The third group had successfully passed the exam, needing only to find something to keep them engaged for the remainder of the period. In this particular instance, the students either moved to one of the break out areas or simply separated themselves at their individual desks, creating an open space between them.

This particular moment suggested that reteaching was an entire class activity where the initial assessment instrument guided instruction for individual students. The back-and-forth between Megan's lecture and her students' responses addressed the processes and procedures needed to find the solutions. It became clear that Megan used direct instruction as a method to get students to access prior knowledge and focus them on the tasks at hand.

It would be quite easy to conclude that reteaching is defined by this singular event. However, a closer examination of test scores indicating the struggle that many students had with this chapter – suggesting that a second dimension of reteaching within Megan's classroom might be connected to the curriculum. The assessment focused on mathematics skills emphasizing the multiplying and dividing of factions. However, the procedure the students engaged in after the test was passed back suggested an emphasis

on students self-identifying the missed objectives, which were identified by the circled "No" at the top of each page, and then beginning to correct their mistakes. As their time on task increased, more and more small hands would raise requesting Megan's assistance. As she weaved between the desks, one could sense her high level of energy and her frustrations with the high number of students needing assistance.

This observation also called to attention a potential flaw in the reteaching activity. As a result of the large number of students not engaged in the guided practice at the beginning of the period, many were now were faced with the reality that they had to reassess on at least one objective and had very little understanding of how to perform the task. The reteaching of the concepts before distributing the formative assessment results created a situation where the students began to seek Megan's assistance. Though the one-to-one instruction was rich in the exchange of terms and procedures, too many students were left waiting for assistance, resulting in more off task behaviors by the students rather than actually focusing on mathematics. Two particular students exemplified this behavior. Both began by flipping through their tests. Their initial carefree attitudes visibly turned to bewilderment as they recognized their poor performance. Each page turn led to increased expressions of apparent confusion on their faces. Both raised their hands simultaneously in efforts on their parts to get Megan to come and assist as they kept looking at their performance. Nonetheless, as their attention turned from their test to Megan's location in the room, their faces turned from puzzlement to disappointment realizing the long wait ahead of them. One of the students lowered both his hand and head to his desk as if exhausted by the task. The other used the time to get up and sharpen his pencil with the electric sharpener in the back of the room. At first, I thought this was a

boy simply trying to be efficient with his time. Still, the continuous grinding brought my attention back to him during this process. Though he stood there sharpening away, his gaze was clearly on Megan, indicating a possible ploy to either delay working on the assignment or pull her away from other students.

Within a couple of minutes, Megan not only addressed the student with his head on the desk, but also this young boy who was clearly becoming a distraction to others in the classroom. She called out to him to find his seat, in which he sat down and looked again at the first page of the test, raised his hand and then looked up – noticing Megan still across the room working with another student. His facial reaction quickly showed a sense of distress; he lowered his hand and began working on some of the computational areas of the test, using his fingers as a makeshift calculator for the basic arithmetic.

Megan found herself that day working with a large number of students individually – both in rescoring the exam as students were finishing and helping others in need of further assistance on the reworking of missed problems. Her dialogue with the students continually addressed the mathematics procedures needed to solve each problem. That often involved getting the students to verbalize their own process – almost mimicking the initial instructional activity Megan had demonstrated at the beginning of the period. If students made an error of misplacing the decimal in their answers, the student-teacher discussion would rewind and go back through the different procedural stages, identifying the error within the student's thinking – often directing to the previous discussion to conceptually recall the decimal location based upon a poster on the wall addressing place values. Once Megan felt assured that the students understood decimal placement, she would then redirect the student to rework the particular problem.

A tremendous amount of this initial classroom observation not only noted the instructional procedures Megan implemented in the classroom, but also how students utilized her assistance. For example, when students were asked to reassess a skill that was a word problem, often more time was needed discussing the problem and breaking down the necessary procedures, during which time other students seemed to become displeased while waiting for assistance. Megan's approach to reteaching reflected her desire to meet the individual needs of each student. As she quickly moved from student to student, she always maintained a consistent, patient tone – even when addressing behavioral problems from across the room. She quickly would work to get the students to focus on the individual question and objective area. Once she felt assured that the student could answer at least one of the questions, she would move off to assist the next student.

This initial observation also exemplified a very typical classroom environment addressed by a considerable amount of the research literature in terms of defining classroom social roles and the help-seeking behavior of elementary students (Aleven, McLaren, Roll and Koedinger, 2004; Karabenick, 2004). Though the clusters of desks would suggest some peer-to-peer interaction, it became quite clear that those students who did not successfully meet the objectives relied primarily on Megan's support. Her movement in the room, therefore, was very critical to learning.

Supporting evidence of this delineation of defined social roles within the classroom was actually more evident in the interactions of the students with another person in the classroom. This particular person was a paraprofessional assigned to a particular student confined to a wheelchair – providing personal assistance with adaptive technologies customized for this student. Often, the other students sitting near the

paraprofessional would seek assistance after a short wait for Megan. The paraprofessional would follow similar discussion points by restating the process and procedures Megan had taught earlier to the entire class. After about an hour, a second paraprofessional replaced the first. Students continued to request assistance from this second person.

One area of concern arose as a couple of students became a little more disruptive. These two were students demonstrating frustration in both the task and the wait time for assistance. One in particular demonstrated his frustration as Megan arrived to assist and asked him, “Show me how you did the decimals before?” His response was to take both hands and to rub his forehead with his palms. Looking at his facial expressions over the two minutes she was beside him one could see lines of stress becoming more evident in his forehead, eventually leading to the quivering of his lip as he became more frustrated.

As the period continued, I began to wonder if some of these visible signs of frustration were early indicators of intrinsic cognitive load. Many of the students were clearly trying to avoid the task when Megan was not nearby and would visibly show their agitation when Megan came to them and tried to direct them back toward the desired task. Megan’s dance throughout the room providing assistance often included personal connections with students that lowered their frustrations and showed the connections she had developed with her students.

One might think this dance within the room was a one-sided performance by Megan, but on this initial observation, the dance actually featured many performers. The paraprofessionals’ role was to stay close to her assigned student, but her proximity allowed her to extend a helping hand to those students who ventured into that space. Even the students played their parts. Those successful students quietly found their next task

either in the reading corner or at their individual desks. The students who needed Megan's assistance found their rhythm, quietly working on their tasks. Even the more disruptive students found their beat – creating a back beat to the harmony. This syncopation suggests an ebb and flow to this dance, clearly defined by the routine of instruction within the room. Granted, there were visible violations to the dance when some of the students were not comfortable with their role. One student clearly gave the appearance that he was violating a rule by pulling out a multiplication table for assistance as he worked on trying to complete the test. It was this notion that the dance had defined roles and rules of each player – was further reinforced in subsequent observations. One particular student only exemplified this idea by his repeated discipline issues addressed by Megan throughout the session. Megan verbally recognized the behavior and then eventually relocated the student to one of the designated discipline locations. One could sense that this tension had been there for some time because the other students appeared oblivious to the loud verbal outburst, and when the behavior was actually addressed, the boy smiled when he knew Megan was not looking – acting as if he had won a minor victory in the battle.

The next visit occurred a few weeks later and, once again, began with a short conversation with Megan before her students arrived. Most of this discussion centered on how she manages reteaching and reassessment of the objectives. This discussion further explored the topic by focusing on the creation of possible instructional interventions before the assessment. In the previous observation, it was noted that Megan had made a couple of comments encouraging her students to ask for assistance before the test. On this day, however, Megan shared that very few students actually take advantage of these

opportunities before the assessment. Megan also commented on the number of students who repeatedly needed reteaching, wondering if there were something else she might be able to do to encourage students to seek help.

It became evident within this short discussion that Megan's concern was clearly for the well being of her students. She recognized that many of her students' performances were directly related to their levels of engagement within the instructional process. She was finding it difficult not to blame herself for their performances. This connection to take personal responsibility seems to be an important strand, particularly with younger teachers trying to reach out and make a difference in their students' lives. Megan was clearly showing evidence of seeking additional strategies and support in order to raise the achievement levels of her students.

This strand illustrated a point Megan had previously hinted of – her own limited comfort with the subject matter. One might connect these points together and conclude that some of the students' performances could be directly related to Megan's own self-confidence of the subject. However, the previously observed reteaching session did little to support her fears. Rather, there were more issues addressing individual student behavior, suggesting further interventions might be needed to decrease off task behavior.

All of these connections emphasize Megan's desire to teach students to become less dependent on her assistance and more aware of their own knowledge. Thus, she is spending a considerable amount of time thinking about ways to increase self-efficacy with each student. Megan seems to have a good sense of where students are at in their abilities and was trying different strategies to build self-awareness with each student.

Still, by addressing instructional objectives centered on more behavioral issues creates limited time to focus on actually building these skills for each student.

As the clock quietly announced the time for Megan to go get her students, a greater level of acceptance of the primary researcher in the classroom was clearly visible on the students' part as they arrived. Throughout the entire hour and a half, the role of the primary researcher had changed from one solely focused on observing classroom behavior and patters to that which provided additional reteaching assistance for Megan. Though this change in role was accepted by all the students, more time was spent working with two of the boys in the room who clearly had displayed more behavioral problems during the first visit. This strategic move was discussed beforehand with Megan, and did seem to direct more focused engagement on the part of the two students, freeing up Megan to work with the larger group of students.

Up to this point, observations were made regarding objectives addressing those mathematics standards involving problem solving or computational skills. This third visit in early April created a unique opportunity to observe a new standard introduced for the first time in the year that focused on geometric and spatial understanding. This was a unit with seven assessed objectives – more than the four or five objectives covered in each previous chapter after the first of the year. This shift in content and increase in objectives was an issue that the district office actually suggests breaking into two manageable units in order to decrease the cognitive load on the students. Megan had adopted this strategy. Megan recognized the early focus on terminology transitioning into a more application stage, indicating a connection to some of the materials using Bloom's taxonomy.

The reteaching and retesting of this particular assessment clearly identified that the terminology was difficult for many of the students, particularly in the classification of polygons. Several students seemed to struggle with the names, particularly with shapes of five or more sides. Materials were available to assist the students, even during the assessment. In fact, each student had a worksheet distributed throughout the district during the instructional unit that helped organize all the shapes in their respective classifications. A completed version of the worksheet was even viewable on one of the partitions. Students engaged in their previous noted dance could easily get up and look at the worksheet to see if they had guessed the correct response. It was uncertain why students did not use this resource as a tool except when encouraged by Megan or the paraprofessional.

As students were working on the test, I began working one-on-one with one of the male students I had assisted during the previous visit. This boy is considerably taller than Megan and he was clearly struggling with the identification portion of the test. As he fidgeted in his seat, I asked a question about one of the classifications. Rather than simply saying “I don’t know,” his most frequent response, he said “I wasn’t here when this was taught.” This was the first time that illness emerged as a possible factor leading to reteaching. Instruction continues in the student’s absence, and sometimes the reteaching moment is when the missing information is taught for the first time. I brought the student over to the wall and talked through the worksheet with him, enough to be able to give the student confidence to quickly identify the necessary geometric shapes on the test.

This moment pointed out a concern that lower level knowledge, such as terminology in classifying polygons, might need further supporting materials in order for

students to build understanding. Evidence of this could be seen as two girls had similar conversations with Megan. In each conversation, a similar dialogue involving “What is a polygon?” and “What is a shape with five sides?” were guiding questions used to identify classification issues. Once the student would make the connection to term, his/her head would turn towards the sheet in an attempt to find the answer. Interestingly, though, the elements on the worksheet were not that visible unless the student was standing right in front of the paper. Thus, when these students would turn toward the worksheet, it became clear that this was an attempt to visualize the location on the handout in order to prompt recall of the corresponding term.

These first three visits suggested several potential themes that could influence student learning. One focused on the self-doubt that Megan brought into the classroom. Another addressed the lower level skill within the materials. However, the behavioral problems seemed to mask any definitive conclusions. Though several behavioral issues were noted, two specific students seemed to influence Megan’s use of time in these individualized reteaching moments. Since consent was not obtained from these two students, additional observations were requested to observe direct instruction in order to identify any potential factors leading towards reteaching. Megan eagerly accepted this in a further attempt to improve her instruction.

The next classroom observation occurred less than a week after the previous reteaching session, and much of Megan’s instruction focused upon applying the previous day’s topic of calculating perimeter into direct application situations. Thus, an objective identified as problem solving was the focus and was selected as a topic the students had previously struggled with in earlier chapters. The only difference was the geometric

emphasis. Nonetheless, Megan's use of words and phrases such as "this is tricky" and "slow down" suggests a connection with students struggling to conceptualize the process of lower level knowledge and applying it to a more application/analysis tier. This connection is supported because, during Megan's talks with individual students, similar words of encouragement tried to slow students down in order to process what was being asked of them.

The other thing this particular observation revealed was the importance of the standing relationships Megan had made with her students and the students' reliance on her expertise. Often the discourse between all parties was a set of questions directed by Megan, with the response given by the students. Often this response was vocalized with a bit of trepidation, consisting of a wait time by the students until a positive response was given back from Megan. This give-and-take was a ritual that many students used to build confidence in their own abilities, something the paraprofessional supported when she suggested that "these students want to be spoon-fed the answers." This insight suggests further connections to the use of feedback during teaching in order to build student self-efficacy, particularly when it comes to areas addressing procedural knowledge. Not only does this focus on individualized feedback take a lot of effort on Megan's part, but often was resisted by students, particularly by those who frequently needed to be retaught objectives.

This visit also accentuated another concern as Megan's instruction continued. She utilized sets of overhead transparencies as she gave guided instruction – some of which were difficult to read if one were sitting in the back of the room. This notion of difficulty in viewing materials at critical times was earlier documented with the polygon worksheet.

However, this moment prompted a closer examination of other materials posted throughout the room. Many of the purchased materials were colorful and quite visible, using letters and numbers that could clearly be seen from all sides of the room. Other materials, especially handouts created by district, were printed with a relatively small font. These sheets were displayed throughout the room and at various eye levels, very difficult to read unless one was standing directly in front of them. The supportive materials used to enhance student learning seemed like a possible theme to address with respect to the struggles of learning mathematic content.

This particular observation also provided an opportunity to track individual student-to-teacher engagement throughout the session. Thus, as Megan concluded the guided practice at the overhead and transitioned students into self-exploration activities within the prescribed homework, Megan's dance once again commenced. This time her movements through the class were clearly dictated by the students. Students would raise their hands with questions. This created a sense that she was the dancer being led by the students, moving back and forth between students, to board, to student, to overhead and so forth, each movement predicated by the nature of the student's questions. Megan's dance suggests that the instructional environment functions successfully based upon the use of feedback amongst the participants, where she can respond to the individual student needs.

In a later conversation, Megan revealed that the district's objective cards not only provided a prescriptive guideline to deliver instruction, but also valuable data on student progress. Megan had utilized a spreadsheet in order to track student progress in each area and felt more at ease that students were successfully moving through the curriculum. This

also allowed her to keep similar data over the years and to modify her instruction based upon the difficulties of past performance. A good example of such modification was when student performance regarding geometric terminology prompted her to split the chapter into two manageable units.

This last observation also addressed whether there might be a connection towards the amount of peer-to-peer interactions used in the learning environment. The past reteaching observations did not discover any use of peer interactions that focused on subject matter. This was the first observation where peer-to-peer interactions were noted during instruction time, particularly when the students exchanged homework and graded their "neighbor's" work. This suggests a misuse of suggestions made by the NCTM and outlined in Chapter 2 on using peer interactions to improve learning for low achieving students. The peer activity assisted Megan in quickly obtaining performance related data, using missed questions to rework homework problems in order to revisit the process and procedures necessary for success. It did not involve having students help one another in learning.

The level of discourse during this one session once again illuminated the connection between the perceived social roles of students and adults within the classroom. Near the completion of class, one of the students who had continually demonstrated behavioral problems was again disruptive. Megan tried to bring his attention back into the subject matter by asking him a homework-related question. This prompted another boy to respond, "You're the teacher. You should know this."

It was clear that reteaching in Megan's classroom is a reactionary response. The reassessment data suggests that these reactionary reteaching methods are successful. In

every case documented, students went from an initial score of one or two to a three after the reteaching-reassessment intervention. The chapter addressing geometric figures produced the largest number of students (N = 8 out of 11 participating students) needing reteaching, whereas the unit involving addition and subtraction of decimals the smallest (N = 2 out of 11). Each one of the district's objective cards not only lists the assessed objectives, but also the NCTM strands involved. As noted in an earlier conversation with Megan, those objectives that involved more problem solving seemed to be the objectives that required more reteaching. The only difference was with some of the computational objectives involving multiplication and division of decimals that had a fair number of repeat students and then the first time introduction of several geometric concepts.

Thus, the observational data along with assessment scores indicate several potential factors that might contribute to overall student success. Those include the social dynamics within the classroom, including the behavioral issues of several of the students. This extends into the help-seeking patterns of each of the students within the class and the norms each person has developed throughout the school year. Another potential factor could address Megan's personal intrinsic cognitive load with respect to the subject matter. However, it was the focus on process and procedures continually addressed with her students that suggests little effect in this area. A third factor could easily draw attention to the mathematics materials used throughout her instruction and her classroom and the impact they place on learning novice materials. Finally, one final potential factor to extend into this narrative was Megan's reactionary process of reteaching. Though the overall impact reactionary teaching plays on students and teachers was not clear in my observations, there does appear to be some element to this interaction and reaction that

suggests a pattern exists – possibly focusing on creating additional interventions built into the structure of the curriculum.

Megan's reassessment data and contributing factors are summarized in the upcoming chapters. This information is combined with the observational and reassessment data collected at the other participating schools in an effort to summarize findings and make some general conclusions to the overall examination of reteaching.

Hasan's Experiences at School #1

Looking at Megan's classroom reveals the emphasis placed on instruction. However, there are two other lesser emphasized components tied to reteaching that make up this particular story within this district – those are relearning and retesting. To understand these other two vital components at this first school, one boy's (pseudonym Hasan) experiences and voice are explored.

Hasan is a boy whose size and actions are quite representational of the many children going through school during this difficult transition of late elementary into middle school. Hasan is quiet and much smaller than all his classmates. His meek presence was noted on the first observation as he quietly found his seat located in the middle of the back row of the room. Hasan's demeanor remained consistent throughout all my visits; he sat quietly juxtaposed between the two most disruptive students. As the motion and commotion that encompassed Hasan's world continually changed, his attention seemed to remain focused on his teacher. Occasionally his gaze would follow those students as they left to use the restroom or moved to sharpen a pencil. However, his purpose seemed focused on the instruction at hand.

Hasan displayed signs of a typical little boy struggling to find his identity within the classroom, but did not welcome any further attention. As Megan taught, Hasan would engage in activities suggesting that he was processing information. For instance, because of his height, his feet barely touched the floor as he sat there in his chair. As the dance of Megan's instruction seemed to either hit a crescendo or a coda, Hasan's feet would swing side-to-side as if he were a metronome keeping tempo during instruction. Other times he would lip sync as he did calculations in his head, sometimes biting on the end of his pencil as if to hide his rituals of doing the math.

Hasan's academic progress, though, clearly indicates that there is more to the story in terms of processing instruction into long-term memory. The data collected during that quarter showed that he only achieved an initial proficiency on eleven of the twenty-one objectives assessed. Out of the ten that Hasan did not initially pass, he retested at the minimum proficiency level in five, indicating either a lack of opportunity to retest or a piece in the curriculum where he still had not demonstrated a basic understanding. Overall, Hasan only averaged an initial score 2.3 on a 4 point scale on the twenty-one objective areas, and a 2.8 after an opportunity to retest.

The first four chapters addressed number sense and computational skills. The final objective in each of these chapters addressed a problem-solving strand that the district has identified. Hasan received a one out four on this problem-solving strand in all but the first chapter demonstrating his struggles to extend the curriculum to meaningful problems.

From another perspective, Hasan did find moments of success within each of the first three units. In the first chapter, he received threes in each objective area. In the next

chapter, he only received a three in one of the three objective areas. In the next chapter, he received two threes and one four out of the four objectives. This pattern suggests that Hasan is clearly focused on some of the material, but struggling to extend this knowledge to a problem-solving context.

When it comes to learning, Hasan's performance indicates a clear struggle with bringing skills together in one assessment. Further evidence of this was found in his final assessment of this quarter where he showed proficiency in four of the seven geometric concepts objectives.

Even though Hasan's assessment data suggests a mixed understanding of mathematics during this brief study, his story is more clearly defined in how he processed the information. This little boy who sat politely in the back repeatedly demonstrated his individual processing abilities. The swinging of his legs, his focused attention, his mouthing of the words were clear indications that he was performing what NCTM calls think-alouds, but in his own self-defined manner. Thus, while accomplishing learning, Hasan performed his own strategies to keep focused and on task and to understand the problems.

On one occasion I observed Megan working with Hasan one-on-one during this time of reteaching. The interaction was quite brief; the discussion focused on going over two or three problems together, with immediate feedback given by Megan when Hasan responded. This two-minute exchange allowed Hasan to not only make corrections to his current work, but also to correct any misunderstandings he had in the computational processes working with fractions.

Even though this one instance provided a rationale in delivering reteaching through one-on-one instruction, it also zeroed in on a major concern. What happens when a large number of students do not pass? In Hasan's case, that often meant those moments for direct one-to-one interventions were not available. Additionally, Hasan's shyness created barriers to the immedicacy of feedback necessary for understanding. Thus, when more students needed to be retaught, Hasan did not always get the time to check his learning beyond the test.

The one question I asked myself after I left this first school was what would happen to Hasan over the next three to four years? Would his hit-and-miss success rate in mathematics continue? Was his shyness a factor in his learning? Was he getting enough practice and feedback to do well on the tests?

David's Classroom at School #2

The second elementary school is located along the northern edge of this Midwestern city and depicts how a classic structure illustrates the surrounding community's values. The three-story brick building resembles many of the schools across the Great Plains during the 1920, constructed of a deep, dark colored brick and lightly colored grout and borders. The contrast of colors creates distinct contours across the landscape, illustrating a focal point to the surrounding community.

This school's location is also very symbolic of its connection to the community. Across the street stands a Baptist church, whose parking lot often serves the needs of the school. A crosswalk provides a safety net between both structures as young children and parents make their way to and from school along this heavily traveled street. A

swimming pool and park are also located on the opposite corner of the school's lot, serving many of the students after school and throughout the hot, humid summers.

The school also represents the community's growth over the past one hundred eighteen years. The original school was a two-story, four-room building and served a smaller community within the city for nearly forty years. As the city's commercial and industrial opportunities grew during that era, this community also grew – placing more demands on the school. This growth continued through the mid 1950s, stretching the demands of a K-8 school at the time to meet the nearly two hundred students. This growth prompted the community to expand the school to add additional classrooms along with an auditorium. The school's student population during that expansion continued to grow, almost doubling even though the school narrowed its instruction to a K-6 population.

As the community continued to expand over the next several decades, the school also was expanded to meet the needs of the local residents. This expansion included the construction of a community center. The enrollment is almost seven hundred fifty students, very large for an elementary school in this city.

These historic elements reflect the direct interdependence of the school and the community. As residential housing expanded within the area, including several apartment complexes, the school has expanded to meet the educational and recreational needs. The four portable buildings adjacent to the school's playground, added within the past decade, symbolizes this expansion.

The initial visit to the school was to discuss with David the EDU materials and how he might utilize them with his students. That day was a particularly cloudy day

following the school's Thanksgiving break. The school's connections to the community were quite apparent upon my arrival. The brick steeple awning sitting along a diagonal to the rest of the school revealed an entrance for both students and visitors, with a small foyer allowing an extra barrier from the elements on the soon-to-come winter days. Signs hung on the entrance's glass doors provided orientation to all visitors, giving instruction to all visitors to check into the office upon their arrival. A greeting station just inside the front entrance provided an additional level of security – where a senior volunteer smiled and pointed in the direction of the entrance to the office.

The office also revealed other intricacies between the school and community on that particular afternoon. Students who had gotten ill during the day were sitting waiting for an adult to pick them up. Administrative assistants were busy answering phones, helping teachers get instructional materials together for the upcoming days, and assisting administrators by observing students who clearly had displayed behavioral outbursts during the day.

After waiting a few minutes for guidance, one of the assistants placed a phone call to David, alerting him of my arrival. She followed her call with a friendly, "he is on his way up here. You can have a seat if you'd like," giving me a few minutes to observe the numerous interactions within this environment. It was through the commotions, actions, and interactions between the many people that an evident connection to the community began to emerge. Over the course of this study the rapport between the staff and me began to expand, extending to the young preschool student to the senior volunteer, again, clearly reflecting the strong connections to the community.

David greeted me and suggested that we head to his classroom located in one of the portable buildings. From the parking lot, one only notices the chain-link fence and the grey and white exterior of these buildings. This suggests a possible disconnect between these additional classrooms to the rest of the building. Notwithstanding, as David led the way, it became evident that the before-mentioned, adjacent playground is what binds these portable buildings back within the school community. Several visits support this claim, as the playground clearly served to transition people back and forth between the portable rooms and offered recreation for anyone who chose to use the playground equipment. David guided us through a couple of after-school basketball games being played by several boys and acknowledged a couple of girls engaged in conversation.

David arrived at his classroom and walked up the three-step cement staircase to his classroom. He reached for his keys and unlocked the door with little effort in finding one of the many keys on his key chain. A clear sign of someone who had found a clear pattern in his day – a routine, *per se*, that allows him to function in this building that extends the school to meet the school's large population needs. These grey-colored buildings are seen throughout the district and at all the educational levels. Some residents view the "portable" as a symbol for overcrowding within the schools – giving the district a considerable amount of leverage to construct other facilities. Additionally, the middle and secondary levels use "portables" to offer alternative programs, providing a safe haven for students who are struggling to complete their education.

My previous experiences working in portable classrooms created an initial bias about what David's classroom must be like. Those experiences included teaching in cramped quarters, where storage was minimal and the instructional environment was

often limited. Still, as we passed through the door I found those biases quickly evaporating, with a large, traditional work area containing tables arranged in five student workstations holding anywhere from two to five students. An overhead projector and screen were positioned in the middle of the room along the same wall as the exterior door. The combination of paneled and painted walls displayed the current educational topics. An interior closed door lead the way to a shared set of restrooms with the classroom on the opposite end of the building. David had made a makeshift teacher's office in the smaller rectangular area off the main classroom by positioning several four-drawer file cabinets as a wall with several floor-to-ceiling bookshelves located behind a teacher's desk. This area included the many resources of books and materials David had collected over the years.

During this pre-visit, David described the upcoming educational objectives and discussed his students' struggles and strengths. He further voiced his personal excitement at participating in this study simply because he had found several of his students needing retesting on several units. David had a good sense that access to technology outside of school would be an issue for many of the students, but had found that the level of motivation by the students always seemed to increase whenever they used computers. Additionally, David shared that he had actually tried using EDU in the past because of others' success within the district. This background and previous explorations only further supported his willingness to participate in this study.

Our discussion not only provided the starting point for the development of the EDU materials to be used with David's class, but also suggested another potential concern. Reteaching and retesting was creating a situation where David felt he was

behind his colleagues at other schools within the district. His concern about falling further behind and not being able to keep pace with the district's curriculum suggests another situation where teacher self-efficacy with respect to district expectations might influence instruction.

The first set of reteaching interventions using EDU began right after the start of the second semester. This initial visit working with the students actually emphasized some of the shortcomings of using EDU, which David later admitted was one of his frustrations about previously using the system. With a class of fourteen students, David had predetermined that the entire class would benefit from using the web-based system to work on the mathematics objectives addressing the addition and subtraction of fractions. Students were using wireless laptops that were in a cart stationed at the back of the room. David began by demonstrating to the students how they should access the materials using his own personal laptop connected to an LCD projector, but then turned his focus on individual student to begin working on their own problem sets. All of the students quickly found themselves engaged in the activity – each seemingly utilizing the available time to its fullest. However, the online structure of questions and responses required each student to perform many calculations before entering responses. Some of these computations required the student to find the least common denominators of fractions, which often required more than mental math processing, where the student would pull out scratch paper in order to perform the necessary calculations.

The success, though, was in the structure David used in the activity and the levels of engagement of each student. David challenged each student to work on a particular objective he or she had not mastered, encouraging him/her to continue using that one

assessment repeatedly until he/she got a score of three or four out of four total points. This challenge narrowed the focus to the task and seemed to be enough to keep each student on task. Additionally, David and I used this activity to assist individual students, as they appeared to struggle with a particular question. This created an opportunity for the sort of one-on-one instruction that was clearly a part of the reteaching undertaken when not using any web-based materials.

As the students continued into their third and fourth attempts of working on one particular objective, another problem became evident. Each question within the EDU materials had a direct feedback component built into it, where both descriptive and prescriptive information identical to the reteaching materials found within the instructional materials was given to the student directly after completing the task. It did not matter whether the student scored the question right or wrong, the descriptive feedback was given in each case. Though some students found these helpful at first, the amount of feedback within each set of assessments clearly overwhelmed many of the students. Students eventually chose their overall score and the correctness of their answers as their only source of feedback.

This phenomenon suggested a reexamination of the use of feedback in the upcoming objectives. In an effort to not overload students' working memory with the steps for each question, it was decided to narrow each online assessment to only one detailed explanation of the solution and then rely on the correct answer as another feedback mechanism.

Other programming issues within the EDU materials were also noted during this visit. Occasionally, a student would receive an error message from the EDU system after

they submitted his/her answer. On these occasions, the randomization process would create a question requiring the student to divide by zero. Rather than pointing out how these were mathematically impossible, many of the students would go ahead and attempt to submit their response with a zero in the denominator, thus receiving an error message at the end of the activity. The error message then created an initial response by the student that either "they broke" the system or that "it doesn't work." Still, what this event allowed David to do was to engage his class in a "teachable moment" where the entire group discussed how dividing by zero was an impossible task. Thus, a programming flaw created two opportunities – the first to see how quickly one could make a programming change to the EDU system. The second created a moment demonstrating students' higher understanding of the materials.

Though David's students played up how individualized learning experiences can create opportunities for deeper understanding, it also exemplified the reactionary process of teaching. For my role, this visit accentuated a potential research flaw over the long haul if I was going to modify materials while in the field. Not only did this visit zero in on moments when I was disconnected from the observational process in order to correct the flaws within the instructional materials, but also tainted any quantitative data in the EDU system. Thus, I chose to focus on the debugging of materials in both feedback and randomization over the next several weeks before my next visit, allowing me to redirect my observations and interactions in future visits to the students rather than programming flaws.

This focus on preparation resulted in a much richer experience during the next visit, allowing me to work more one-on-one with students. Still, student engagement was

much lower during this visit. This lower enthusiasm could have been attributed to additional outside factors, as it was about two weeks away from the school's spring break. Additionally, there also was inclement weather at the time. Therefore, observing the students throw their winter clothing onto hooks along one wall suggested their tiredness of the trek along the bridge. All of these were clearly potential factors on student learning when considering these students have to make this progression daily.

Students did seem to respond quickly to the EDU activity once they began. The laptops were turned on so that when they arrived they could open them and access the EDU site quickly. David again demonstrated how to access the site. This process showed that the lengthy URL EDU automatically generates for each class might be a problem for teachers who wish to use the system.

Two additional students were in the classroom since my last visit. David and I spent more time working with each of them, leading to more opportunities for the other students to get off task.

The third observation visit occurred in late March. David had transformed the classroom to be in three major rows with students in strategic seats throughout the room. The projector had been moved to the opposite side of the room, giving an indication that the entrance might have been a distraction to the learning environment at some time since the last visit.

The objectives to be covered during the reteaching session addressed multiplying and dividing fractions. This time, David used the EDU system as a tool for the entire class. He performed some basic examples at the board before moving the students to their individual laptops. Reteaching used words like "what we have been doing" and "think

about what you did" as a prompt for recall. The problems David worked on the board also centered on the same instruction he had given previously, thus indicating that reteaching in this instance was simply to cover the same instructional process once again.

At this location reteaching was an entire class activity in all three of the observations. During the third visit, David promoted more peer-to-peer interactions, encouraged those successful students to become instructional leaders in the classroom. Thus, when all of the students began to use the EDU system, those successful students became resources for struggling students.

The major difference between David's use of EDU and the remaining EDU cases to be discussed was that David used the online system as an entire class instructional intervention tool. David's early use of EDU helped motivate students to want to learn the materials and then further help other students. The data outlined in the next chapter showed this to be of little success, though. EDU did create a way for David to visually see when students were struggling simply based upon their facial expressions as they worked the problems – allowing him to modify and shape his instruction to meet each individual student's needs. These "teachable moments" are opportunities where discussions between both peer-to-peer and teacher-to-student groups are consistent with the NCTM (2007a) guidelines for improving the performances of low-achieving students.

One potential flaw in David's case was that reteaching created a scenario where successful students were actually participating in the reteaching activity. Though his later adaptation suggests a more positive strategy, there is a risk that such practice may result in an expertise reversal effect (Kalyuga, S., Ayres, P., Chandler, P., & Sweller, J., 2003).

The EDU data presented in the next chapter does not support that this phenomenon actually occurred in David's classroom.

Cindy's Experiences at School #2

David's classroom provided several unique threads – access issues of using EDU outside the classroom, the classroom being in a portable building, and the male teacher in an elementary school environment. Though each could easily provide some rationales behind his students' struggles, one young girl, pseudonym Cindy, singled out the experiences within David's room.

Cindy reflects the cultural and socio-economic challenges within David's classroom environment. However, where Hasan's story earlier reflected the meek, quiet student, Cindy's story is quite the opposite.

Cindy is a typical African-American girl who appears to be popular with many of the students. On that first day of observations, she came in with a small entourage of followers who seemed enamored with her conversation on playground issues. She had a sense of athleticism about her. She wore Nike tennis shoes, blue jeans and a long-sleeved t-shirt – that reflected no indication of the economic hardship David had earlier emphasized. Cindy's voice appeared to dominate the conversation as soon as she entered with this small band of girls, clearly indicating the playground events that had transpired earlier in the day.

David's classroom had other visible social structures, each defined predominately along ethnic lines. Cindy's group of friends clearly dismissed any racial bias simply because this particular group extended into three different cultural groups, indicating that

popularity was the only deciding factor to be included. If you were Cindy's friend, then this was your group.

Cindy's story expands her social structure into creating and orchestrating her own supportive learning environment. For example, as the laptop computers were handed out, Cindy helped other students around her, even those outside of her group. At first, it was in just distributing the computers to her classmates. Then she assisted get the computers turned on, and helped with accessing the URL that David was demonstrating in the front of the room, and with using the EDU system. This outward appearance at first gave me the sense that Cindy was one of the better students and possibly the teacher's pet. When David shared her past performances on the two measured assessments, however, Cindy's performance actually was one of the weakest in the class. This realization suggests that Cindy was possibly trying to mask her performance in order to maintain the leadership status she had acquired within her group.

Cindy also continually demonstrated the expectations of the practice of reteaching. Even though David would also take time to reteach the entire class, usually resulting in continuous verbal feedback exchange between Cindy and David, it was her abilities to guide me or David to her during practice time to get individualized, one-on-one assistance that suggests she played a bigger role in her own education than do most fifth grade students. She typically would use two problems as discussion points when getting assistance, get the tutor to walk through the first question, and then seek support as she attempted the second. Though explicit instruction was clearly given before the start of this time for practice, Cindy continually sought the assistance of the adults in the room. Ironically, when those students sitting around her struggled, she did not hesitate to

share her knowledge with them, suggesting peer-assistance was an accepted role as long as she was the one giving the assistance.

Observing Cindy engaging in the EDU materials also suggests that much of her academic success is rooted in limited feedback. The initial EDU practice problems were designed with detailed feedback for each question. However, Cindy insisted that she could achieve her three or four points if she kept redoing the work rather than reviewing the feedback. It was initially her eagerness to ignore the feedback that prompted David to work one-on-one with her, giving her assistance on the first two problems. At first, he would work the first question, emphasizing the instruction he had just covered, and then talk her through the same process with the second question. David clearly did this as an effort to build her confidence and to slow her down to think before she reacted. It was the two of them working together that prompted the purchase of small notebooks for scrap paper because some of the computations required calculations outside of the EDU system before submitting an answer.

On closer examination of Cindy's use of the feedback within each one of the EDU problems, it became clear that the graphic used to indicate the correct or incorrect answer were more favorable for Cindy – unless someone was there to talk her through the elaborative feedback. This prompted a change in feedback not only with the second EDU trial at this school, but also the use of feedback at all the other EDU sites. The change was to focus on immediacy, prompting the elaborative feedback for particular objectives to only be added on the initial question rather than the entire set of questions. This allows individuals like Cindy to focus on the given feedback when students missed questions to

break down the problems. This creates an additional link to the think-aloud strategy outlined by the NCTM (2007).

Cindy's assessment scores do translate into a bigger issue within the reteaching cycle. David's major focus in developing EDU materials was not only from the equity issue by providing opportunities for all students to use the online system, but also by narrowing the focus of the materials to emphasize the essential objectives prescribed by the district. In Cindy's case she received initial scores of three ones and one two in the four measured essential objectives. However, each of these four had previous similar objectives, creating a situation where a student who successfully demonstrates understanding of prior knowledge in the non-essential objectives clearly leads toward the success of the essential outcomes. Cindy's low scores in these non-essential areas clearly were linked to her abilities in the essential areas. Other students' scores reflected a similar thread. Thus, reteaching, relearning, and retesting was not going to produce a higher level of success simply because students were not adequately recalling prior knowledge because the necessary prior knowledge had not been mastered.

Cindy's case accentuated the many pros and cons. Her enthusiasm is something one sees often with elementary students. Her desire to reach a higher level was something quite apparent by her interactions with both the other students and with David. Despite that, there are clear limitations to reteaching in this fashion when the focus is clearly defined on meeting predefined essential outcomes because the emphasis is on demonstration of skills with little connection to a student's prior knowledge.

The question that seems to arise with Cindy's case is strictly addressing the issue of prior knowledge. The curriculum that David was working with Cindy on covered basic

number sense and computations of fractions. As the curriculum shifts away from these lower skills and more into the areas of algebraic understanding, Cindy is very likely to continue to struggle because she has not acquired enough understanding in these areas.

Jennifer's Classroom at School #3

The third elementary school examined was located on the opposite end of this Midwestern city. Originally constructed during the early 1950s, there had previously been two additions to the building, reflecting the surrounding community's value regarding education. The first renovation project occurred just shortly after the original construction had completed and the second during the late 1980s. Each project provides a glimpse into the importance placed on facilities and access to resources within the district. This link was further supported in that the school was in the middle of another year-long renovation project, addressing parental concerns regarding the lack of air conditioning and access to technology/media throughout the building. As these renovations were underway, the school relocated to a temporary location in a more recently developed part of the city. The temporary location was mixed into the fabric of the surrounding commercial businesses, reconstructed to fit the needs of an elementary school, including a fenced-in playground on the same block as the building and a fenced-in soccer field across the street.

Though this elementary school was relocated for what had proven to be a trying year, its population reflected an affluent community. The 19.8% student population who qualified for free and reduced lunch and the 90.8% Caucasian population reflects the

historic perceptions that this area of the city was upper middle class. The 95.8% non-mobility rate also suggests strong school connections to the community.

Jennifer's fifth grade students demonstrated another theme that might easily be overlooked because the students had developed a strong connection to the concept of community ownership and because of the excitement of occupying a renovated structure, a much anticipated activity that awaited them at the end of the school year. Additionally, Jennifer's early e-mail had indicated that she was going to be on maternity leave for an eight week period, creating another factor that these students were adapting to their given situations.

Jennifer showed many skills of a mid-career teacher. She possessed confidence in meeting the objectives, a strong tie to building relationships with students and families, and a connection to the community within the school environment. The classroom, however, has many sources of distraction. When one walks into the makeshift school, one passes a set of windows that allows the front office to observe movements in and out of the building. Through the glass doors of the entrance, the office staff can see easily the arrival of the buses transporting students.

I checked into the visitor registration system and walked down a short hallway into a larger community area that serves multiple functions. One function was as the band area – where, on several mornings, one could be greeted with the instrumental performances of young maestros in the works. Tables and chairs could be set up and taken down quickly. This area also served as the lunchroom to serve nutritious meals to hungry kids. It also served the purpose of a recreation room. On the cold winter days when my classroom observations began, there were times when students were throwing

rubber balls and running in a room that had a vaulted, open ceiling – allowing students to throw objects quite high without ever hitting the ceiling.

The classrooms were constructed into two wings of the building off of the multipurpose room. The separating wall between these areas was clearly designed to serve as a noise barrier in order to allow instruction to continue while other students used the larger room. It was not perfect. One had to walk through a wooden set of doors that had a glass window to allow one to see the activity on the other side. When walking into the instructional area, one sees a long hallway with walls only reaching halfway to the ceiling and constructed to isolate separate classroom spaces. Jennifer's classroom was halfway down this hallway. Any visitor walking down this hallway was a distraction to classes in progress since no class space had a door.

On my initial visit, a discussion about access to technology was a primary concern simply because of the temporary location. This temporary school did have access to a computer lab in a similar manner as all the other elementary schools. The access issue followed along a similar theme as in other schools, however, where teachers had limited access to the technology lab and would have preferred times when they could utilize those facilities as whole class experiences rather than isolated, one-on-one instructional interventions that EDU was being designed to address. Thus, we made an arrangement to for a set of laptops to work with students. Initially, this was situated with isolated accesses. It subsequently was expanded to be utilized in a just-in-time fashion so Jennifer could direct students to work on EDU materials when time permitted.

The overall structure of the classroom with open ceilings and no doors created an environment where background noise of other classrooms consistently filtered into the

room. From an observational standpoint, I noted on more than one occasion that one might think this could be a factor in student progress. Even so, when observing Jennifer in both traditional teaching and reteaching, student engagement was rarely an issue; her students almost always seemed to be engaged.

Jennifer's classroom reflects the importance of social interactions in that the desks are set up in two main rows with five desks along one side and another three on the other. The pattern seems to create a sense of staying focused by directing student attention toward the front of the room. The room itself seemed small, but the students seemed oblivious to the closeness the room brings. The compact environment extends to the students' materials and artifacts. For example, when one looks at each of the student desks, one sees how they pack the storage compartment with as much as they can – homework papers, books, pencils, and whatever else might need to be accessed easily.

The rest of the room had a larger set of tables pushed together as a work/study area for both Jennifer and her students. On the first classroom observation, this area also had stacks of student papers as Jennifer was in the process of grading, but not quite done when school began. Off to the corner was Jennifer's desk, which also was set up in a small L-shape with a file cabinet and computer positioned to get access to student records. In front of her desk was a bookshelf and near this along the back wall of the room was a smaller table.

The symbolism apparent in the classroom was interesting. In the front portion of the room was a whiteboard, a couple of bookshelves, a screen, an American flag, an overhead projector, and a director's chair that Jennifer sat in as she taught her classes. Thus, the twenty student desks were always being "directed" from the front of the room –

which was not a terribly large room. The walls were adorned with traditional educational materials, featuring the mathematics, reading, and social studies curriculum being taught within the room along with an easel near the entrance with a white board announcing the day's activities.

The first day I observed Jennifer reteaching her students, laptops were brought into the classroom and set up in a makeshift workstation off to the side of the room. As Jennifer worked individually with students, she asked those students who had not succeeded in specific objectives on the previous exam to move to the station and try working with the EDU materials. Jennifer offered words of encouragement to each of them, suggesting how EDU was a tool, giving each of them additional practice in each objective area.

Some of the students were reluctant at first. This could have been a result of being identified to their peers that they needed additional practice. It also could have been due to the novelty of someone observing them in their environment or even possibly their reluctance in using technology. Just the same, once these few students sat down with their own laptop, their tough, exterior shell pealed off – opening up a rich dialogue between the students and myself, addressing how they should use the web-based materials. The steamrolling discussion began to focus on the similarities between each of us and their previous experiences using technology – including those outside of school. Though quite boastful in their expertise, the discussion quickly transitioned back to the practice sessions created within EDU – giving them an opportunity to learn how to use the website before any data collection commenced. After about thirty minutes, we discussed the upcoming visits and how they could utilize the materials outside of school.

The second day of reteaching observations and using EDU actually started a little earlier than I had planned. I arrived a couple of hours ahead of schedule and had an opportunity to observe more of the students' typical day. I noted how the sequence of daily events is very orderly, smoothly transitioning between subjects and activities. As the day moved forward, it was almost 9:15 AM when the students got out a "snack" – consisting of healthy foods and drinks that were supplied by parents. Once Jennifer felt that students were not only having their snacks, but also engaged in the assigned reading, she went over to her desk and pulled out a large bag of healthy popcorn and a Diet Coke for her own refreshment.

This morning promised to be a rather warm and beautiful Spring day. Thus, shortly after the students finished their snacks, the entire class went outside for recess – taking full advantage of the weather. This was also my first experience to witness the closeness amongst the entire school because most of the school was also taking advantage of the weather and were out on the makeshift playground. The setting suggested that a strong, cohesive community existed – as teachers interacted amongst themselves, talking about their daily events, including their own parental responsibilities outside of the school. Additionally, recess illustrated how many of the teachers utilize the time to check in on their own children – providing additional evidence that the teachers' and students' lives are interwoven into a tapestry extending well beyond the school's boundaries.

This suggests that the school is actually an extension of the community where every person, both student and teacher, plays a vital role in the overall success. This was supported through evidence observed in other conversations occurring that morning,

particularly those addressing the renovation progress of the school's permanent site. A couple teachers shared their initial hesitation about this yearlong relocation, particularly regarding the limited size of the temporary site's playground. The previous year had a large number of student fights on the playground and many worried that a smaller space would increase these fisticuffs. Still, the students were equally part of the discussion process and had bought into the idea of moving for the year. This resulted in a strong commitment by them, resulting in fewer altercations on the playground. Of course, other factors such as better supervision could have been the cause for this outcome. Nevertheless, the teachers voiced favorable anticipation for the better facility that awaited them once this year was over.

Once inside, there was a short, transitional time before instruction was to begin. The sense of community was quite strong. Jennifer used this time to tell a personal story of her newborn that had occurred that morning while students settled into their seats. The story was about how Jennifer was getting her newborn ready for daycare and a humorous "peeing on her slacks" story. The bathroom talk got some of the students laughing, opening up other humorous stories where one student shared an incident of a "noodle coming out of his nose."

One could see a personal investment in the relationships between teacher and students, underlining the give-and-take relationships in Jennifer's class that clearly makes it successful. It was clear that while she sat in her director's chair, she was guiding everyone in the direction of setting a higher goal for the year. In Jennifer's classroom reteaching appeared to be a "second take" that a director might conduct on a Hollywood movie set. She would lead them into the process with words like "let's revisit this." A

guiding practice and rhythm directed the instructional process as seen when she said "hand goes up" and the students quickly replied in unison "mouths go shut."

Traditional instruction during this observation centered around simplifying ratios with an emphasis on the conversions of ratios to similar units. On this particular day, much of the instruction went back and forth between overhead and whiteboard – with both Jennifer and the students adding to the discussion and to the writing. It is very clear Jennifer has confidence in her students and that her students trust her as she leads them toward the bigger goal. This trust that one senses also extends the traditional role of the student and teacher because, when a student appears to struggle or "doesn't get it," a neighboring student is likely to assist. The class becomes a cast that buys into the concept of working together.

At one point during the instruction, Jennifer, the director, asks the students to pull out their individual whiteboards – which students pulled out of their desks in a very synchronous manner. The instructional moment was very structured. She would pose a problem to the entire class. The students would quickly work them out and then raise their hands when they found their solutions. After a good number of raised hands indicated the completion of the problem, one student was called upon to explain what he/she did to find the solution. This process continued for a quite a while when it became clear that some of the students were beginning to lose their engagement. Almost instantly, Jennifer directs them to be more alert. In nearly the same breath, she poses a challenge that "looks at a football field" and the conversion of yards to feet.

This structured process brought focus to another theme as students worked problems on their whiteboards. The students were moving back and forth between the

new problem and trying to solve it themselves. Their attention would move from the overhead to their whiteboards and back. When their gaze moved downward, after a very brief time, many of the students began to move their mouths as if they were verbalizing the process to solve the problem. No words were actually voiced, but there was a very distinct connection visible that each of these students was internalizing and processing the information to come up with the correct answer. Those who struggled with their work often would roll their eyes, giving an indication that they were trying to start anew with the problem – almost an erasing of their mental processing up to that point, giving them a clean slate to work the problem.

When Jennifer focused on guided instruction to the entire class, there was a clear focus on linking the subject matter to real-life applications – connecting the somewhat abstract mathematical concepts into a real-world context. For example, Jennifer posed a ratio problem her husband, an architect, might face. This provided further evidence that Jennifer's comfort with her students could easily blend personal and professional experiences, creating a strong community environment where other students would then respond regarding their parents' professions working in the construction field.

One might think that, in this open exchange between teacher and students, there might be some hesitancy when students answered incorrectly. However, in this classroom there seemed to be the expectation that an open dialogue centered on supporting others was not only encouraged but also expected. When students would get an answer incorrect, they showed little hesitancy in helping each other find where the mistakes were made.

Though this opportunity to experience more of the traditional instruction occurred before reteaching began, it set the classroom stage. It revealed "the rules" and the expectations of everyone involved. Noticing how neighbors share their answers with one another and help each other signified another theme within this environment.

Reteaching to Jennifer is clearly a broad process that actually extends reteaching into the areas of relearning and retesting. When students are there to support one another, when students share their responses, when students assist Jennifer in the correction of problems and the picking up of homework, it is very clear that the time for instruction is filled with guiding questions that not only encourage but also demand student participation. Observing the complete instruction demonstrated that the process of review, self-check, community dialogue, exploration of new material, guided practice, and then homework followed traditional instructional models. The commitment from the students, however, was new to me, especially in observing how students supported each other. This was a strong theme worthy of additional exploration – supported in the literature by linking cognitive development of primary students to a delicate balance of curriculum and instruction, classroom management, and motivational strategies (Pressley, Bogaert, Mohan, Roehrig, & Warzon, 2003).

At the designated time for reteaching, Jennifer identified those students who needed to work with the EDU materials and the particular objectives. This gave them a focus as they sat at the table and became engaged with the web-based materials. Still, even though each of them had different objectives to focus on, it was very clear that the community approach was at play once again. The students who worked with the EDU materials during the previous visit helped other students get logged into the system and

demonstrated to them how to work through the practice materials – revealing a level of expertise not visible in the previous observation.

There were eight students engaged in the reteaching exercises during this observation. The students knew exactly which objectives they were suppose to focus on and each managed to stay on task throughout the time period. As they got further into the EDU materials, their dialogue was boisterous, vibrant, and quite dynamic – moving back and forth between each other and the materials. You could hear the their disappointment when they had not passed the necessary objectives within the exercises and when they didn't understand the materials, each student would seek expert help from either myself, David, or another student. Thus, everyone in the classroom had a specific role to play, sharing the responsibility in developing skills necessary to successfully perform the necessary calculations. This notion of building skills was even more visible in the student notes scribbled in the notebooks.

As I walked into the classroom for my third observation, I noticed a considerable amount of change in the artwork and posters adorning the walls. Where previously a considerable amount of material addressing the mathematics curriculum had hung, a transformation focused on reading strategies and comprehension clearly suggested a larger change in instructional goals within the classroom. Discussing these distinct alterations with Jennifer revealed the district's emphasis on the upcoming reading assessment, for which students had approximately two weeks to prepare. She additionally indicated that she had less time available on this day for reteaching mathematics because of this assessment – providing a unique opportunity to test the possibilities of EDU in an instructional environment. We discussed how EDU could provide a just-in-time

component for individual students, allowing each of them to get the necessary assistance with mathematics while her attention was directed at helping prepare struggling students for the reading assessment. We decided that the laptops would be left in the classroom for a two-week period, allowing her to direct students in an impromptu environment to utilize them as the need arose.

It was on this visit that I began to establish an understanding of Jennifer's interpretation of reteaching. Though only a few students needed to be retaught that week, reteaching meant in her classroom that students were given an opportunity to display their understanding of the material presented in a two to three week period covering about five objective areas linked together by a broader chapter theme. If students had not displayed a basic level of proficiency in each of the objective areas, they were given an opportunity to spend additional time either working directly with Jennifer or in small groups to revisit the materials. Each student's dialogue in response to Jennifer's guiding questions would indicate whether he/she had a sufficient understanding of the material. Once Jennifer felt comfortable with their responses, she would give them other opportunities to reassess.

Over the next two weeks, I carefully observed how the Jennifer's students were utilizing EDU from afar through EDU's administrative interface. The frequency of logged attempts were less than five, suggesting that either the students were mastering the material or the shift in focus emphasizing the upcoming reading assessment kept them from utilizing the system. Despite that, the lessons learned at the previous location suggested using instructional design strategies that centered around utilized an anonymous method of delivery to give students opportunities for additional practice

without the collection of data. I had used this format as a way to introduce the students to EDU, the interface, and how it can help them with their understanding of mathematics. It was when I returned to pick up the laptops at the end of those two weeks that I learned that the students had been frequently utilizing EDU in this manner. Jennifer was out of the building on this day, but one of the students gave me a quick message that Jennifer had asked her to share – that the laptops and EDU provided a safe way to give students additional practice. In our brief conversation, the student shared with me that often only a handful of students would use the website, often as a collaborative activity where two or more students would work through problems the EDU system would give them. EDU had become an opportunity to share their understanding of the material collaboratively through practice problems – not necessarily recorded, but in an environment free from traditional assessment measures.

Jennifer was glad to share with me the retesting scores of students for the entire third quarter, including the information prior to the use of EDU. Once again, these objectives emphasized developing skills in the areas of number sense and computation skills. For students at this school, their prior performance would possibly be an indication of the variability of students needing reteaching. As the quarter transitioned into material that focused more on spatial and geometric sense, it was clear that these students had strong foundational skills. There also seemed to be a high degree of community ownership of success. This continual camaraderie enhanced learning.

Reflecting upon my experience within this environment, reteaching was never an activity for the entire class – only consisting of a few students within a given objective area. The only exception was in objective 14.3 – utilizing patterns to multiply and divide

by powers of ten. Several factors could attribute to this reality – from the social norms developed within the classroom to the onsite parental involvement of the education system, creating an atmosphere of shared knowledge through community.

Though the data in the next chapter will point this out further, the limited number of participants using EDU does pose a valid question as to whether EDU had any impact on student learning. The success within each online assessment varied, from achieving a zero to a perfect score of four. Students who made multiple attempts at each objective area performed a little better when asked to retest the materials, supporting an argument that additional practice along with immediate feedback can result in higher self-understanding and eventual success. Nonetheless, Jennifer's classroom also illustrated another example that a closer look at the curriculum might be necessary. Specifically, her emphasis on guided instruction addressing the necessary isolated steps appeared to predict a higher success rate, particularly in those areas that require extending number sense and computation into procedural knowledge skills. Once again, a quandary exists suggesting limited prior knowledge of basic facts could predict difficulties with procedural knowledge.

Brian's Experiences at School #3

Jennifer's classroom was unusual; students had created a remarkably self-reliant environment. They had a very personal relationship with each one another, and appeared to maintain a level of academic rigor that one would hope results in future success in later grades. Brian's experiences underlined student life in Jennifer's classroom.

Brian is a young Caucasian student, one very typical student of Jennifer's class. He often wore the local university athletic shirt or a local professional hockey shirt, suggesting that he was quite interested in the everyday athletic interests of many of the young boys. His friendships seemed mostly to be with other boys also interested in similar sports activities. Brian blended quite well into this makeshift classroom.

On my first day of observations, Brian sat directly in front of me. From this vantage point his back was to me and his open desk showed his organization skills – with papers, books, pencils, and snacks crammed in this small area with little room for anything else. Nevertheless, this space had a personal organization that allowed only Brian to transition effortlessly from subject to subject.

Though his personal organization might have some concerns, observing Brian from afar actually showed him to be quite successful at mathematics. This level of success remained high until Jennifer got to the chapter covering geometric figures. This unit had sections focused on low-level understanding and connection terminology to the identification of shapes. Brian's struggles did not create a moment where he wavered in his self-perception of his math skills, even though he faced revisiting multiple objectives. In fact, out of the previous fourteen objectives, Brian did not initially pass three of the objectives, and documentation reflected only retesting in one area. This documentation suggests that there are moments when students do not have to retest over every missed objective – creating some uncertainty whether students have to retest or only if it is encouraged.

All the previous uses of EDU had required the student to have some prior knowledge to successfully perform the task. However, in this case EDU was being

utilized to assist lower level knowledge skills – requiring only geometric identification of terms. Brian had used EDU on a day when I was not on location. Thus, Jennifer quickly was able to identify a student struggling with basic understanding of shapes and then get him to use a computer on his own to work some additional problems while she worked with the rest of the class. From Jennifer's comments, this was a pretty seamless process. She let other students who had used the EDU system assist Brian and the other few students to log in and work through a set of practice problems.

Brian only needed to work through the practice problems twice before achieving the mastery level. Additionally, Brian was one of the early cases demonstrating that success with EDU can lead to success in assessments. Brian's case is one where technology was utilized in a just-in-time situation to help make the necessary connections for successful learning.

Nancy's Classroom at School #4

The fourth elementary school visited is a school that reflects the city's diversity and growth. Built in 1956, the school is hidden a few blocks from a major roadway, surrounded by residential housing, but very near a mix of commercial and industrial services. This school has grown to meet the demands of the community, including three major renovations over a twenty-five year period including the addition of four portable units.

This school reflects its neighborhood struggles: 69.1% of the students qualify for free and reduced lunch; the student population is 49.6% minority with ninety two students qualifying for an English Language Learners program. The school population at

the beginning of the year included only 84.4% within district and a mobility index of 0.252.

When I approached Nancy about participating in this study, she acknowledged that the mobility of the students at this school was a major concern. Many of the students came from migrant families and often it was a struggle for teachers to identify where some of these students were in terms of their academic progress. This placed an immediate instructional barrier that many teachers within the school were trying to address because the district wants the pacing of the curriculum to be pretty consistent – meaning that if parents moved across town, that students could change schools with little change in their progress.

Nancy was keenly aware of not only of technology's potential in her classroom, but also of the limited access to such technology many of her students had beyond the school. This interplay between potential and access suggested another scenario where digital divide concerns could come into play.

Nancy is a veteran teacher who brings her continued passion for learning to the classroom. She has grown children who are traveling the world pursuing their own educational pursuits and she enthusiastically shares these adventures in her adult conversations.

My first visit to Nancy's classroom was an interesting experience. It was a particularly cold day, and the streets quite damp from an earlier rain. The off streets around the school are not paved, and this late afternoon visit made parking a difficult challenge as parents parked bumper-to-bumper waiting for children. Many remained in the cars until the very last minute, windows up, engines running, providing a little

warmth for the next couple of minutes before they had to venture to the front of the school to pick up their child.

Once I parked, my trek across the sidewalk prompted other parents to get out of their vehicles. A few initiated conversations as to the current weather as well as how good the teachers were in this school, causing me to suspect that this school might be a hidden gem. Perhaps this was simply a way to get to know new people inside of the environment, but it was a unique experience to see the supportive community outside the school's walls. Once I established that I was a university graduate student, there was a unique, still surprising dialogue with one male parent as he described his own studies at the university – along with his perception to the number of pre-service teachers working within the school. At first I thought this might indicate some hesitancy amongst some of the families. However, he quickly added that this open exchange of ideas between the university and the veteran teachers was a positive sign – suggesting the dynamic exchange between new teachers who were bringing new methods into the school and those of quality, veteran educators was creating a sound educational environment for his children.

This particular conversation suggested a tremendous amount of trust had been established amongst the extended community. In the previous schools, this sort of trust amongst the extended community had typically been noted only at the front office as parents picked up and dropped off their children. However, those schools had single sets of doors funneling people in the direction of the office. In contrast, this particular school had a more expansive, dual entrance centrally located in front of the building. There is a large diagonal glass wall and foyer providing an open view for the office and

administrative staff just inside the doors. Parents and guardians gathered in front of the building and patiently awaited the bell. Soon teachers guided students safely to each of them. Where other schools placed a higher emphasis on a volunteer security person at the entrance, it appeared that here patiently waiting adults played this role – particularly during this time of day when kids would be more vulnerable.

My first visit brought an enthusiastic welcoming response from the front office. I was greeted by many familiar instructional staff who also were working on their graduate degrees. Students who did not have parents picking them up outside were gathering in the office and meeting other siblings and friends before calling home to get permission to leave the school. As this hubbub of dismissing students continued, I signed into the familiar computerized system the other schools had in place, filled out a name badge and patiently awaited Nancy to greet me in the office.

Even though I never inquired why this school varied in their dismissal procedures, I could sense there was actually a stronger emphasis on safety in and out of the school, both from the parents' actions and the childrens' conversations. I assumed that some of these procedures were related to a safety incident occurring at another school during the previous year.

After a few minutes, Nancy came and greeted me. We exchanged pleasantries, both formally and informally, including a simple nod with the school's principal. Nancy suggested we take a short cut back to her room where she led the way through the office area, copy room, and out a side door. This opened up into an area leading directly en route to her classroom – which was an open room off one of the hallways.

Although no students were around, it was evident that a tremendous amount of action occurs within Nancy's room. All the desks faced forward allowing students to see out into the hallway. The structural juxtaposition of walls created two additional classrooms, suggesting a noteworthy link of a larger community amongst the three teachers stationed in these rooms. As Nancy led the way, the two teachers approached Nancy, asking questions regarding the upcoming events that the three of them needed to prepare. There seemed to be a symbiotic relationship wherein the two younger staff members would ask for guidance as to these events and Nancy's response was quite calm and quick – like a veteran who has gone through these events time and time again.

As I looked around during their conversation, there was something about this particularly older, brick building that seemed quite familiar. Maybe it was the pattern in the tiled floor of the hallway, the tightly woven industrial carpet in the classrooms, or even the neutral colors adorning the walls that reminded me of a simpler time when I was in elementary school. Nancy's room seemed to remind me of my own elementary school experience, including eliminating a lot of the distractions by closing off windows with partitions. As with the first school, this created an atmosphere removing any natural light flow into the classroom – but provided a medium on which to hang her additional instructional materials. The room itself had four rows of student desks with a small walk path in the middle. There was a round table for group work on one side of the room, a set of students desks pushed together in a rectangle in the back, and another student table off to the back corner that clearly held a lot of activity for students. Crayons, scissors, and paper were artifacts decorating this back station and revealing some of the current class projects. Behind the table were a few shelves holding board games.

Nancy had her personal station situated at the opposite end of the room, near the front entrance where she could easily get to student documents via computer or in the few positioned file cabinets. The SMARTboard, though, suggested that this veteran teacher was someone who was trying to remain at the forefront of educational technology, utilizing this new medium over the more traditional overhead projector at the front of her room.

Nancy was forthright regarding her own concerns about the mobility rate of the students at the school and how the entire staff was finding this attribute a significant barrier resulting in the overall success and failure of the students. The school did not have an answer, but needed to look at possible alternatives to assist those students needing to catch up to those around them. She shared her vision about using the computer lab for the EDU experiments, and worked it out in advance with the technology coordinator to have the handful of students who needed reteaching/retesting come down during my first classroom observation.

Nancy's conversation set the stage for a remarkable experience. First, it became quite evident that she has a deep commitment to education and openly shares that commitment with her students, their parents, the staff and extended community. Additionally, she shared her perspective regarding reteaching – suggesting that the intent was to maintain traditional instruction concurrently with the reteaching process, ensuring struggling students would keep pace with the more successful students.

The day of my first classroom visit only supported my previous observations – as Nancy forewarned me that her students were anxiously awaiting my arrival. She had discussed with them beforehand my role in the classroom and had allowed them to accept

my role well before I stepped into the classroom. Additionally, many were excited about using the computer lab to work on their math.

I had to remind Nancy that my initial role was simply to observe reteaching and then to assist students in the utilization of the EDU materials. However, she invited me to expand that role as she positioned students into the reteaching process. Nancy had the students move closer to the front of the room if they had not passed at least one of the objectives on the last exam. Those who did not fall into that category were then directed to move to another location in the room to work on either a puzzle or craft.

This transition from regular instruction to reteaching was almost seamless. Initially I wondered if the students might be more reluctant because of the negative connotations failing a section of the test implies. However, Nancy seamlessly made this transition with no clear objections by the students – suggesting their commitment to this reteaching process as well.

Nancy began reteaching this group of students with a portable document format, or PDF, version of the test loaded into the computer and displayed on the SMARTboard. Nancy's use of the technology allowed her to guide the students through the necessary steps to successfully answer the assessment questions. As she worked her way through the several pages of the test, it seemed that a few of the students were more concerned by the final answer rather than the process to get the correct answer. This suggests a possible origin to the claim many secondary teachers voice concerning how students do not pay enough attention to the details in their work, making simple computational mistakes.

Nancy spent about fifteen minutes working with the students. Her give-and-take dialogue with the group gave prominence to the social norms she had established within

her classroom. More importantly, it featured a limited amount of the conversational exchange between the students. As I saw how the students would hang onto the wisdom Nancy brought to the moment, I began to wonder if this was due to the guided instructional procedures she was using or whether this was supporting other literature on the help seeking skills of elementary students (Newman & Schwager, 1993).

When Nancy had concluded the guided instruction, she directed the students to move to the round table to grab their sheets and begin working with her on retesting. As the exchange shifted into this new location, I sensed how the previous concern about Nancy being the only sought authority figure was a false claim, particularly with the boys in the group. At first, the boys openly disclosed their test results to the others in the group, passing back and forth their tests, freely sharing their answers with little concern to any possible social stereotypes that might arise as a result of their low scores. The few girls, though, were much more reserved.

This was the moment I knew my role within the group. The entire group brought me into the discussion, inviting me to help them with their mistakes on the original test. Once Nancy brought the worksheets over to the table, my role changed once again, where I was thrust in one-to-one discussions with the students as they struggled to recall the procedures to successfully perform the retest questions. However, Nancy was also faced with the same role and used the open dialogue with each student as a way to get him/her to verbalize the process with prompts here and there until the one task was performed one task successfully. Granted, many of the students relied on Nancy and me to guide them as they began working through their problems. She could not respond to all at once, but the

four to five problems each practiced gave each of us a moment to respond to each student at least once while they worked.

Some of the students clearly struggled during this session; they were unsure about how to proceed. They often would wait until Nancy directed them using the same language she had used in the front of the room to engage them in the process. My role clearly had also changed to the subject matter expert as students sought both approval of their efforts and praise to their success.

All of this clearly established some social boundaries for myself within the classroom before I took the first group of students down to the computer lab. This transition only occurred after Nancy had felt comfortable that the three students had successfully demonstrated their understanding of the objectives, almost establishing a level of destined success before they logged into EDU. The students had already demonstrated their capability to meet the objectives on their worksheets. However, the addition of EDU would provide additional practice and supportive evidence of such performance.

These students led the way to the computer lab and positioned themselves near the door, which was located at the back of the lab. There was actually another class in the lab at the time, but the technology coordinator knew we were on our way and invited us to work quietly. Students sat down with a small strip of paper I had handed them that gave them the URL to the EDU website. As with the other locations, each student worked a couple of the practice, non-recorded sessions with a little guidance, giving them an idea of how the EDU system worked and how they should use it. I brought small legal notepads along for the students, allowing them to write any notes and perform side

calculations necessary to answer the EDU questions successfully. Though few notes were written, students seemed to enjoy working with the EDU system. Eventually, a total of seven students were sent to the lab by the end of the hour, each of them were smiling and having fun – talking with me and with each other about the process in solving the EDU problems.

As previously noted above, each district objective is assessed using a test with four items where three correct responses is considered proficient and four is considered mastery. Therefore, EDU was set to deliver four similar questions with server generated, randomized numeric variables programmed within each question, altering both the questions, the answers, and the feedback delivered to each student. Though none of the students actually achieved mastery during my initial visit, most students did achieve a proficient level after two or three trials with each objective area.

As I carefully observed the students using the website I began to see an instructional design flaw within the EDU website. Each objective assessment only delivered one question at a time out of the four and the "Grade" graphic located in the upper right portion of the top frame of the webpage invited them to click after each question. However, the protocol to successfully navigate the site required the student to click the "Next" graphic or use a dropdown menu to navigate throughout the series of questions. The "Grade" graphic actually was the submit button, submitting the entire assessment back to the server to be graded. Granted, EDU does provide an intervention alerting the student that there are unanswered questions within the assessment and the penalty of hitting the "Grade" graphic once again.

Although the other two previously mentioned schools using EDU had similar student interactions with the website, this initial visit at school #4 enlightened me to two major concerns regarding both the students and EDU. The first was that even fifth grade students already had developed a strong sense of understanding in using the World Wide Web and navigating throughout a website. Though Nancy had acknowledged in our earlier conversation that many of the students did not have access to technology outside of the school, these students clearly demonstrated an initial understanding in both navigation and web form entry, establishing clear norms in their use of a website. EDU's graphical interface clearly violated some of those norms in both the placement of submission icons and the labeling of graphics.

The second concern turned out to be of value in our hour together. These students, who had just moments earlier gone through an instructional process focused on procedures, could easily adapt their practices to meet the EDU format. The first few students were working independently on the EDU material and quickly found themselves getting zero or one point out of the four possible points because they submitted their answers before responding to all of the questions. One might think this negative feedback would lead them to dislike the process, at the same time they found the built in feedback, even if it was simply the answer, a valuable experience in breaking down the problem and helping them see how to work backwards in solving the question.

Initially, I was worried about this approach the students were engaging in with the EDU website, because this suggested the students were utilizing a means-ends analysis approach in their understanding of mathematics – where working backwards from the answer gives them the basic skills necessary to succeed. Heyworth (1999) clearly

suggests this as an indicator of novice students versus expert learners and something to continue to pursue in further observations.

After spending some time working with each student on the interface aspects of the website, I began to notice how two of the boys turned the EDU activity into a competition – a game. They knew they had to get four of the assessments correct for a perfect score. Thus, they began vocalizing their success rate, trying to achieve that perfect score. It soon became evident that were focused on speed rather than accuracy as they shouted out "go!" and "three out of four!" for the next several minutes. Once again, the already established social norms seemed to come into play as I later found out that these two boys were always challenging each other, from races on the playground to performance in the classroom.

Though this state of competition between the students was not displayed equally amongst the students, the social roles that began to emerge became an interesting theme throughout the remainder of this and future observations. I had initially perceived EDU as a stand-alone tool where students would work independently on improving their skill sets. As these particular students displayed, it was clear that their social norms established within the classroom could extend into the computer lab environment, creating an environment rich in discourse. Students would ask each other how to solve the EDU problems, allowing them to use the same language Nancy had earlier demonstrated – suggesting another possible theme where students would take on the expert role that Nancy traditionally played in the classroom. It was becoming evident that EDU was also a tool to open up discourse in mathematics as the students worked together. This discourse was not a process that continued throughout all four of the

problems, but rather a case where one student would help another on one question and then let him/her work the remaining questions on his/her own. Role reversal occurred: students became teachers, if only for an instant.

I left the computer lab that day thinking this experience was rather phenomenal. In my trips to the previous schools, web-based materials were used either as an entire class activity or for individual students while the instructor worked with other students on direct instruction. In this school, engagement was high, distractions were low, and student discourse reflected the intent of the instruction.

My second observation brought a larger number of students into the computer lab, needing to be retaught mathematics material addressing geometric and spatial understanding. In this particular unit, many of the students had not performed well with the classification of polygons. I used the existing supplementary, reteaching materials within the instructional curriculum to compose randomized EDU assessments that focused on providing a figure (shape) to the student and asking the student to select in a multiple choice fashion from four different choices in order to identify the given shape. Eight students participated in this particular objective, where scores ranged from 2 out 4 to 4 out of 4. This use of EDU actually reminded me more of a standard process used in traditional classrooms where teachers use flashcards to help students learn the basic terminology of shapes. No records were collected to indicate whether a student actually improved, with the exception of one student who actually did successfully demonstrate an improvement in that area.

The subject matter during this unit also exposed another potential problem outside of the scope of EDU – one concerning the accuracy of the materials students are utilizing.

The textbook had a fair amount of material that began with basic understanding of terminology. Terms like polygons, rhombus, and parallelograms, added to their growing lexicon, but also included materials such as finding missing angles of a triangle. When I was developing the EDU materials from the original reteaching materials, I took a problem that was an isosceles triangle. As in the case in the original worksheet problems, I overlooked the congruent labels on the two legs of the triangle, and suggested the base angles would not be congruent. My original intent was to follow the original worksheet materials to ensure equality across EDU and non-EDU groups, not considering that some of the materials were clearly flawed. When I later shared with my graduate committee the structure of the EDU materials and how they could be modified to fit the individual classroom, one member quickly identified flaws.

In retrospect, this moment illuminated a larger concern that many educators must face on a daily basis – those addressing the accuracy of the materials they are using. When one considers the need to address a basic understanding of terminology, one must consider Bloom's (2008) lowest levels of knowledge within his taxonomy and the accuracy within the materials must play an important role in creating cognitive connections and developing deeper understanding.

After fixing some of these flaws, I revisited the school and found that the students responded as they had earlier – some more engaged in the competition EDU provided, others seemingly engaged in discourse with their classmates, and others simply focused on their own individual work. It had become apparent that EDU was becoming a tool to build confidence before going back to the classroom and retaking the assessment. One boy who worked in the competitive realm consistently yelled out his score after each

attempt – getting louder as he consistently earned threes or fours, and making me laugh conspicuously in the rear of the room.

My third and final observation visit continued to follow the earlier patterns. The chapter materials focused on geometric and spatial sense objectives. Several students needed reteaching in the areas of the computation of perimeter, basic understanding of shapes (particularly three dimensional shapes), and the calculation of area. The noteworthy thing that stood out during this final session was the emergence of a new instructional environment extending beyond Nancy's classroom. My role had elevated to a similar status as Nancy's where I used the same language Nancy had just used moments before our trek to the computer lab in an effort to get students to use the same strategies to achieve the objectives.

Cameron's Experiences at School #4

Though this exchange of discourse between the students and me was noteworthy, the most important observation during this visit occurred when talking with Nancy that morning. She shared a recent story of working with one of the students who was showing her how he was using EDU. It was the same boy who treated the sessions as if it were a personal competition, but it was his enthusiasm that caught Nancy's attention. She noted his earlier struggles with math during that school year, and how he has begun to find his voice during this semester – a path on the road to learning. She further commented on his ability to talk through the math while he tried to get that next four out of four, thus creating a new forum in which to share and explore mathematics.

Out of all the students who were in Nancy's classroom, Cameron was one who seemed to be going through the biggest transition. Cameron is a young African-American student who appeared to be one of the more physically developed students in class. He was the tallest student out of the group. He often talked about the activities on the playground – from soccer to basketball to football. This suggested that school has a slightly different meaning to Cameron because it seems to have roots in activities.

This outward, boisterous exterior was not visible during my first visit to the classroom. In fact, a shy, timid posture suggested a person who might not have found a way to succeed academically. That initial moment of introductions placed Cameron in the middle of the classroom with few students around him. His plain white t-shirt and faded blue jeans suggested someone who was not looking for any great attention; however, the dirt on the knees of his jeans and his tennis shoes suggested some possible rough-housing before school with his friends or classmates.

As Nancy had students come to the front of the room, Cameron seemed reluctant to join into the same rituals as the other students. When they would sit in a semi-circle on the floor in front of the SMARTboard, Cameron moved up to the front row, but maintained a slight distance from his classmates.

After the brief lesson to reteach the unit covering geometric shapes, Nancy moved all of the students to the round table off to the side of the room to work a few practice problems. The initial idea was to give each of them some practice, and then have them go to the computer lab to practice with the EDU materials. This is where Cameron's exterior shell began to crack just a bit as he began to become more active with the other boys in this group. The initial topics had little to do with the mathematics content and more to

addressing what they were going to do at recess, but it did begin to shed some light on Cameron's preferences and initial conceptions about school and the social structures that are in place there.

This brief discussion quickly quieted, though, as Nancy placed worksheets in front of each student – giving them individual directions on the questions based upon the missed objectives on the previous exam. As Cameron quickly finished, Nancy checked his work, gave a small intervention on the missed problems, and then asked me to take him and four other students down to the computer lab.

This first visit was to get students like Cameron comfortable using EDU. Non-scored practice problems were the initial focus – allowing each of the students time to get comfortable taking a four question assessment using the Internet. Cameron walked into the lab and positioned himself away from the other four students. When he first got to the website, he seemed to ask me two types of questions. The first type was about how to use the EDU site. The second type addressed the mathematics skills to pass the objectives. This suggests that Cameron was trying to find his own way to succeed at the task. When faced with uncertainty, he sought adult experts to help him in this process.

As Cameron's pace and comfort level grew to acceptable levels on his own defined terms, he became more engaged in the task – transitioning from the previously quiet boy into someone who would declare his outcome to the entire computer lab with outbursts of either disappointment or laughter.

One also could sense his energy pick up as he worked at the computer. Initially he sat there with his eyes focused on the monitor in front of him. As his comfort level with the material increased, his legs began to bounce vigorously against the tables supporting

the computers. It was energizing to watch his outward physical acts as his understanding of the material increased. It was at this point that his energy hit his own crescendo that I got him to log into EDU and actually capture his scores within the system. As I moved back to assist other students, I noted how Cameron's intensity began to wane just a bit, hinting that either the extended time on task, the closeness to lunch, or something within the assessments was causing him some discomfort. It was later while examining the actual EDU data that showed that his earlier success with the non-scored questions seemed to create an initial success on the first scored objective. However, when Cameron did not have time to practice the next objective before taking the assessment, his success rate dropped below the minimum score of three. Cameron took this one assessment four times, getting an initial score of two out of four, a two and one third the second trial, and then zeros the final two times.

Cameron's initial experience suggested that having success through practice problems led toward further academic success in assessments. So, Nancy and I discussed a slight modification to the next unit where the EDU materials would only be captured after repeated success was achieved by the student through practice problems.

This drop in scores, particularly after such early success, indicates that Cameron may have test anxiety. Though he found his own ways to overcome them initially through conversations with me and then through his own drive to earn a mastery score, he seemed to give up once he began to struggle. The EDU data provides evidence of this because, on the second attempt, Cameron took only two minutes to work on the assessment and only one minute on the third attempt. The final attempt was started, but never finished.

As I left that day, I considered many aspects of Cameron's experiences. Was his pattern of seeking help only with adults related to his academic success? Was his sense of internal competition something that could be recreated? Were his successes and failures an early indication of test anxiety? It was hard to come to any definitive answers that day, but I could sense that a spark was there in this boy. For at least forty minutes, EDU had some positive impact.

Cameron was the student who brought Nancy into the computer lab after school one day and talked her through the materials. He was the one who demonstrated gained knowledge because of the practice problems. In spite of that, it was because of Cameron's success and failures with the EDU materials that led to a one-on-one conversation with Nancy, creating an instructional moment where he got to share knowledge of his success and she got to help him with some of his struggles.

It was very clear after the initial assessment that Cameron was having a difficult time with many of the concepts related to geometric concepts. Out of the six students who did not master all of the objectives, Cameron was the only one who had failed five of the objectives. This time Nancy followed the procedure of a brief reteaching unit, but dismissed those students to the computer lab to work with the EDU materials right after instead of having them work with other traditional practice problems.

Cameron found his previous spot in the lab. I gave him directions to follow his previous mode of working practice problems before attempting the scored assessment. Once again, his sense of competition seemed to rise, focusing him on the task of just getting that three or four. Once he did, he logged in to see if he could achieve a similar score once again. Only on the very first objective did he not achieve the mastery level.

For all that, when he and I talked about why he only received the one out of four, he quickly identified his mistakes and he decided that he wanted to move to the next objective.

Cameron's demeanor seemed to be much more focused after this brief conversation and his EDU assessments reflected this. In the following four assessments, he received a perfect score in all but one of the objectives – on which he received a 3.75 out of 4.

The success of EDU should be reflected in the retesting scores. It was within Cameron's scores of this last unit that one could see the potential impact of EDU in practicing the necessary skills. Cameron not only successfully passed the missed objectives in this unit, but his scores for the remaining units for the quarter showed that his success rate improved tremendously by only needing to retest in two of the objective areas. It is difficult to conclude EDU determined further success. However, as Nancy later discussed with me, Cameron began to have a lot more confidence with his own academic abilities, became less hesitant to ask for assistance when he didn't understand the materials, and seemed more engaged during the instruction occurring in class.

Carrie's Classroom at School #5

The final school I visited appeared to fit into the same historically familiar pattern as the previous schools. Originally constructed in the 1920s, the school had two expansion projects over the years, once again meeting the educational demands of the growing neighborhood. Positioned on one end of an expansive park, which includes public baseball/softball fields and an older public swimming pool, the school is neatly

angled along the park with a metaphoric view spanning back across the larger downtown area. This view in itself creates a powerful portrait, symbolizing the one time vision the city developers must have had with the city's oldest high school in the foreground and several large business and state governmental buildings in the background. The surrounding residential housing and various flora connects the high school to the larger downtown sector, creating a fluidity to this portrait, further supporting this idea that at one time this city envisioned growing in a similar manner as other urban, Midwestern cities had, where a large population would work and live near the heart of the city.

My initial visit to the school happened to be rather early in the morning and I found myself becoming influenced by several paradoxical images of the neighborhood. Directly across the street from the school lies an apartment complex, which routinely creates an additional parking dilemma when the residents park their vehicles along the street. Thus, on this morning I was forced to traverse throughout the neighborhood simply to find a place to park – experiencing the entire neighborhood in all of its perceived glory.

This fifteen-minute journey of the neighborhood suggested that the vision of connecting the residential to the downtown area had not risen to the desired expectation. Some of the streets remain unpaved and many of the houses are in dire need of paint and repair, suggesting a lower to middle class neighborhood that mirrored the well-documented ups-and-downs of the economy over the past eighty plus years. This rugged exterior either suggests the city either forgot to address the residential needs of this neighborhood or simply decided to focus on other areas of growth for the entire city.

However, one should not assume that this rough exterior defines the community, nor the school for that matter. Quite to the contrary, the seemingly antiquated style revealed a tremendous amount of trust existed amongst the residents and an outward extension of each person's significant role within the community compared to other areas of town. The various styles of homes allowed the occupants to sit on their porches, facing both the street and the park, conversing with passersby as they traversed the streets. Additionally, several neighbors were actively engaged in discussion even at this early hour, inquiring as to the status of their day and their individual professions. Still, the level of trust was more outwardly visible with the open, detached garages overflowing with automotive parts and yard equipment. In some cases there was no room to even close the door, suggesting that the owners easily trusted their neighbors to protect each other's belongings.

After I found a parking spot along a side street, I took a couple of minutes to concentrate on the task at hand by reviewing my notes from an earlier conversation with Carrie and then turning my focus on the exterior of the school itself. I found myself admiring the pristine exterior of the school's yard, the cleanliness to the two-story brick structure, and the very distinct towering windows that adorned both floors. On this particular morning, the sunlight seemed to reflect both off the windows and the brick, suggesting a shimmering gem in a less affluent neighborhood just waiting to be discovered by the young, eager minds that soon would be entering its doors.

The short block-and-a-half walk to the entrance made me recall my previous conversation I had with Carrie regarding this study. I had met her late the previous fall when she had presented her own graduate project at a research conference at the local

university. Her research project was a collaborative effort with one of her fifth grade colleagues at the school, which allowed students to self-assess their level of engagement in the classroom, utilizing a photo rubric the two educators had created. Each photo in the matrix portrayed the two teachers mimicking the behaviors worthy of a particular point value along the continuum, demonstrating the four different stages of a student being responsible, participating in class, engaging in discussion, and working independently. It was Carrie's enthusiasm during that presentation and the results she presented that indicated that something dynamic was going on within her classroom. Thus, we conversed that day about including her in this study to observe how students' level of engagement might add a new dimension to the study of reteaching.

I was quite aware that Carrie's classroom might provide a layer of bias toward this study because her research suggested a more definitive role each student played in the assessment process, suggesting that each participant was also a significant stakeholder in the broader school community. Her findings could possibly taint my efforts in defining reteaching because each student was more actively involved up front – which hinted that their performance might not require as much reteaching as defined in the other locations. However, her enthusiasm shown in her presentation that day suggested that the impact of their interventions might provide a unique definition to reteaching and it was the anticipation of observing something a bit more formidable that motivated me to push beyond any potential bias and view reteaching from her and her students' lens.

My short trek up sidewalk on this clear, but bitterly cold morning had turned into quite the reflective journey and the intent of my visit was to briefly discuss the research protocol before my classroom observations of the students began. Still, as I attempted to

open the glass doors, I found myself locked out and thinking that I might have missed a school cancellation on the morning's news. Rather than heading back to my car, I decided to walk around the school and see if there was another entrance into the building.

This short walk took me past the teacher's parking lot and I noticed a half dozen cars, indicating that school had not been cancelled. I walked past the portable building, which had the same look as the other portable classrooms I had witnessed throughout the district. Then I found myself at the back of the building, which is where the school's playground area is located. A set of stairs led in the direction of another glass entrance, but I found those doors locked too. I held my hand up to the glass, peering through the glass hoping to find someone walking down the hallway. At the same time, I only saw a flight of empty stairs that guided one to the main level of the school. But I was intrigued by a metal structure sitting atop of the stairs, which displayed large, single portraits of students in a jungle gym structure, suggesting another attraction I needed to view more closely before the end of my visit.

I began walking back around to the front of the school when I was greeted by one of the school's administrators – who had just pulled into the parking lot. She greeted me with an apologetic tone, indicating her delay was a result of the cold weather, causing her distress in getting her car started that morning. For all that, she was quite aware of my visit and was indeed excited about the potential of my study and the broader scope reteaching might bring. So, she quickly led me through a side entrance of the building, guiding us to the office so I could get checked in. She asked me to fill out the visitor's logbook since the computerized system was not turned on and called up to Carrie's room

to let her know that I had arrived. By the time I had finished filling out the form, Carrie walked through the office door – inviting me to follow her up to her classroom.

Carrie led the way down the main hallway, taking us past several artifacts adorning the walls - each item clearly symbolizing that the purpose of the school was focused on each single student. Cutout, construction paper hands and other colorful artwork organized by classes were affixed to the walls, indicating the vibrant activity that occurred within each of the classrooms. The jungle gym art display sat in the middle of the hallway, containing twenty-four unique photos of students – each enlarged and attached on the two structural towers, greeting each visitor with a welcoming face. Each picture was affixed to a wooden board, secured with four replaceable straps, indicating the art display was adaptable to each year's student population. The student photos noted the diversity of the population and the excitement each brought to the learning environment of the school.

Carrie continued leading us down the hallway, up a staircase leading up to the second floor. The pathway was clearly defined along the wall; the lower half of the wall was a brick tile, and the upper half a bright cream color, quite similar to the previous schools. A bold, green stripe ran about six inches above the brick indicating a "go" incentive as one moved down the hall. As we hit the second floor landing, I could clearly tell this hallway mirrored the lower level. Carrie quickly turned and led us down a hallway. Her classroom was at the end of this short hall – where a doorframe provided a focal point, inviting any traveler to head down this pathway.

Once inside, one could quickly begin to sense the daily energy that is generated in her classroom. The position of her classroom within the school allowed her to have north,

south and eastern views out of the three quarter windows that went around the room. One set of windows along the north wall provides a clear view of the school's entrance. The five sets of windows along the eastern wall had blinds lowered to within a foot of the wooden enclosure, hiding some of the bright morning sun. The southern wall was a bit different, though. There was a door in one corner, leading to an office area with another window. The remainder of the wall held the one whiteboard, two bulletin boards, and a projection screen.

The noteworthy thing during this initial visit was how Carrie used materials throughout her classroom. This large, expansive room towered to the ceiling – spaces where few could ever reach. Still, she strategically affixed items on the wall in a quilt-like manner, calling attention to specific items by subject matter based upon its location in the room. Her photo rubric was hung between two windows along the eastern wall, raised well above the reach of young hands. Additionally, she had several note cards adorning smaller spaces between the windows, emphasizing verbs and nouns in a growing list based upon classroom discussion. All of these patterns suggest someone who utilizes every square inch of space for instructional purposes.

The arrangement of the students' work area suggested that Carrie had divided the room into several similar instructional stations, each with some unique characteristic. The larger instructional area was composed of individual desks positioned in six separated clusters, side-by-side to suggest an emphasis on communication. One cluster, positioned near the whiteboard, had only two desks suggesting this might be an area for classroom discipline or two students who had difficulty working with others in class. Directly behind this cluster, in the middle of the room was a cluster that had five desks, suggesting

quite the opposite, where a small group of students actually worked well together. The surrounding four remaining clusters had four desks, providing a thread throughout the room, linking each station to each other. Carrie had one additional desk positioned near the south wall, where she kept a projection unit and computer for her SMARTboard, angled off in the corner of the room.

The northeastern corner of the room was arranged with two small bookshelves, creating a private room within the room, containing two rectangular tables on which a group of seven could work together. Also along the northern wall, near the entrance to the room, sat two sets of tables. One smaller table possessed a single, computer station near the door. The other set of tables were two desks pushed together, creating a hexagonal workstation, allowing up to six individuals to work.

Though the room contained other subject-specific artifacts, it was those artifacts addressing specific math skills that caught my eye such as a self-made poster of the number 524,138,867,915.004. Each grouping of numbers was organized by color and labeled by its specific base ten placement. Another self-made poster addressed the conversion of units, such as metric conversions, feet to inches, and quarts to gallons. Another self-made poster accentuated specific divisibility rules, addressing those numbers divisible by two, three, four, five, six, nine, and ten. A purchased poster of the number line stretched along the south wall. It displayed on the placement and order of both negative and positive numbers from negative twenty to positive forty-nine. One other purchased poster stressed various geometric shapes – including the two-dimensional objects of square, pentagon, and octagon – and the three-dimensional objects of prisms, cones, cylinders, pyramids, and spheres.

All the artifacts clearly circled the room, suggesting the students were surrounded by mathematics. Though many of these were either purchased or made by Carrie and positioned out of the reach of the students, it was the other self-made posters and note cards that indicated the students also contributed to their own learning environment. Snippets of paper were affixed to a bulletin board featuring the "Fab Math Vocab," made of either computer printed words or marker colored terms they were currently talking about. Another poster positioned in the corner was labeled "Fibonocci's bunnies" – illustrating the first five numbers of the Fibonocci series. Scribble and highlight marks in the "month" and "number of pairs" columns suggest this was a group effort.

Carrie and I sat down at one of the workstations and began by discussing her classroom and her students. She began by stressing the impact her own graduate work played in developing the social norms of the environment and how those norms directly impacted the overall success of her students. My previous attention to detail shifted from the focus on artifacts to her passionate words concerning her students. She shared her personal experiences with the district's mobility issues many of the schools faced – creating a classroom with the high number of students in the English Language Learners program. Carrie knew the struggle some teachers had with this issue, but rather embraced the challenge with optimism because it created a school reflective of its surrounding diversity. This, in turn, generated a larger audience of visitors who came to the school to learn more about addressing diversity within their schools – allowing the entire school to be leaders, both locally and globally.

As our discussion moved beyond her process of reteaching, she shared her philosophy on the topic. In the past, she had followed similar methods of teaching and

testing, and then reteaching and retesting once students were identified as not meeting specific objectives within the material. In past years she had felt a great deal of frustration with this approach, sensing that it was too reactive and took place after the learning moments had occurred. This approach focused on addressing moments when students had failed, potentially lowering the overall self-esteem of students. Rather than being in a position of reacting to failure, the fifth grade teachers wanted to try something that would address the skills during the regular instructional environment. Thus, an hour and thirty minute mathematics class was broken into three thirty minutes sessions. The first thirty minutes addresses the reviewing and teaching of the material. The second session was called "centers" – a five-station work environment that each student would work in a prescribed station given the particular day of the week. These five stations consisted of one group where Carrie would work with three to six students, depending upon the day, covering particular objectives tested on the criterion referenced test. Another station focused on practicing basic numeration facts. Another station moved students out of the classroom to work with another computerized software program, called *Ways to Success*. A fourth station worked with class partners to provide peer tutoring, practicing problems typically out of the textbook assigned by Carrie. The final station was outside of Carrie's room, where students identified through an individualize education plan would work with another paraprofessional. The final thirty minutes was focused solely on practice. My study was most concerned with the second 30-minute session that focused on centers.

Carrie was most definitely using a preventive approach in respect to reteaching, suggesting these observations could be used both to accentuate her instructional practice, and gain a fresh perspective in the use of extended practice beyond regular instruction.

Carrie's centers methodologically were like no other reteaching opportunities in the district. Thus, we decided that the best approach would be to make several classroom observations, observing students on different days of the week. This would provide an opportunity to document both her classroom management techniques in this environment and to observe students progression through the different stations. We ended our conversation with a shared enthusiasm about the possibilities that could arise and set a target of beginning within the next week.

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Carrie teaches mathematics right after lunch, with centers occurring right afterwards. On my first visit, I arrived a few minutes early, allowing her to introduce me to her class well before centers had begun. Many of the students appeared excited about having someone observe them in their learning of mathematics. After a very brief exchange of names, I positioned myself at one of the workstations and observed Carrie wrapping up her lesson and then calling out it was time to move into their “Centers.”

I stayed in my seat for a while, admiring the quick pace as the students transitioned into their work areas. Carrie equaled the pace, moving quickly herself into her station, which was the small table separated by the bookshelves in the northeast corner of the room. The topic she was discussing with her small group of four students was the powers of ten – guiding the small band of students through a process of talking out loud the steps necessary when multiplying or dividing by a factor of ten. Carrie quickly led them through a brief anticipatory set and then asking them to pull out their own individual whiteboards – which were no bigger than a foot in length and width. They each got out their own markers and self made erasers – small carpet remnants that someone must have donated to the instructional cause. Carrie would give problems to the entire group of four, asking each of them to work independently on the problems until they each reached a solution. Though the math problems were never that difficult nor time consuming, Carrie carefully watched each of the four students, devoting time to focus on those who were struggling and then offering a tremendous amount of verbal praise when the students reached the correct solution.

This vocalized rapport between students and teacher was quite energetic. Carrie could devote all of her energies to each student – ensuring each was at the desired level. However, it was her physical position in the group that also stood out – suggesting a strategic manner to keep a keen eye on the rest of the students. Her back against the eastern wall of the room, she would occasionally call on other students to keep them engaged in their designated task. Then with a verbal "use your mental math," she would return her focus on the small group of four, indicating that even though Carrie attended to other issues, her focus was on the group of four students. This back-and-forth of

problems and discussion would conclude with each of the students verbalizing the steps necessary to solve the problem – giving them an opportunity to share their learning to the larger group.

As the time flew by, I found myself mesmerized by the entire process. It appeared that she was utilizing several instructional strategies, such as peer-assisted learning and student think-alouds, stressed by the NCTM (2007a). Though it was unclear if these were struggling students, the strategies suggested a more focused intent on the processing of mathematics using both skill and drill practice and then verbalizing the necessary steps – which suggested students moving information learned into another area of memory.

My second observation visit was the next day of school, a Monday. Upon my entrance into the classroom, I found four new, middle-aged visitors talking with the students. As I positioned myself in my previous location at the back of the room, Carrie made her way over and explained that three of the men were Turkish dignitaries visiting the city to learn more about American education – one of which was appointed to be the next Turkish Minister of Education. One person acted as the interpreter for the group, translating an active dialogue between the students and the dignitaries. Questions were asked between both parties, but those from the students addressed a search for more cultural understandings regarding holidays and the ways of life of a Turkish fifth-grader, which prompted an invitation from the main dignitary to visit Turkey whenever they would like.

This impromptu visitation meant that Carrie had a little more math instruction to cover, causing a slight delay in the start of centers. After the visitors left the room I had an opportunity to watch her use the SMARTboard technology she had at the front of the

room. Carrie had a student worksheet already loaded in portable document format on the computer and easily used the built in pens to go through the problems. The majority of the questions on the sheet were word problems, suggesting a little more emphasis on guiding students to break down the problems and problem solve using the current topics in order to find the solution.

At first I wondered if the change might be a distraction for both the students and for Carrie. I often had seen moments when educators are pressed for time and try to utilize technology in such a quick manner that they stumble and struggle to make the technology work. However, Carrie seemed to not only be comfortable with the technology, but also gave the appearance as if this was the norm – reacting to circumstances in real-time and keeping a calm demeanor in the process. The students seemed to mirror her reactions too – suggesting they could easily adapt to the learning environment as if they were veterans in the learning process.

As Carrie worked for about three to four minutes on the worksheet, it soon became clear that the material covered was already understood. Carrie quickly used the verbal cues of her students to transition her instruction into concluding the lesson and then transitioning the entire class into their centers. On this particular visit I decided to move between two of the groups – one addressing basic facts and the other using partner practice and peer tutoring. I chose this option because one of the students I had observed during my previous visit was now working with the basic facts group, providing an opportunity to see how students manage change in their environment.

In all, there were three students in this basic facts group on this visit. Each student worked feverishly on his/her own. Students walked briskly over to the cabinets along the

west wall of the classroom, picking up an individual mathematics manipulative – either in the form of flashcards or a handheld game. Each manipulative was design to address basic computational skills and it became clear when the students placed a stop watch on their desks that time was a critical component.

I moved back and forth between these three students, observing them in their activities – each adding his/her own element of individuality to the session. One student was not using the stopwatch for time, but rather his fingers to manually visualize the correct answer to some basic addition problems. The other two students were actually mouthing the answers, with no sound, before turning over the flashcards to self-check their success. It was at this moment when I began to sense a pattern emerging – one that addresses the student conceptualizing the mathematical process. It could be seen throughout the entire room – from the artwork on the walls to the activities each student was performing. Each element allowed the student to visualize the necessary steps in order to find the solutions.

This visit also gave prominence to building the connection to a broader audience. The partner practice/peer tutoring session was actually utilizing volunteers from one of the local colleges. One student was working with a group of three students as they used the main whiteboard at the front of the room. The dialogue between the volunteer and the students was minimal, at best, suggesting their role was only to support the students when they didn't understand the material. In fact, a greater emphasis was clearly placed on the continuous discussion between the students. Each of them would pick a homework problem out of a textbook and then challenge each other to solve the problem. The students' discussion mimicked the same tone Carrie had just used with the class,

indicating each student was an authority, at least for the time being. Once again, the discourse suggested that the student working on the problem at the board talk through the mathematics.

On this visit I found myself in a tug-of-war between these two groups. I was asking myself repeatedly what were the differences and similarities between the three centers that were actively working that day. Carrie was talking with her group of students, demonstrating how talking through the process builds connections toward finding solutions. The peer/partner center was using similar steps, switching authoritarian roles, playing the teacher role by calling out problems and talking each student through the process. The individual students were finding their own methods to talk through the process by either moving their lips as if they were talking out loud or using their fingers to actually count. The only differences between the groups were the person who initiated the discourse, varying upon the group and the person given the authoritative role.

As the time flew by, Carrie suddenly called out “five minute check.” This is the cue for those students who were working on their basic facts to pull out a worksheet in a boxed folder positioned on the counter. Each worksheet is for a grade and measures their understanding of a particular objective area. The folders are clearly marked, providing each student the necessary guidance, with graded sheets inside from their previous attempts. Carrie later brought it to my attention that the basic skills station gets students to narrow their focus during the initial phase of the activity by identifying which set of manipulatives they should be using during the station. For example, the addition objectives guided students to utilize addition flash cards if they were deficient in this area. Multiplication would guide students to use either a particular game or set of cards.

The five-minute check was a very specific transition where this small group of students would move to the wooden floor portion of the room and either sit down or lie on their stomachs to work on the worksheet, turning in their work at the end to be graded for the next time they were in this station.

This entire session suggested that a connection existed between developing one's basic set of skills and the impact immediate feedback can play in the process. Though the method of feedback varied – from Carrie verbalizing the correct response to her group, to the peer/partner congratulating the other on getting the problem correct, the to flashcard telling them they had the correct answer. At the same time, it was this immediacy that kept the room in rhythm, focusing students on their designated tasks.

After the center session concluded, Carrie called the students back to their desks and had them perform their self-evaluations using the rubric she had demonstrated so many months ago. I watched them look back-and-forth to the rubric for guidance in their own evaluations, but also asked them to write an example of their work to support their assessments. Carrie had mentioned this condition during her previous presentation, indicating that the combination of her data with the students' data validates the behavioral assessment. Additionally, it is this rich description by the students that parents initially see when reports are sent home – suggesting that students have to be thoughtful in the process because this work extended well beyond the classroom walls. I noted an exchange between Carrie and one student, discussing whether his description was accurate. The student in question was working in the peer/partner tutoring center – which Carrie observed from across the room. This exchange suggested Carrie's awareness of student engagement extended well beyond her small group.

My third observation occurred about a month later. The students were still engaged in classroom math instruction where Carrie was adding to the artifacts on the wall with another notecard about the “Fab Math Vocab” within the lesson. The subject matter had moved into a chapter focused on area and perimeter. As the instruction went on, there was clearly the same common exchange of questions and answers between her and her students. This is also where it was noted that, during her instruction, she uses the entire classroom by continually circling the room asking questions that engage the students in “table talk” discussions. One might think this routine would generate a considerable amount of chaos. Nevertheless, Carrie strategically uses a set of questions orchestrating proper “table talk” which she refers to as she circles the class, wanting to hear the students use the proper language.

This movement around the class illustrated how Carrie directs her students in a symphony like performance. She calls for more engagement from one student; she circles the room and keeps them all on their part as if she’s tapping her baton to call for a quicker tempo from the flute section. As she guides the students through the materials, one can almost sense her tapping to the song of instruction, as if a distinct beat guides the rhythm within the room.

It was during her “dance” that I noticed something unusual on the floor. On the wooden section of the floor there were strips of tape arranged in distinctive patterns with student writing on top, indicating the perimeter and area of each figure. Though I was not sure when these artifacts first came into play, as the instruction moved into centers, there was a clear rationale behind them as the partner practice group began using them.

The sense of the extended community was clear during this third observation. One of the paraprofessionals was not there that day, meaning that an additional five students were in Carrie's room for centers. These students, who had been observed up to this point, were clearly a little more reserved in their activities and more hesitant to vocalize what they were doing. This was a clear break with the routine. Those students engaged in the peer/partner and basic skills seemed to be more focused, however, more engaged in traditional activities. Two students were at the board calling attention to "groupings" or "boxing out" method when multiplying with decimals. One of the students has a distinct height advantage over the other, which only becomes noticeable when observing them at the board, as they challenge themselves to fill the whiteboard with homework problems. The taller girl works high, the shorter one works right below – and the dance seems to pick up pace as they vocally state that they want to fill the board. After a few minutes, Carrie actually acknowledges the effort of these two girls – once again supporting the claim that she is the person directing the students all along the way.

This routine also has other rules. One of the girls appears to be one of the student leaders within the room, and she has her own special responsibilities because of that leadership. It was evident on this visit when the phone rang. Carrie was clearly in a position where she could not easily get to the phone. Rather than Carrie calling on the student, she instantly rose from her desk and walked over to get the phone. The call was one of the teachers wanting to let Carrie know about one of the other students on his way back to the classroom. This student took the message and relayed it to Carrie in a manner suggesting that this was the classroom norm.

At the end of the period, the students filled out the engagement rubric. One of the students scored herself on the low end of the continuum in two of the categories, so Carrie used this to start a small conversation. The student was clearly distracted the entire time, and it was evident that the unusual factors of the additional students were part of the problem. Although she had a couple of interactions with Carrie as Carrie tried to get her back on task, it was clear that she was not engaged. Her self-awareness expressed during this evaluation showed her ownership in this matter.

I also made an observation about Carrie's personal artifacts. Her office area was located in the small room off the main classroom along the southern wall. She had personal items, family photographs, and papers that needed grading located on a desk. She had her coat hung in this small room. There was an obvious separation between Carrie's personal artifacts in this office area and her classroom. All of the artifacts on the wall called attention to either particular learning objectives in reading or mathematics, or addressed self-assessing behaviors and routines that were part of the classroom norm. Thus, when discussions about using the "table talk" were made, it was reiterated that this was a class-generated list – indicating that ownership was clearly shared among all class members.

During my fourth visit, I detected another situation where flawed materials might cause some concerns with students. Math instruction was still going on at the front of the room and Carrie was talking about the topic of area on her SMARTboard. She gave an example that guided the students to find the area of a square where the sides had mixed fractions in their measurement. Carrie's initial comment was to use the process they had been using in the past, converting each of the two mixed numbers into single fractions

and then multiplying them together. However, she made a statement to the class that stressed a potential "shortcut" to find the answer where they could simply multiply the whole numbers together and the fractions together – combining them afterwards to give them the solution. Thus, the problem of three and one quarter times three and one quarter had the incorrect solution of nine and one sixteenth instead of the correct answer of ten and nine sixteenths.

This very rare moment was surrounded by several consecutive events that suggested Carrie's oversight was more a timing issue than anything else. For within a two to three minute span, one student announced that it was time to move into centers, prompting the entire class to begin moving quickly to their designated location. As the most of the students moved, Carrie announced three additional words that needed to be added to their growing list of math vocabulary. However, I could sense that some students were still engaged in the activity on the SMARTboard, because one student announced that they should have included the units when they calculated the area of the square.

The ebb and flow of the centers on this particular visit suggested Carrie's role was actually more significant in the keeping of time than I previously had noted. It was a Thursday, which meant that she was working with six students at her station, three of which had displayed a more noteworthy social role in class. My initial thought was that the other four students might have a less active role in the center or that the two might lead the discussion to get off task. However, Carrie managed to focus each of the six students on their particular tasks, asking guiding questions to either each individual or to the small group, creating a distinct rhythm amongst the discussion.

When group questions were asked the students would turn their attention in the direction of their individual whiteboards, trying to quickly find the solution. It became evident that a strong sense of emphasis was placed on understanding, where students would assist other students who were trying to solve the math question, prompting them with guiding questions in a similar manner that Carrie orchestrated in the front of the larger class.

It was quite mesmerizing to observe this action and reaction amongst the students and Carrie, as each of them displayed the observed norms that Carrie displayed in her teaching of the class. My focus this day stayed on Carrie's group and I noticed that the accepted norms of the entire class, where students would raise their hands in response to questions and motivate each other along the way to find the answers, remained consistent within the individual center – indicating that there were a clear set of social rules within the classroom that remained with the center stations. Granted, occasionally Carrie would have to call out to another student in a different station, but the rules were still evident.

On this day there were two college helpers in the classroom as well. Their engagement was directed to work one-on-one with the students in the basic facts group. One assistant worked individually with one of the students who clearly was struggling with some of the basic skills. When trying to work with the flash cards on his own, he did not follow other patterns displayed by students of either using his fingers to mentally perform the mathematics or to lip-synch the mathematics operations. However, when the assistant began to work with the student and would ask for the answer, there was a clear but distinct moment when his face revealed a deeper understanding of the process

involved, particularly after a short exchange of ideas helped build the student's confidence.

The other assistant worked with two girls. The interaction was not so much vocal, but more an observation of those students while they were engaged in the games and manipulatives. These girls were not struggling with these skills nearly to the degree as the boy. They seemed to know that their objective was to get ready for the upcoming “5-minute check.”

After the entire exchange of centers, it was hard to connect whether the initial mistake made during instruction was even recognized, let alone what the factors were that caused the oversight. Still, the break of routine by not having students fill out the engagement rubric suggested outside influences might have been a part of Carrie’s concern.

Interestingly enough, an email communication was sent the next day regarding her oversight and how one of the students had worked some of the homework problems incorrectly on the assigned worksheet. For Carrie, this was the first observed moment when reteaching was necessary and it had to deal with a simple mistake made in front of the students. However, it should be noted that this case was not taught incorrectly, only given as an extension activity from work done previously in the week. Her mistake provided a forum for continued discussion to find and correct the mistakes.

During my next observation, there were a few minutes more before centers commenced and another chance to see the students' roles within the classroom. The student who had previously gotten up and answered the phone was engaged in a good discussion with Carrie about rectangles and their relationship with squares and

quadrilaterals. The other students were working with their respective table groups and that exchange took a few minutes. As the conversation moved closer to a closing moment, the phone rang. The student once again arose and went to answer the phone, suggesting that this was always her responsibility. Once the message was relayed, the student went back to the table and began helping the other student at the table group.

As the class transitioned into centers, there were a couple of times where students had to be reminded of their desired tasks. The pair partners at the board had to be reminded of their task, indicating one of only a few times that behaviors occasionally disrupted the learning environment in this class. I was invited to play a more active role in the peer tutoring session as students were struggling with drawing three-dimensional objects. This opened up a new dynamic of social acceptance that showed that Carrie's students had actually grown to accept being observed, and now also invited involvement.

It was observed that students working with other manipulatives in the basic facts session featured a set of keys that contained a string that the student had to wrap around the teeth of the key as they did either multiples of two or three.

Because other visits had identified the lack of personal artifacts in the room, it was noted for the first time during this session that Carrie's college diplomas were displayed with a question posing where these fifth graders would attend college, strengthening the ties to her students and their education.

My last two visits further supported the emphasis on the use of language to describe the processing of mathematics, the connections of shared ownership within the classroom, and how Carrie directs the classroom. The only significant changes to the classroom on these visits were related to the new MacBook used for the SMARTboard.

At first it only featured the updating of technology within the room, where she now had a total of three computers. The previous SMARTboard computer was now situated closer to her office entrance with the intent to load additional software that would focus on basic skills. The new computer's presence became even more significant when screen saver pictures of the students began to fill the SMARTboard while the rest of the class engaged in their center activities.

At the end of the classroom observations, it became clear that the story to this school's and more specifically Carrie's success was in the preventative nature of the centers, increasing the level of engagement of the students. Though no discussion actually compared the previous years' performance to determine if this preventative approach was quantitatively significant, there were many indicators that this year's class was passing the district's objectives with less difficulty – and more importantly, less stress on Carrie's part. However, that is not to suggest reteaching was not required. The areas of geometric shapes seemed to raise the numbers slightly, but that phenomenon was found at the other sites as well. Thus, Carrie's approach, whether innovative or adaptive, appears to have signs of success.

Brooklyn's and Angelica's Experiences at School #5

Two students' stories need to be told here at School #5 because of two definitive outcomes that were observed. The first student is Brooklyn. She is a Caucasian student who seemed to have a more defined role within the classroom by answering the phone. Brooklyn had long dark hair and on the several observations wore it in a ponytail. Her typical dress was a long sleeved shirt with blue jeans and tennis shoes. One colder day,

she did wear her winter coat, but considering the amount of windows the room had and the resulting temperature of the room, that not only seemed acceptable, but a necessity.

Observing Brooklyn's role during the variation of centers throughout the week points to the roles outlined previously that the NCTM (2007a) suggests as successful strategies for low achieving students. When Brooklyn sat within the small discussion group led by Carrie, one sensed the impact of the smaller, more intimate settings with just four students working through direct, explicit instruction. Thus, the traditional anticipatory set of problems, the revisiting of concepts given in the whole-class setting, additional practice, and then closing activity seemed to reinforce her learning. During the two times I observed Brooklyn in this setting, she seemed comfortable in the student role she played by quickly answering questions on her individual white board when directed by Carrie, but also by being active in the conversation. In fact, every student fit that mode, thus suggesting that the small environment continued to support an open dialogue where a larger class might have one or two students become disconnected from the instruction and not participate.

The times I observed Brooklyn working in the basic facts center, it became clear that students who engage in more practice tend to internalize the processes. Brooklyn was just one of many students who were exhibiting "think-aloud" behaviors, though never being vocal in the process. Brooklyn would lip-synch the answers to flashcards, key manipulatives, and handheld games in order to check herself for understanding.

Finally, one could also connect the impact that peer-assisted learning had in the classroom and Brooklyn's role in that process. During this time, Brooklyn would play the necessary roles to succeed – those include motivator, encourager, instructor, and student.

When faced with the role of student, she would work at the white board with either a black or colored marker in hand, anxiously await the next question posed by her partner, and eagerly work through the problem. When not in this role, she would play all three roles together, keeping time with the task at hand. So, Brooklyn would have her textbook open, propped against her hip and read the next challenge problem to her partner. As that student began to struggle, Brooklyn would help guide her, never revealing the answers, but providing encouragement until that student found his/her own success.

The second student is Angelica. She is of Middle Eastern discent and was Brooklyn's partner during many of the peer-tutoring observations. Angelica was the one student who appeared to be shyer than the other students. Her smaller than average build must have made it easy at one point in her academics to hide in the midst of the rest of the class. However, because of the structure established within centers, Angelica never once was out of the norm.

In terms of the smaller group instruction Carrie provided, Angelica worked with four other students, one of them a little more dominant than the others. Carrie's ability to circle the group with individual questions seemed amazing – never allowing time for one's attention to wane. It was during these moments that I noticed that Angelica seemed to struggle with some of the content. Because of the more intimate setting, however, she seemed part of the process.

Angelica also reflected the similar trend of lip-synching the answers when working with basic facts. As she worked at her desk, I noted several times her processing information within the activity at the time, and still I wondered if maybe she might struggle, because occasionally she would look at the clock to check the time. Because of

her shyness, it was hard to determine that this was something she did because of boredom or something she did because she was anticipating Carrie's next direction to pick up the quiz. However, it was very clear that she was trying to keep pace with everyone in the room.

With Angelica and the peer tutoring sessions, as long as I observed from a distance, she appeared to be focused on the task at hand. There were a couple of times when, due to illness, she was paired with a new partner, but these times did not seem to sway her from the task at hand. Similar to Brooklyn, Angelica played all of the roles on equal terms.

Both Angelica and Brooklyn were two students observed to interact with the materials posted throughout the room – including the day when masking tape outlined on the floor a geometric shape. Carrie had purposely made a makeshift learning activity where students used these shapes to calculate area and perimeter. The day I observed Angelica and Brooklyn interacting with these shapes, Brooklyn was sitting down on the floor with her knees almost to her ears figuring the perimeter of the parallelogram in front of her while Angelica was on her stomach with her feet swaying back and forth as she calculated the perimeter of the rectangle in front of her.

Notwithstanding, it is both of their test results that make me acknowledge the effectiveness of Carrie's structured activities. Brooklyn is a top student – in fact for the entire quarter she did not initially pass four of the objectives. Angelica, on the other hand, was at the other extreme, not passing fifteen of the objectives. The piece of the puzzle that suggests a little more to reteaching is there under the surface is that for each, Brooklyn only retested in two objectives and Angelica in seven. This indicates that

retesting is not a necessity, but a decision between teacher and student – another dimension to the puzzle of reteaching that is worth considering.

A question that still remains after these observations, though, involves whether it was the preventative structures connected with the use of centers that led toward the individual success of each student, was it the environment and the roles each student played contributing to academic success, or was it some combination of both?