Keith Alcock
EDU 281

Artifact 11

Conduct an observation of at least three teachers at the grade level and subject area you intend to teach. Look for evidence of effective verbal communication, effective nonverbal communication, and techniques that foster supportive interaction in the classroom. Report on each observation (one page each) and write a one-page summary of the techniques that you wish to incorporate in your classroom teaching.

The grade level and subject area for the four interviews documented on subsequent pages is high school mathematics. While my primary goal is to teach computer science, few local schools offer sufficient courses to employ a teacher of that subject full time. In fact, the computer science teacher is often more so a math teacher wearing a different hat. Such is the case at Tucson High Magnet School (THMS), where I just completed a practicum in the Java/C++ classroom but moved to math to gain experience in that more popular area which can also provide enough teachers to observe. The following pages document observations of four numbered rather than named THMS teachers. People familiar with the setting will be able to identify them. In addition to these observations, I have also observed a different Teacher 4's math class at Catalina Magnet High School (CMHS) for Artifact 7 as part of the EDU 275 Classroom Management course. For EDU 272, Educational Psychology, I observed a math class at the local AmeriSchools East Broadway high school campus for approximately five weeks. Since I wasn't specifically focusing on communication issues and the college frowns upon reusing data for multiple classes, I do not revisit that data here. What I mean to point out, however, is that for having a secondary goal of math, I have observed a substantial number of its teachers.

Keith Alcock

Teacher 1

The first observational target, Teacher 1, is the youngest and least experienced teacher in my lineup. I observed his period one Algebra Concepts class bright and early on Tuesday morning, March 13. THMS uses block scheduling, so the 1:25 hour class period corresponds to nearly two days of instruction in other schools. Despite the duration, the sample size is nearly insignificant compared to a year's instruction, and significant extrapolation of these observations would be unreliable. On this particular day, the class was reviewing for an upcoming unit test rather than acquiring new material. For this reason, many of the supports had likely been withdrawn and students were being pressed to work quickly.

Verbal Communication

Teacher 1 speaks more loudly and quickly than the peers I observed. Students had no problem hearing him in the noisy classroom above their iPods and MP3 players, which are forbidden in classrooms by a largely unenforced school-wide policy, and his volume may have kept some students awake. He does not allow students to sleep or rest their heads in class, but a small number required resuscitation despite his amplitude. One student cranked the volume on his ear buds up enough that they could be heard halfway across the room and was notified of the impending confiscation. I mention these incidents because communication takes place between two or more people, and in some classrooms a major impediment to effective communication is lack of a partner.

Enunciation is difficult to quantify, but while this teacher's was completely satisfactory in my estimation, it was of lower quality than that of the other teachers. The loud volume and high rate may have been contributing factors, but I suspect some degree of conscious informality in the presentation. The teacher would like students to feel at ease rather than under pressure to be perfect. The teacher also uses words "plus," "minus," and "times" colloquially as verbs, which may match student speech habits and put them at ease. At the same time, he also teaches academic vocabulary. He had them, for instance, distinguishing between expressions and equations and identifying the distributive property. During my observation, the teacher employed at least one useful analogy in explaining how an expression and its simplified version could be equal: "It's like a dollar and four quarters. They look different, but the values are the same." This drew well upon shared background knowledge to enhance understanding.

All four teachers' classrooms are teacher centered, with teachers talking far more than students. Lack of communication partners in this classroom might have been ameliorated by allowing more student interaction. Not all students participated verbally during the period. I noticed three students in particular tucked away in the back corner not interacting with anyone. From their outward appearance, I would have jumped to the conclusion that they were ELLs who were not understanding and reluctant to ask questions. The teacher did visit absolutely everyone, however, and verified repeatedly that their work was complete, usually with the correct answer, and that they were patiently awaiting the next problem. Peer tutoring might have been a worthwhile activity for them. I was simply pleased that they hadn't taken the opportunity to get into trouble.

I observed two slight communication problems. In one case directions were unclear or inconsistent and students needed to ask whether they were required to graph their solution. In another, a quiet student volunteered a correct answer multiple times without raising a hand, but was unfortunately never heard above the background noise.

Kevin Alcock

Nonverbal Communication

The teacher's fast pace and loud volume communicated enthusiasm, which can encourage students and keep them on their toes, but it also reduces response time. On the other hand, the review session primarily involved low level questions about mathematical mechanics that students should have understood reflexively. The drill and practice format may have been exactly what these particular students needed. In addition, many of the day's activities were timed, sending the message that time was of the essence.

Review questions for the day were written in standard algebraic form on a side whiteboard. Teacher 1 uses a Smartboard at the front of the room to work the problems symbolically with a parallel running verbal explanation. In order to completely understand, students need both to listen and watch. This may have been one rationale behind keeping sleepy heads off the desks. In one case a student requested that a problem be solved at the board, but then put her head down and was summarily reprimanded. The nonverbal portion of the communication channel was blocked. In a similar vein, the teacher announced, "If you raise your hand for help, then at least show me you have copied down the problem." This action communicated readiness to him.

Students indicated desire to speak by either gesturing with a raised hand or, more often than not, simply interrupting. The teacher called on students by name. Despite this, someone not called upon was likely to answer and take away the another's opportunity, especially if wait time had somehow expired. This prevented the targeted communication from taking place. Turn taking, whether negotiated verbally or nonverbally, was not always smooth.

Supportive Interaction

The teacher's fast pace extended to the rate at which he fielded questions from the floor or solved them at the board and at which he circulated around the room answering questions and providing individual assistance. This allowed students to address him personally rather than in front of the entire group. He could support individuals while others worked on. Pace did not extend to the rate at which scaffolding was constructed. During the review session, students were expected to stand as independently as possible. In one isolated instance he requested one student to help another, thus encouraging a supportive peer interaction. I recorded him exclaiming "Excellent," "Absolutely," and "That's Perfect!" One troubled student was told, "Don't know how to do it? That's OK. We'll do it on the board." He may have been pleasantly surprised to receive support rather than criticism.

Kevin Alcock

Teacher 2

First period on Monday, March 19, I visited the most interesting classroom of the four: bilingual Algebra 2 in English and Spanish. Teacher 2 has taught math for nineteen years after first having studied mechanical engineering. He carried an air of formality which appeared to be very effective in his classroom, possibly for cultural reasons. When I arrived as scheduled, the students had just individually completed a 30-minute quiz, which they proceeded to work out as a class. Afterwards, they practiced on two real-world examples. Because much of the class was conducted in Spanish, I can't thoroughly report on the verbal communication.

Verbal Communication

Test questions and answers were presented in English, as is in fact all written work, according to the teacher. This reflected practical requirements of life in Tucson as well as AIMS testing. The majority of spoken words were Spanish and all students except one were native Spanish speakers. All appeared to understand both languages fluently and were able to code switch on a dime. The teacher called on students to read questions aloud in English. For the two paragraph-length, real world examples, they also transcribed the complete text for writing practice. After the problems were read, the teacher checked for understanding of both language and math and then paraphrased parts as necessary. The teacher confirmed to me that students do learn a substantial amount of academic Spanish in the process. I detected cognates for "multiply" and "equals" when more colloquial terms like "times" and "is" likely existed as used in English math. When students conferred among themselves, they appeared to be on task, verifying understanding. The teacher would often join their discussion and carry it further rather than change topic or quiet them down.

After class there was a half hour Badger Read period during which students were to read independently or complete coursework. All likely reading materials available in the classroom, magazines in particular, were written in English. The local newspaper was available and consulted by students. Publications did not appear to be targeted toward ESL students. However, some tips hanging on the front wall related to writing were. Posters addressed ideas and content, conventions, word choice, voice, and sentence fluency. If these issues are ever addressed near the math class, then bilingual students learn more about writing than their monolingual counterparts. Strangely enough, math posters were affixed to the ceiling. I recall staring at the ceiling when I was a student, so that may be an effective placement.

Nonverbal Communication

Teacher 2 used a touch screen to model algebraic operations for the students. Rather than having to turn his back to students and talk into the board, he was able to face students continuously and speak normally. The display was projected onto a large screen along with anything he wrote on it, which tended to be on the smaller side and always in black. He could, however, write directly over text documents, making the system more adept at handling words, but possibly less proficient at graphing. One graph in particular would have benefited from bold axes to distinguish them from other grid lines.

The problems that the teacher worked out proceeded through two explicit steps. First a verbal model was created, which included not just words, but also nonverbal mathematical symbols and graphics. The major benefit seemed to be the extraction from free prose of the pertinent information, which might be difficult for the bilingual students. A standard algebraic model

Kevin Alcock

constituted the second step. In one of the real-world problems, shoes of styles A and B were being sold, but variable names were strangely converted to x and y. This may have reinforced a standard procedure, but did not communicate the meaning of the variables directly.

The formal frontal presentation and corresponding body language (very erect with deliberate movements) communicated seriousness in the classroom. Students may respond to it and him more positively than to teachers who bend over backwards for their students, providing their every need. Everyone in this class had a pencil and paper. Because the teacher closely matched the demographics of his students and is a successful model, they may have responded better to his authority and nonverbal cues.

Supportive Interaction

Since my observations took place immediately after a quiz, I expected minimal scaffolding. Students were ready to stand on their own and prove it. The teacher did circulate to answer individual questions while students completed the "real life problems," and he answered all requests for clarification as the class reworked the test.

More interesting support originated in the apparent genuine concern for the students' future well being. One problem involved choosing between two potential shoe store jobs. They differed in salary and commission, and students were to decide which would result in better pay. Students really acted as if the situation pertained to them and that the problem provided substantial insight into their own future. The teacher must have picked it deliberately. One student commented what it was too much work to figure it out. The teacher replied, "That doesn't matter," implying that work was not optional and the student actually got back to it. The teacher also pointed out that you wouldn't want to take the job with the larger salary and not worry about the commission, because then you would get *nada* for salary when they fire you. One student paraphrased, "They kick your ass," and was reprimanded in Spanish for it. To me the tone said, "That attitude won't get you anywhere." The teacher's support is intended for the long term.

Keith Alcock

Teacher 3

Teacher 3's Honors Geometry class observed on March 19 was targeted to contrast with the Geometry and Algebra Concepts classes. The students' mathematical abilities were my primary concern, but I wasn't surprised to discover that the fourth period class included no ELL student. First period does include one or two. Be it zero, one, and two, all are below average representation at THMS so that the class also contrasted with others in that respect. Period four immediately followed lunch, which energized the students, distinguishing them from their zombie period one counterparts. Teacher 3 is related to the teacher I observed at CMHS and to a student in the Computer Science course. This class resembled my childhood mathematics class more than any other I have observed.

Verbal Communication

The teacher and students shared a wide communications channel with parties on both ends having more in common than inhabitants of other classrooms: the teacher's European-American background, English fluency, and mathematical ability were closely matched by the students. This allowed the teacher to convey highly encoded information. For example, the teacher abbreviated theorem as "thm." and approximately as "approx." I learned, after asking, that POW meant Problem of the Week. "Never say never," "Knock yourself out," and "We agree to disagree" were uttered without explanation. Despite the fact that the teacher and I grew up in adjacent states, the teacher said "Xerox" for "copy," "radical" for "root," and "minus" where I say "subtract." The students weren't disoriented when told that terms have synonyms in either English or in math. An inscribed right triangle, she pointed out, could have a side labeled "h" for hypotenuse or "r" for radius, and length and base are synonymous for rectangles. In other classes, the language manipulations would have had to be explained. I noticed the pronoun "cha" being used in "Don't cha?" It is indicative of informal speech and the friendly atmosphere.

The teacher did elaborate on several mathematical terms for students. FOIL (first, outer, inner, last) was just a way to remember how to apply the distributive principle, she stated, before drawing the illustrative arrows. Within a matter of minutes, she successfully described factoring as the opposite of FOIL. She explained that consecutive integers are n, n+1, and n+2 like three, four, and five. Clarification in other classes would have required several minutes. One student then wondered how consecutive evens could exist, since at least one of n, n+1, and n+2 would necessarily be odd. A two, four, six example cleared that up quickly. The teacher must have devoted substantial attention to vocabulary at some time, since an entire side board is filled with terms written on colored paper, and since students were adept at asking about meaning. "Does consecutive mean one after another?" was the question rather than "What does consecutive mean?" When the teacher questioned her own spelling of "primitive," students recommended an "a" by comparing with "primate." They didn't consult one of the many dictionaries in the room, but one student was quick to use me as a reference.

Verbal communication was thus geared to fluent, nearly adult native speakers in rate, enunciation, and not just syntactic complexity, but semantic as well. "I need to know how you know" and "Is it true that we *have* to get all Xs to one side?" were typical exchanges. The teacher once took pointed offense at someone's language: "I'm not a dude!" Since reading and writing are being emphasized in every THMS subject, I noted two missed learning opportunities. Had someone actually found primate in the dictionary, they would have discovered the relationship to primary and the mathematical term prime. Someone also asked whether

Keith Alcock

satisfaction of the Pythagorean equation implied a right triangle. Iff, if and only if, could have been explored.

Nonverbal Communication

Although the teacher did have access to a touch screen and projector and reported using it half the time, she worked at the whiteboard during my observation. No problems resulted from her turning her back to the students temporarily. Students began the period asking about the more difficult of their homework problems due that day. For the initial problem the teacher was quick to recommend that they draw a picture, and then the teacher modeled at the board. In explaining FOIL, lines were drawn to show how all values were combined, and a similar demonstration showed how two radicals were multiplied. During class, a table was constructed on the board to organize Pythagorean triples. By the end of class, the board was covered. For a three dimensional diagonal problem, the teacher tracked down a transparent cube and placed a pencil in it to show what needed to be measured, even though it was already pictured in two dimensions in the textbook.

Supportive Interaction

This classroom was the only I've observed at THMS in which students sit at tables in pairs. This fostered supportive interaction between students in the classroom. Students were not using the opportunity to copy their neighbor's work during independent practice. No explicit group work was organized for the day, but in at least one instance a student asked the teacher a question and she forwarded it to another student to answer, as is often recommended. This increased the number of student turns and interactions.

Some of the classroom interactions would not necessarily have been considered supportive, especially if students had truly been struggling. However, some observers might classify the interactions under establishing high expectations. A poster at the front of the room proclaimed "No excuses!" The teacher once said, "Didn't do your homework? Confused? That's why we do homework!" and "Do you want to whine just a little bit more there?" In other courses there is either no homework or it is used exclusively to solidify already understood concepts, which should not result in confusion. A student responded once with "You're not encouraging me to do my best."

On the other hand, the teacher asked once in an incredibly concerned voice whether a student was alright. She also accepted advice from students regarding the spelling of "primitive" and the bell schedule. Students were told they were entering the realm of trigonometry, and they seemed impressed. She encouraged not just understanding of the Pythagorean Theorem, but mastery of the lower valued triples to improve performance. She expressed confidence in students by asking higher order, challenging questions. Students did not lack for support.

Keith Alcock

Teacher 4

I have worked with Teacher 4 in my practicum classroom for several weeks. She teaches a third period Geometry Concepts course to a class including four ELLs. Several of the students have failed the course before and almost all distain mathematics. Below is only a small sampling of relevant observations made to date.

Verbal Communication

Teacher 4 speaks fairly slowly, loudly, and with a great deal of repetition. Enunciation is clear, but by the time words reach students, interference from the myriad other conversations in the room and the ear buds implanted in most students prevent good reception. The teacher's valiant attempts to communicate may exacerbate the problem: students know that they will have second and third and fourth chances, so they don't appreciate any of them. Cell phones and other devices have been confiscated and sleeping students have been awoken in attempts to improve communication inside the classroom. In an apparent experiment, the teacher elicited the correct one-word answer to a simple question from a student, who after one miss provided it. The exact same question was asked of the next student in the row. He repeated the incorrect answer without thinking. When the question was presented again, he thought and answered correctly. The exact same question was asked of the very next student in the row. He didn't know the answer. The very same utterance can be effective in one situation and not in another, with the very same audience, depending on whether anyone is listening or not.

Despite the setbacks, some very positive events have taken place. One student enrolled in an American Sign Language class and did not speak for the week for an assignment. His answers, written quickly in a notebook and volunteered by gesture, were exemplary and once made their way onto the front board. Other students were very impressed. On one positive day, the students volunteered a numeric answer in Spanish, which was wrong, but the teacher played along and students were eager to correct it and help the teacher understand their answer, short of saying it in English. L1 support is not emphasized, but the teacher recently tracked down a glossary of mathematical terms for students in Spanish, which was appreciated by at least one student I helped. One day students enthusiastically joined in an "Area equals base times height" cheer. They had never verbalized as cohesively before.

The teacher includes analogies to popular youth culture in explanations of mathematical concepts. Movies, television shows, and music have provided material. Definitions of new and old terms are often embedded in sentences. Students have filled graphic organizers with definitions of transformations in their own words and with colloquial synonyms (e.g., slide or move for translate). One lengthy investigation concluded with translating an observation from BICS to CALP for writing practice. The teacher has asked students to read problems aloud and once read a mathematical fairy tale to students, providing reading, speaking, and listening practice. Many of the bases have been covered.

Nonverbal Communication

Teacher 4 wields the Smartboard adeptly. She takes advantage of different colors for markers and highlighters and can quickly flip, rotate, expand, and drag objects around, making it great for transformation lessons. Geometry lends itself to a graphical representation. The board does cause problems in that it puts the teacher's back toward the students, who continually take out electronic gadgets and switch seats at every opportunity.

Kelli Allcock

Graphic organizers have been creative and effective. Terms for transformations are themselves transformed (e.g., rotated), for example, or the word tangent is really shown tangent to a circle. The nonverbal reinforcement built into the verbal communication must be effective. Similarly, manipulatives have repeatedly been employed to provide tactile reinforcement of oral and written explanations. The teacher has used gestures to indicate translation, reflection, and rotation when explaining transformations. However, the most prevalent gesture is the one for "take those things out of your ears."

Supportive Interaction

Math at THMS seems to be an individual activity, but the teacher did conduct one group activity in which teams worked on test review questions. Unfortunately, the activity resembled parallel play more than cooperative learning. The advice about group work hanging on the wall was not reviewed on that particular day, if ever. Students often support each other in a non-educational way by providing answers to their classmates, although I have witnessed some on-topic discussion of problems.

The teacher has a way of calling on students that encourages interaction, although not support. She occasionally picks a student not for the purpose of answering a question, but for choosing some other student to answer. Students are skilled at picking out peers who are not paying attention or have been slacking off. As a bonus, the targeted person can hardly resent the teacher for getting picked on.

Keith Alcock

Summary

Each teacher employed at least one technique which I would like to incorporate into my classroom teaching. Whether they are adopted for the long term will depend a lot upon the students. Teacher 4 and I have discussed at length, for example, how years ago her math students preferred working together, but have swung around in preference to individual activities. The techniques I would like to incorporate are therefore not predetermined but rather dependent on characteristics of as yet hypothetical students.

From Teacher 1 I would like to borrow the booming voice to use in selected circumstances, but not as often as students heard it. I'd also like the classroom atmosphere he established that allowed the student to feel at ease admitting that he didn't understand, as long as it only occurred as often as in Teacher 3's classroom. The last condition is my responsibility, I admit.

Like Teacher 2 in the extreme and Teacher 4 to a more realistic extent, I would like to speak some of every student's language. In most cases my fluency will be insufficient to improve verbal communication directly, but the indirect benefit of the supportive interaction make it worthwhile. A word or more here or there can motivate students and demonstrate interest or even commitment on the teacher's part. I have covered the rather unpopular languages of German and Dutch, so Spanish is of course my deficit. Teacher 2's exemplary real-world applications are another technique I'd incorporate. However, I'd be sure to mention the real-world relevance as a motivating factor before material is presented, not only at the conclusion of a unit. Students have two opportunities to read: during Badger Read and homeroom. I would extend this to independent math-oriented reading during class from sources other than the textbook. Students won't need to rely on me to observe that math is all around us.

I would prefer to seat students in pairs as Teacher 3 and also the AmeriSchools teacher to increase student interaction. Similarly, Teacher 3's forwarding of questions to other students is a technique I would adopt. If students ask not "How do you do this?" but rather "Can anyone show me how to do this?" then I will have a class rather than a loose collection of students. The honors students came up with their own high level questions, and I would like to borrow those students. Alternatively, the skill might be modeled and taught. Games like Math Jeopardy in which students construct math questions are one possibility I've observed. Teachers 3 and 4 have a good collection of math manipulatives which I should accumulate.

Teacher 4 did best at having students construct knowledge and arrange it in meaningful and memorable ways on graphic organizers that included drawings, definitions, and notes. A library of her materials would benefit anyone. I would adopt the organizers, but at the same time hope that students can learn to organize information on their own if I demonstrate the skill and allow them a greater role in production. Teacher 4 has a good working knowledge of youth culture which I should be more aware of in order to connect with students and build rapport.

Lastly, for presentations I temporarily prefer the touch screen over the Smartboard simply because it's much more natural to communicate with listeners while facing them (except in Computer Science when I want to face their screens). Although teachers, especially 4, were very adept at using software, the computer functioned primarily as a simple raster image builder. Internet resources were not used in class and more powerful drawing and mathematics programs such as Geometer's Sketchpad, Mathcad, or Mathematica seem underutilized. I would also like to at least experiment with Flash animations to convey more of the information not just nonverbally, but interactively. I think that the hypothetical students would approve.

Kevin Alcock