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ABSTRACT

What happens in a classroom that fosters the Harvard Project Zero teaching for understanding framework? That is the initial inquiry for this pilot ethnographic study of African American fifth graders in an urban public school. The study sets out to show how children are engaged in a class set up to understand science and mathematics. Themes emerging from fieldnotes suggest that children are more engaged when they are the presenter, when they work in cooperative groups, when they are solving open-ended problems, and when they play critical thinking games such as Project Zero's Starting Block. As the study unfolds, the theme of self-selected, science presentations stands out. When examined more closely, the self-selected presentations reveal four ways in which 5th grade presenters involve other children in their presentations. Thus, the study explores methods children use to involve their audiences. One implication of the findings is that kids teaching kids gives them another way of showing what they know and building new understanding. (Author/CCM)

Kids teaching kids

An ethnographic study of children's strategies for presenting in a 5th grade science class

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Abstract

<u>What happens in a classroom that fosters the Harvard Project Zero teaching for understanding framework?</u> That is the initial inquiry for this pilot, ethnographic study of African American fifth graders in an urban, public school. The study sets out to show how children are engaged in a class set up to understand science and mathematics. Themes emerging from fieldnotes suggest that children are more engaged when they are the presenter, when they work in cooperative groups, when they are solving open-ended problems, and when they play critical thinking games such as Project Zero's " Starting Block."

As the study unfolds the theme of self-selected, science presentations stands out. When examined more closely, the self-selected presentations reveal four ways in which 5th grade presenters involve other children in their presentations. Thus, the study explores methods children use to involve their audiences.

One implication of the findings is that kids teaching kids gives them another way of showing what they know and building new understanding.

Descriptors

Major: Harvard Project Zero Teaching For Understanding Framework, ethnographic study, elementary school, science education

Minor: future of education, multiple intelligences theory, logical mathematical intelligence

INTRODUCTION

Nyame, the sky god, gives Anansi all the wisdom of the world in a bag. Delighted to have such a treasure, Anansi tries to hide his bag in a tree. He fails to climb the tree even with his eight legs because the bag in front of him stops progress.

Kuma says " Father, I have an idea. If you hang the bag in back of you instead of in front of you, you'll be able to climb the tree."

Anansi recognizes that his son must have wisdom, too. Angry because he does not have all the wisdom in the world after all, he slams the bag down. The bag breaks open and ever since there has been plenty of wisdom to go around.

A children's play based on the West African trickster character Anansi the spider, " How the World Got Wisdom," offers a moral: if you get wisdom, share it.

Thinkers in the 21st Century Initiative have been doing just that as they speculate about the future of education.

Ash Hartwell says, " while the popular concept of reality in the 20th century has been mechanical, the metaphor for the 21st century is likely to be organic. Public schools have not yet reflected this shift."

More graphically, Hartwell points out that few 20th century ideas in science--ones such as relativity theory, quantum mechanics, the discovery of DNA, the theories of chaos and complexity--have shown up in classroom instruction. Most scientific instruction draws on primarily Newtonian notions of reality, leaving even the brightest children miseducated. (Hartwell, 1998)

Then another internet offering " Making the case: Understanding the 'disconnects' that explain why good schools alone will never be good enough to meet the needs of the 21st century," raises questions about present reality and past assumptions.

So fast and so fundamental are the changes occurring within present society that each year brings a greater discontinuity with the past. Taken together these changes amount to an absolute disconnect between what was good practice for schools and what we now know from research we should be doing. Discontinuous change is not a new phenomenon: in 1927 Mercedes Benz produced 1700 cars, and management was so excited they employed consultants to tell them what their growth potential over the next 50 years could be. Eventually the report came back: ' by 1977 so fast will be the technological change that Mercedes could expect to produce 40, 000 cars a year.' The Directors threw out the report and sacked the consultants. 'This is totally irresponsible,' they reasoned, ' there is no way schools could train 40, 000 chauffeurs a year!'

Likewise, future schools rest in world that will disconnect with the present in economics, learning, the brain, and learning technologies, say the authors.

This possibility is made probable by events as long term as the exponential growth of humans on planet Earth (expected to reach 20 billion by 2050) and short term problems such as the Y2K crisis.

Les Brown' article in the January 1999 issue of *The Futurist* points out the probable devastation to planetary resources that rapid population growth may have in the next 50 years. Already overfishing, deforestation, decreased crop yields, diminishing fresh water supplies, waste disposal, increasing gaps between the haves and have nots, all indicate widespread species stupidity.

We are killing ourselves, slowly.

The call is for planetary wisdom. Such wisdom about how to live in harmony with life and non-life on Earth might begin with schooling. Such vision, as made vivid in Octavia Butler's latest science fiction novel *Parable of the Talents* and NASA's strategic vision to put a colony of humans on Mars by 2050, might go beyond living wisely on Earth.

In the words of Butler's main character Lauren Oya Olamina, " I have not given them heaven, but I've helped them to give themselves the heavens. I can't give them individual immortality, but I've helped them to give our species its only chance at immortality. I've helped them to the next stage of growth."

" The Destiny of Earthseed is to take root among the stars, after all..."

Understanding the strategic problem of space exploration can begin in schools. But a more immediate self created problem we humans face will happen when the Millennial sun first rises over the independent republic of Kiribati.

In the words of John Petersen, Margaret Wheatley, and Myron Kellner-Rogers, authors of " The Year 2000: Social Chaos or Social Transformation?" it is already too late.

According to them, " as the sun moves westward on January 1, 2000, as the date shifts silently within millions of computerized systems, we will begin to experience our computer-dependent world in an entirely new way. We will finally see the extent of the networked and interdependent processes we have created."

" At the stroke of midnight, the new millennium heralds the greatest challenge to modern society we have yet to face as a planetary community. Whether we experience this as chaos or social transformation will be influenced by what we do immediately."

What they are describing is the year 2000 problem known as Y2K or more informally as the Millennial Bug, revised recently to be known as the Millennial Bomb. The anticipated disruption to life in developed nations around the world might be the slap in the face schools need to restructure deeply.

Asa Hillard, among many others, says " the restructuring that educators need to do, then, is much more than a matter of rearranging the technical and logistical chairs on the educational Titanic."

" It is not a matter of the amount of time, of middle schools or junior high schools, of site-based management, of schools of choice, of behavioral objectives, of access to technology."

" Deep restructuring," in Hilliard's view, " is a matter of drawing up an appropriate vision of human potential, of the design of human institutions, of the creation of a professional work environment, of the linkage of school activities and community directions, of creating human bonds in the operations of appropriate socialization activities, and of aiming for the stars for the children and for ourselves academically and socially."

He adds, " the beauty and promise of true restructuring is that it will provide us with the opportunity to create educational systems that have never existed before, not because they were hard to create but because we have not yet made manifest the vision or tried to create them."

Wisely, Hillard knows that new wine does not belong in an old wineskin. New wine explodes in an old wineskin.

Longfellow Hall on Appian Way doesn't look very modern from the outside. It sits on one of the oldest campuses in the United States. But workers on the third floor have been busy creating new wines. Harvard University's Project Zero research center, thanks to Spencer Foundation's generous grant, has been field testing a framework that synthesizes the best of what we know about thinking and learning. The teaching for understanding (TFU) framework offers a fresh way of seeing the thinking and learning process in schools around the world.

Harvard University's " The Project Zero Classroom: Views on Understanding" symposium may have been the crown jewel of the five year collaborative effort funded by the Spencer Foundation. Two new books from that collaboration between classroom teachers and Harvard researchers were released at the symposium as well. Both books built on the foundation set in Lois Hetland's earlier work on teaching for understanding. Hetland's 1997 book was the first to present the framework springing from the collaboration rooted in the wisdom of teachers and researchers.

Then in 1998, Tina Blythe's *Teaching for understanding guidebook* offered a plain English work that makes the model more reader friendly to educators with little or no background in Project Zero research projects.

Also, it enables researchers to replicate the procedure. Her book provides an extended definition of teaching for understanding and a step by step presentation of each idea in the framework. Each chapter offers a reflection that can guide staff development sessions.

Martha Stone Wiske edited a compendium entitled *Teaching for understanding: Linking research with practice.* A companion to the Blythe book, this work includes an historical perspective for the teaching for understanding framework.

In this work, Vito Perrone wrote a chapter. He says this: " **renewed interest in teaching for understanding during this closing decade of the twentieth century is partly a reaction to the narrow skills-oriented curriculum that dominates schools as well as considerable evidence that large numbers of students are not receiving an education of power and consequence--one that allows them to be critical thinkers, problem posers, and problem solvers who are able to work through complexity, beyond the routine, and live productively in this rapidly changing world (in what is often referred to as the 'global economy').**"

Perrone argues that schooling in the United States has at best only given elite white males an education of power and consequence. But 21st century work places demand multitudes of workers who can learn, think and create (John Naisbitt's 21st century basic skills). Combine this demand with the national standards movement's call for all children to be well educated.

Perkins, in another chapter argues that a performance view of understanding leads to sound thinking and learning practice. In his extended definition of ' understanding,' he says understanding may best be thought of as "...the ability to think and act flexibly with what one knows." Moreso, he says, " because understanding performances ask the learners to stretch, they lead to advances in understanding as well as displays of understanding."

TFU belongs in a deeply restructured school. New wine belongs in a new wineskin.

Yet the literature says nothing about what happens in a teaching for understanding classroom when it is the instructional framework for elementary school children in science. Only three pieces about TFU appear in the ERIC database, for example, as of December 1998. All three are anecdotal. The literature says nothing about how children experience a TFU classroom. Even the research summarized in *Teaching for understanding: Linking research and practice* does not examine a TFU classroom from the view of elementary school students.

Also, to date, no inside view of TFU in an elementary school featuring a population of African American students has been recorded in the literature. Thus, one of the very populations Vito Perrone says has been left out of efforts to create an education of power and consequence, also, has been left out of systematic studies in this field.

METHODOLOGY

What happens in a classroom that fosters Harvard Project Zero's teaching for understanding classroom? That is the starter inquiry for this ethnographic study of African American fifth graders. The research problem has two concepts in need of definition: understanding and teaching for understanding framework.

In a keynote address, delivered at Harvard Project Zero's 1997 symposium MI/ND (multiple intelligences new directions), Howard Gardner defined understanding as the "transfer of knowledge to a new situation for which that knowledge is appropriate."

Teaching for understanding, then, gives children chances to show what they know--demonstrate their ability to transfer knowledge to new situations.

The teaching for understanding framework creates a way in which teachers are likely to answer the four basic questions Martha Wiske poses in her compendium.

She asks the following:

1. What topics are worth understanding?
2. What about them must students understand?
3. How can we foster understanding?
4. How can we tell what students understand?

The teaching for understanding framework has specific, though flexible, steps for its implementation.

Take for instance the title " African Americans in Space," a generative topic for a 5th grade class Black History Month project. Blythe asserts that a **generative topic** must connect with a teacher's interest, connect with children's interest and offer a lot of chances for all learners to become experts on a smaller topic generated from the larger whole. " African Americans in Space " fits the criteria. It generates multiple topics within its borders and connects with both teacher and student interests. It gives all learners a chance to become experts.

More specifically, Perkins and Blythe say the following in an *Educational Leadership* article entitled " Putting understanding up front": " In general we look for three features in a generative topic: centrality to the discipline, accessibility to students, and connectability to diverse topics inside and outside the discipline."

The " African Americans in Space " project seemed central to the field of space exploration. It seemed accessible to students. And it connected with other biographic material they had read: the story of Sally Ride; first woman astronaut; multiple news stories of John Glenn's historic mission; and articles about space science in the Harcourt Brace science program for 5th grade.

Throughlines are instructional ideas to nutshell what children must learn in their investigations. For example, these throughlines were for the " African Americans in Space " project.

- **Use what you know to find out what you want to know.**
- **Create clear, coherent texts that demonstrate understanding.**

These throughlines repeat over and over for the life of the project similar to the way August Wilson's fence gets repeated throughout his play " Fences." In fact the word throughline originated in the drama field. It means an idea that is repeated throughout the play. For example, the circle of life is repeated in the Broadway production of *The Lion King*. The throughlines in the "African Americans in Space" project come up again and again.

For Blythe, **Understanding Goals** spell out what the children are to learn. The project made use of goals stated in selected items in the Philadelphia Curriculum Framework.

1. Children will understand how to write as a means of generating ideas and questions for discussion and research. (Writing Standard #2)
2.Children will understand how to use writing, drawing and measuring as ways to communicate information to others. (Science standard #6)
3.Children will understand how to represent numbers verbally, concretely, and symbolically in order to operate with numbers and symbols, recognize relative magnitude of numbers, construct number meanings, estimate reasonableness of answers, and apply knowledge and understanding of these concepts in problem solving situations.(Mathematics Standard #1)

All activities and assessments in the TFU framework give children chances to show what they know and build new meanings. These are **Understanding Performances.** Understanding Performances include oral and written recitations as well as intellectual projects across Howard Gardner's eight intelligences in his multiple intelligences theory. (Note the eight intelligences are verbal linguistic, logical mathematical, musical, visual spatial, bodily kinesthetic, naturalistic, intrapersonal, and interpersonal.)

Works, what Jerome Bruner calls " oeuvres, " for the "African Americans in Space" project made use of several assessments to see what children understood about the biography of Mae Jemison, the first African American woman Astronaut. The assessments included a KWL learning log, a story map of the main idea and key details, a one paragraph summary of the book, an illustrative picture, dramatic recitation of a poem about Mae Jemison, a filmstrip about her life and dramatic skits drawn from the filmstrips, each an example of text. Each of these intellectual products (texts) gave children a chance to transfer knowledge to a new situation for which that knowledge was appropriate--to act and think flexibly with what they know.

Finally, **Ongoing Assessments** spell out the process of knowing what children know. On the one hand the assessment standard is made public and explicit in a rubric. Thus, the rubric makes public descriptions of the degree of quality in the understanding performances--intellectual products--children make to show what they know. On the other hand, each assessment helps them to build new understanding.

In the case of the "African Americans in Space project," children used the class, knowledge as design rubric for clear, coherent text to assess their own works as well as the works of fellow classmates. The teacher used the class rubric to give feedback on selected intellectual products, in addition. The whole class, then, entered continuous conversations about the meaning of clear, coherent text and Howard Gardner's definition of intelligence: " the capacity to solve problems and fashion intellectual products."

Harvard Project Zero's teaching for understanding framework, in summary, gives a way of thinking about the topics worth teaching and their relationship to deeper subject matter understanding. Yet, it remains to see what happens in a class fostering the TFU framework--one set up to provide an education of power and consequence. Ethnographic research provides a means of systematically exploring selected samples of classroom activity. It allows the researcher to sharpen questions as the inductive analysis unfolds. **Thus, this study describes what happens in a TFU classroom.**

More importantly, it tells a story about kids teaching kids.

PARTICIPANTS

Twenty-nine, African American 5th graders ranging from age 9 to 11 make up the target population. There are 16 girls and 13 boys in a class housed in the Starbase Earth, upper school, small learning community at an urban, public school. As defined by the school reading program, most children in the class are on level or nearly on level.

Grouping in mathematics proves more difficult because the mathematics program in use makes no hard distinctions among levels. Yet some indices of higher order, logical mathematical intelligence can be inferred from scores on the post test assessment of Mathematics in the Germantown Cluster. Accordingly, the distribution of scores was as follows: three scored advanced; ten scored proficient; eight scored partly proficient, seven scored basic, one did not take the test. In contrast only one child scored advanced in the pre test. 90% of the children participating in this study scored partly proficient or basic in the Germantown Cluster pre test. In summary the increased advanced and proficient scores indicate growth in terms of their ability to solve simple algebra word problems as represented in the pre and post tests.

In addition, the 4th Grade SAT 9 results suggest logical mathematical intelligence in the mathematics and science sub tests. Over half of the class scored basic or below. No child scored advanced. A similar result happened on the science measures of SAT 9 with no child scoring advanced. Results of the Pennsylvania Assessment of Mathematics for fifth grade are not available at the time of this writing.

When viewed from the perspective of Howard Gardner's multiple intelligences theory, however, each child has an intelligence profile that includes relatively high and low capacities in each of his eight intelligences. Moreso, unlike the notion of an unchanging IQ score, each of Gardner's intelligences can improve with coaching, parenting, experience, and teaching. Many of the intelligences in this class could not be indexed in standard tests. And few standard tests measure distributed intelligence—intelligence in books, internet, magazines, TV programs, movies, games, simulations, and other people.

The SAT 9, for example, fails to index a child's ability to access distributed intelligence when solving problems or fashioning intellectual products. The SAT 9 does have limitations. The intelligences available within and around children do not.

Also, it seems worth noting that a construct such as higher order, logical mathematical intelligences is hard to research, psychometrically, because it includes deductive and inductive reasoning, metacognition, open-ended problem solving, and linking operations to solve complex problems. Together these present formidable validity issues for most research designs.

Only Jerry Fluellen's " Footsteps: Story of how one child constructs higher order, logical mathematical intelligence, " a teacher research study, has been published to date in the ERIC database. It is the only work that examines higher order, logical mathematical intelligence in children from the perspective of multiple intelligences theory. But his work rests on the shoulders of many studies in the Piagetian view of logical mathematical intelligence and the even broader context of constructivism.

Though not specifically researched in this study, the construct must be highlighted because higher order, logical mathematical intelligences beats as the heart of this exploration of Harvard's teaching for understanding framework in a mathematics and science class. In Howard Gardner's original formulation of multiple intelligences theory (*Frames of mind,* 1983), he describes logical mathematical intelligence as both mathematics and science--like heads and tails of coin. The 29 children in this study worked both sides of the coin.

MATERIALS

Tina Blythe's *Teaching for understanding guide* organized all thematic projects and informed all activities and assessments. In addition, Howard Gardner's multiple intelligences theory--used in the service of teaching for understanding-- informed the design and/or selection of activities and assessments as well.

In addition, the researcher made frequent fieldnotes both contemporaneously and at night to capture observations and commentary on what was happening in a TFU classroom. Also, the researcher received advice from two books on ethnographic research and feedback from a professor and fellow Ph. D. students in a graduate seminar for naturalistic research at Temple University.

PROCEDURE

While the children have been involved in a class that fostered the TFU framework all along since 8 September 1998, the data collection period for this study began 1-24-99. That is the date of the first fieldnote entry and near the beginning of the "African Americans in Space" thematic project.

They had already been involved in two overlapping thematic projects.

1. " Starbase Earth: The Next 100 Years " a year long project based on the 5th grade Harcourt Brace science book as well as articles from *Scientific American, Scholastic News,* and *The Futurist.* The unit included current events such as the John Glenn space shuttle mission and launchings of the International Space Station.
2. "Intelligence: A 21st Century View," a six week science fair project to teach the scientific method including writing a research paper that cited at least two sources.

In between these projects and the final project, they took on Ian Wilmut's " Cloning for medicine " article in *Scientific American.* In addition, all along they had been making self-selected presentations (with an emphasis in science) and working on science fair projects.

"Radio meter," a class wide project to learn the scientific method while children prepared individual science fair projects, ran concurrently with individual science projects.

A final project took full attention 5 April 1999 in the form of " Math and Polymaths," which had, also, been the title of a Philadelphia Education Fund grant .

The final project, in effect, reorganized the instruction into a Y2K research project and a self-exploration project about identity. The "Beyond Y2K" project emphasized computer science, though it was truly interdisciplinary, crossing several standards in the Philadelphia Curriculum Framework, and most of Howard Gardner's eight intelligences.

As a generative topic, " Beyond Y2K " connected with other topics, fed student and teacher interests, and offered multiple opportunities to gain expertise. Each member of the class, for example, kept a file of articles and reflections about the Y2K problem.

" Who am I ," the high touch companion to "Beyond Y2K," emphasized stories, poetry and plays dealing with African American identity. Both projects began in the heat of this study in contrast to those that were already in place when the study took off.

Instructional time devoted to the projects throughout the data collection period had been about ten (10) hours a week; i.e. all the math, science, and English language arts time for the week.

That came to most of the contact hours children had with the researcher who also ran a multicultural drama club for them every Friday afternoon. All children in the class attended reading class with three other teachers while the researcher taught reading for a small group of underachieving children from other classes in the Small Learning Community for one and a half hours a day.

The children, in addition, had classes for written expression, computers, conflict resolution, anti-violence, and gym with other teachers.

In the case of the mathematics/science block, the researcher held responsibility for the instructional program and made use of Tina Blythe's view of Harvard Project Zero's teaching for understanding framework to plan each of the thematic projects.

After examining the whole set of fieldnotes of observations and coding them, four themes stood out:

1. Self-selected student presentations
2. Student work in cooperative learning groups
3. Student responses to games
4. Student responses to open-ended problems

Of these, **self-selected presentations** provided the richest set of fieldnotes. Next I looked at new sets of fieldnotes about self-selected presentations with an eye on discovering similarities and differences with my new set of fieldnotes focused on that one theme. I wrote brief memos about the similarities and differences between the episodes in the focused set. Finally, with a broader readership in mind, I wrote a draft of the ethnographic study. This is a work for other teachers and researchers interested in Harvard's teaching for understanding framework. People who want to know how TFU flies in an elementary school science class, in particular, are the intended readers.

Along the way of writing drafts of this study, I was still creating fieldnotes on the "Beyond Y2K" project. That gave me an opportunity to explore student involvement from the inception of a project. Also I could take advantage of what I had learned about ethnographic research. Thus, an inductive analysis of the Y2K final fifth grade project, while not included in this present draft, is in progress.

The "Beyond Y2K" and " Who am I? " projects surprised me. One started very slowly with only a few children fully engaged while the other began with a bang with every child fully engaged. I chose to explore the one with a whimper, the Y2K project. That also, ran true to the emerging focus on student involvement in science and the exclusion of mathematics, English language arts, and the arts.

The Y2K project itself offered another set of themes:

- strategies to increase student involvement
- student views of involvement

These themes emerged from the early days of the project, which began when children returned from Easter Vacation. New questions emerged in my mind:

1. What strategies increase student involvement?
2. What counts for involvement from children's perspectives?

The former question seems to be a spin off from this study, valuable to me as a teacher. The latter seems quite a fruitful line to explore as children become more knowledgeable about the Millennium Bomb, valuable to me as an ethnographer.

However, none of the explorations on Y2K are included in the findings of this study. Instead, resulting from a conference held with Professor Anita Pomerantz, it became clear to me that the focus of my findings should be methods children use to involve other children in their presentations. These are ten-year-old students without formal training in pedagogy. Much can be learned about what they do when they have responsibility for teaching. Much can be said about how kids teaching kids provides a deep alternative assessment of their understanding of science. In terms of TFU, each presentation is an understanding performance that offers chances for children to show what they know and build new understanding.

RESULTS

Self-selected presentations stood out as the theme for me to explore because students controlled the presentations. That gave me a chance to observe a fuller range of activities and take fieldnotes on the spot. In contrast, lessons I facilitated seldom provided time to write fieldnotes in the heat of thinking and learning activities.

It was during the last days of the study that I constructed the following thesis: **kids teach kids by using one of four strategies.**

The following entry began life as a fieldnote in my journal. It describes the presentation several boys made on the question: Is Michael Jordan the best basketball player ever to play in the NBA? They had worked as a team to prepare this presentation. One team member printed a 10-page set of information from the Internet. Another got information from a CD-ROM. Two others read newspaper articles and an article from *Jet* magazine. They had clipped pictures and pasted them on construction paper. They had store bought posters of Michael Jordan including one of him doing a finger roll and one of his world famous dunking pose captured in the sculpture outside the United Center in Chicago.

Even though the presentation began life as a writing assignment, I gave the team permission to present during the Friday morning science presentation times. The boys opened with the assigned question and then diverged into statistics and facts about Jordan's career in basketball. They made no attempt to connect evidence of greatness as inherent in their reams of facts. I pointed that out to them in the question answer session. They also fielded questions from their classmates.

During the presentation one boy in the audience put his hands over his ears as if to block out what he was hearing. Three other children did other things while the boys were talking. Two of these were girls who cut out hearts (perhaps for Valentines).

From the perspective of TFU, the presenters not only showed what they knew about Michael Jordan, they built new understanding both from doing the presentation and the questions their classmates asked them. I am reminded of Ellen Langer's view on mindfulness and will think about its relationship to teaching for understanding.

More to the point, the presentation demonstrated deep involvement with the subject on the part of presenters, but the method they chose was talking to the audience about a set of facts. It wasn't until the question and answer period that the audience became more alive.

On the first day of class, September 8, 1998, desks were arranged into four smaller learning communities. Each community had an eight by two array times four or 32 sets of desks and chairs evenly spaced. Now some six months later, the structure has changed. I had assigned close to an equal number of boys and girls for each community in September.

It's February, community one consists of all girls.

In January, community four girls split off from community four boys, creating two same sex communities. Recently, community four girls joined a splinter group of boys from communities two and three to form a mixed group. Communities two and three are also mixed groups.

The splinter group of boys and succeeding girls recently negotiated with me to be renamed community five.

At the point in which I wrote the fieldnotes about the 2-19 self-selected presentations, the class had five groups not so neatly arranged in a tight mathematical array although each community has clear boundaries from other ones.

I recall from graduate group dynamics coursework that groups change along the lines of three stages. First, a who-has-membership stage happens in which the group decides who belongs. Second, the group decides who has power. Then if the group becomes effective, it becomes a working group about the business of performing its task or mission. This is not a linear model because every time a member leaves or joins, the group renegotiates this process.

With the introduction of a new girl today the class (group) may struggle with issues of belonging all over again. That model may be something to watch for as the Friday self-selected presentations unfold.

Brad's team took the stage—the front of classroom, which also literally serves as a stage for our Friday afternoon drama club. They had placed several pictures and posters of Michael Jordan on one of the rectangular learning tables. Some of the pictures had text pasted beside them. This was to be a second presentation about Michael Jordan even though these times are primarily used for presentations dealing with science.

I had asked the audience to think about which of the eight intelligences the team would use and whether or not they presented clear, coherent text, the gist of the class wide assessment rubric. So the presentation had two parts:

1. an offering of ideas
2. feedback in the form of questions and ratings with the rubric
   for clear, coherent text

Brad introduced the presentation. He claimed that his team would prove that Michael Jordan was the greatest basketball player ever to play the game.

Brianna followed by reading an article that also commented on Jordan's early years and added a remark from Jack Ramsey who said Jordan may be the best ever. Then Tyrone read facts about Jordan's career in the pros as Anthony held up a picture of Jordan in action, shooting a jump shot. Leon read from another article about Jordan's retirement to play baseball and his subsequent return to basketball. His facts included three straight NBA championships that Jordan had led the Bulls to and summary facts of his career including nine scoring titles and MVP awards. Tyrone held up pictures from a book on MJ. Brad next presented MJ basketball cards as Brianna held up the cards for the audience to see. James read more facts about the last NBA finals of Jordan's career including his game winning jump shot to defeat the Utah Jazz in the sixth game of the seven game series.

Brad ended the presentation with a summary.

The team entertained observations from the audience, recognizing the hands of several other children.

Sakisha said they used art smarts because they showed pictures. Joey (the same boy who had put his hands over his ears as if to block out the Jordan presentation the week before) said they used people smarts. Juan added that they used sports smarts and Charlene thought they used nature smarts.

In round two of audience input Juan asked this: " Why did you write about Michael Jordan instead of President Clinton?" Brad replied, " We like MJ."

Brianna, a member of the presentation team, in response to no particular question, said, " He (Jordan) is not the best because the Globetrotters were (sic) the best."

The audience became more involved in both the listening and question periods. There were too many hands for the speakers to recognize during the time allotted for questions. While the team's method also was speaker to audience, they opened with an argument and attempted to back it up with facts.

On this same day, John presented his science fair project. He described how a scale works. At first his voice was so low those of us in the back of the room could barely hear him. I asked him to remember his drama training and speak from the diaphragm, sending his voice to the back.

He then clearly said his materials had been cups, a ruler and weights. (He used pencils for weights.)

Next he summarized his procedure, results and conclusion while he performed the experiment.

I had asked children in the audience to rate each presentation with a simpler version of our class rubric for clear coherent text. Using a 4 point scale, over a half dozen of the children John called on rated his talk between 4 and 4-. Several praised him for doing the experiment and having names from the scientific method we had been learning.

I said while his talk certainly showed that he knew a lot about making a scale, he missed a few key things that he could include when he gives this presentation in front of parents at the school wide science fair. His problem seemed to be how does the scale work? His hypothesis might have been this: heavier weights in one cup will make it go down lower than the other cup. Then his materials, procedure, results, conclusion, and new questions would follow. (These are the approved steps for a school science fair project.)

John seems to be well liked by other children in this class. They accept him as a bright, well-behaved child. He has close to all A's on the second report card, and his behavior grades were almost straight 1's on a 3-point scale.

Like the presentation before him, the method was speaker to audience. But his experiment with scales drew interest. Children moved their seats closer to see. His question and answer period was intense.

Sandra, Nyaila, and Sakisha did a presentation entitled " Scale to Size." These were paper shapes of the sun and the nine planets in our solar system. Nyaila measured each paper planet's distance from the sun as she taped them to the board. Sandra and Sakisha took turns talking about the planets. They gave basic facts such as name, position, and distance from the sun.

I noticed they placed Mars closest to the sun and Mercury third. Venus placed second. Earth was not in their solar system. Saturn was as large as the sun, and Jupiter was not only larger than the sun but a rectangular shape. I didn't see Pluto in their solar system. (Note that modern scientists are debating if Pluto qualifies as a planet. They are also having a tough time defining planet.)

Student peers said the presentation rated 4 or even 4 plus. They said they used math/science smart, people smart, and art smart to present.

Earlier in the week, I had read the class a Native American myth entitled "How Coyote Stole Fire." As I read, I had several children do a creative dramatics exercise called *body sculpting*. Sets of children pantomimed key events in the myth.

Afterwards, I solicited what they thought were key events and wrote them in eight frames on a chart paper taped to the front blackboard. I drew a picture for the sentence in the first frame, which read "Coyote took pity on the cold humans. They needed a bit of summer." The class divided into teams ranging from two to five members. Four children worked alone. Working in teams or individually, each child created a television storyboard (text and pictures for each frame) for the myth. A set of children who had completed writer's conferences with me about their boards formed a new team to decide how to act out a storyboard in front of the class.

They staged their skit.

100% of the children were engaged in this activity. Each child took a turn in the body sculpting exercise. Teams created storyboards with clear, coherent text. Several children became actors while others acted as audience.

I wonder if using arts in a science class offers a method of involving every member of the audience? I wonder if high involvement correlates in a way with high achievement defined in terms of understanding performance and ongoing assessment?

I saw this same kind of involvement when I opened the multiplication lesson with my Farmer Joe's story.

"Farmer Joe didn't do much farming these days. In fact, his favorite activity was fishing. Each day he would go to his pond to fish. One day he noticed a lily pod on the pond.

The next day, he saw two pods. The next day he saw four pods, then eight, 16, 32, 64, 128...by the 28^{th} day pods covered half his pond.

On what day was the entire pond covered?"

I told them I had prizes for the individual or team who found the answer and could explain the process for finding the answer.

Through three rounds, children worked to find a solution to this closed ended problem.

In the third round Andre said " 29."

To that I replied "Gong! Gong! Gong! We have a winner in the house." Then I interviewed Andre as if I was a TV talk show host.

" Tell me, Sir, how did you find the right answer?"

" I don't know," said Andre.

" Is there anyone in the house who can explain why the 29th day is right?"

Miguel said, "The pods are doubling every day. So if half the pods cover the pond in 28 days, the whole pond had pods on the 29th day."

" Gong! We have another winner."

All the children had been engaged throughout the three rounds. Their answers had ranged from 8 days to 3,000, and they seemed to enjoy my praise of the thinking that seemed to go on behind their mistakes. I gave each of them a piece of candy and wrote a T (for thinker) beside Andre's and Miguel's names on the plus side of the Self-Manager's List for the day.

Then I challenged them to tell the story to their parents and warned them not to say the name of the story until after their parents tried to answer. " The 29th Day " gives itself away.

High audience participation had also characterized their work on cloning as a big idea in science. The children had finished my coaching and modeling sessions for the critical thinking report about Ian Wilmut's " Cloning for Medicine " article in a recent issue of *Scientific American*. After I walked them through the first four questions of the seven knowledge as design questions I had written about the article, they worked in teams of two to five, to design answers to questions three and four. We had already worked on questions one and two during previous sessions.

In the first session I wrote the lead question on chart paper and asked different children to tell what that question asked them to write.

" According to Ian Wilmut in the ' Cloning for Medicine ' article in *Scientific American* what is the purpose of cloning?"

Using a Socratic method, I asked children to tell what **cloning** meant according to Ian Wilmut .

Then I asked them to recall what **purpose** meant in David Perkins's Knowledge As Design method of critical thinking.

Last, I modeled a sentence frame on the chart paper—one that would answer the question and make use of the Strunk and White rule we had worked on all year: "Write with nouns and verbs."

I wrote, "Ian Wilmut says the purpose of cloning is______________________."

They had to copy my sentence and finish it with their understanding of cloning. I wanted them to transfer what they knew about cloning to a situation for which that knowledge was appropriate.

In session two, I led them through a Socratic discussion of the second question: "What were the key ideas about cloning?"

The model sentence starter was this:
"One key idea about cloning was ___________________."

In session three, after a review of what we did for the first two questions, they tackled three and four: "What is the same between cloning humans and animals? What might be different?" Also, "What new questions about cloning do you have?" Advanced groups also answered questions five, six and seven. These were more philosophical. For example, "Why should human beings be cloned? Why should human beings not be cloned?" About half of the groups reached the advanced level questions.

They turned in drafts (3-22-99), and I assessed them with the knowledge as design rubric for clear, coherent text. 100% of the children submitted neatly written drafts with a cover. One child word-processed his draft. All of the children had taken on the standard of four critical thinking questions. Many answered all seven.

But the presentation Nyaila's team made generated the same kind of enthusiasm and excitement as mine did. They used a speaker to audience format with lots of visual aids and high interest in the topic they presented. The other children caught the presenter's fever.

The next two sessions of student self-selected presentations featured science fair projects. These included works from an in-depth reading of Guy Bluford's biography (building on the article they read earlier about Bluford) as well as the book they read about Mae Jemison. In the case of the science fair presentations, about one third of the class presented. In the case of the Bluford timelines and TV storyboards, 100% of the class presented, including a special session featuring original student poetry. The latter session had been the first time that all 29 of the children became kids teaching kids.

Angeline opened the next Friday morning, self-selected presentation session to find its way into my fieldnotes. She told a story about Mae Jemison. It was an original piece of fiction drawn from the biography we had read about this first African American woman Astronaut to serve on a space shuttle mission.

Feedback from the audience included these comments:

"She used art smart and word smart " (visual spatial and verbal linguistic intelligences).

" She used word smart as a writer and self smart " (verbal linguistic and intrapersonal intelligences).

" She didn't use anything. I couldn't hear her. She didn't speak up." (This comment came before the criticism round.)

The first round of feedback featured comments other children made about the intelligences the presenter had used. But the second round allowed for pro and con questions. Sandra, for example, asked, " Why did you write more about Mae than Guy?" To that Angeline replied, " I know more."

Then, Renita commented, " She (Angeline) had more research about Mae and less about Guy."

Brianna and Charlene took the stage next to present a talk about the solar system. The class had completed the first section of " Starbase Earth," one of five themes in their Harcourt Brace science text. So everyone had background about space science.

Brianna showed a picture of our solar system with Mae Jemison and Guy Bluford as children looking up into the night sky. Charlene showed a picture of Mae as an adult. Brianna then read facts about Venus, Mars, Jupiter, and Saturn. Then she showed a picture of the solar system as she and Charlene alternated telling the distances of each planet (except Earth) from the sun. They also told the length of each planet's year in Earth time.

Their presentation continued when Charlene announced that they had made a KWL learning log about Mae and Guy. They reported what they know, what they want to know (questions), and what they learned about these two astronauts.

All along the other children paid attention. No one was making paper-cut-outs or having sidebar conversations. Then, unlike anything I had seen my seven years of teaching elementary school, the energy level in the room rose as if summer had come suddenly to that chilly Friday in March. Charlene and Brianna had prepared several questions about solar systems. Since 8 September 1998, the first day of class, I had been teaching children to use David Perkins' knowledge as design method of critical thinking. The method allows a thinker to make an unlimited number of questions (and, therefore, answers) within the framework of purpose, structure, model case, and argument.

The girls offered classmates shiny new pennies for right answers to their questions. Every hand in the room, except mine, went up.

" What is the closest planet to the sun?"

" How many planets are in our solar system?"

" Is Jupiter bigger than Saturn?"

" Can you live on Uranus?"

" What color is the Earth from outer space?"

" How cold does it get on Venus?"

As the questions went on, it became clear that the girls would not have time to call on everyone. At that time 31 children filled the official roll. Some children put their hands down and faded from participating.

The girls said "...and now the bonus question. Who was the first white man in space? Most respondents thought it was John Glenn. We had invited the whole upper grade, small learning community to join us in the auditorium to watch Glenn's historic NASA mission last fall.

Brianna and Charlene said, "You all did very well on the questions. But the answer to the bonus was Alan Shepherd."

Feedback had to be cut short because it was time for the reading class.

James did have time to tell the girls they used word, picture, science, self and people smarts in their presentation.

A few weeks later, I made fieldnotes on another self-selected presentation session. This featured individual science fair projects.

Juan's " Making a thermometer " project used most of the steps to the scientific method I had been teaching. He stated his problem, gave a hypothesis, listed his materials and procedure, and offered a conclusion. He had forgotten to end with a "new questions " section. He had word-processed his presentation and put it on a science fair board. He included a picture of the experiment he did with the homemade thermometer in two conditions: hot water, cold water.

He said he did the experiment several times, and it didn't work. He started to give up and do a different one. Then he tried a few more times, and it worked. Eleven children gave Juan feedback in two rounds:

1. What did you like? (a positive frame for giving praise)
2. What questions do you have? (a positive frame for citing problems)

I missed the commentary in my fieldnotes.

Mrs. Luvridge, our principal, walked into the room and heard Juan retell his presentation. She loved his presentation and science fair board and selected the work to represent P. S. Joseph School at the Cluster-wide display at Germantown High School.

A team of girls presented next: Justine, Emma, Nyaila, Sakisha and Darlene. They passed out sheets of paper with the name of each child in the class on one sheet per child. Emma then said to the class, " Draw what you see." Then she gave the hypothesis, materials, and procedure. But they added the titles " observation " and " objects " as terms for the scientific method. Their presentation had something to do with colors, but I couldn't figure out what science problem they had selected. There were a lot of bright shapes on their science board. They created a lot of enthusiasm, but not much science. They gave opinions where observations were called for and observations where inferences belonged.

The other children during the feedback session raised more questions about the confusion they saw in the presentation. Only a few told what they liked. I said, "Now let's give the team some feedback. Tell them what you liked about their presentation. For example, I liked the way they passed out observation sheets, kind of science logs, for us to use during their experiment." No child had anything to say about what he or she liked. We moved to the question stage of feedback. Several hands went up.

All assessments demonstrated the children's understanding and misunderstanding of science. Later in the year, these same girls put together one of two science fair projects to represent 5th graders at Joseph School for the Cluster-wide display.

Next, Brad, Leon and James did a skit with text and pictures for key events in Guy Bluford's life. This surprised me because they based their skit on a TV storyboard. I had only taught the TV storyboard idea one time with " Coyote stole fire", the Native American myth. I had planned to do the TV storyboard with the biography of Guy Bluford but that would be a few weeks from this Friday's session. They had based their skit on the article we had read about Bluford.

The class seemed to like the skit. It drew praise and positive questions. Nine children gave feedback.

It is now mid April.

The final fifth grade projects have begun: " Beyond Y2K " and " Who am I? ". The final self-selected presentation for this paper is ready for both fieldnotes and audio tape recording. I missed dialogs by taking fieldnotes while facilitating self-selected presentations. I decided to try recording.

Julie, Charlene, Brianna, and Sara took the stage first. They had organized ten children, each of whom held a large piece of manila construction paper with a letter. All together they spelled GUY BLUFORD. The girls had a saying for each letter in their acrostic poem. The girls took turns reciting ideas about space and Bluford as each child in front of the class held up his or her paper in turn. Their presentation left the other two-thirds of the class clapping when the poem was over. So many presentations were scheduled that I cut the usual two part feedback sessions. Children told what they liked and we moved on.

During this two-hour block of presentations, several teams presented timelines of Guy Bluford. Two teams presented TV storyboards about Bluford. One girl presented a diorama she made for Langston's Hughes' " Mother to Son." Two other girls recited original poetry. Only the Bluford timelines and storyboards, however, had science content.

Most captivating among these was the same team who came up with the acrostic poem. They combined a TV story and timeline. And they recruited a boy to play the role of Guy. What follows is a transcription of the storyboard part of their presentation.

Teacher

...16 April 1999. Joseph School. Math and Polymaths grant for the Philadelphia Education Fund. Self-selected presentations. Today we have timelines of Guy Blulford, two TV story boards and a set of poems...13 presentations in all.

Student (girl)
"Wow a plane!"
Student (girl)
"Guy you're not college...You're not going to college."
Student (girl)
"Guy, what would you like to be when you grow up?"
Student (boy)
"I would like to be an aerospace engineer."
Student (girl)
"Guy's counselor told him, 'Guy you will not go to college.' " (Inaudible lines follow.)
Student (boy)
They said, "I will not go to college."
Student (girl)
(Inaudible lines follow.) "Guy went into space."
Student (boy)
"Wow! I can see my house from here!"
Student (girl)
"This is our timeline."

Then the girls alternated giving facts about Guy Bluford's life as organized in their timeline. Lastly, they brought to the stage the ten children holding the construction paper posters for the acrostic poem mentioned earlier. All three of their presentations drew loud applause from other students.

While the common denominator had been student self-selected presentations, stark differences between the methods individual and team presenters used to involve their audience stood out. At least four types seemed to describe the differences:

1. speaker to audience plus feedback
2. speaker to audience plus questions to audience plus feedback
3. speaker to audience plus activity for audience plus feedback
4. enactment to audience plus feedback

In each of these types, children were able to engage the audience or not engage the audience. For example, the two Michael Jordan presentations were speaker to audience. One engaged the audience fully; the other did not. The one that drew high attention, began with an argument that Michael Jordan was the best basketball player ever to play the game. The team set out to prove their point with facts and entertained opposing views during the feedback session. The other team talked mostly to themselves, though they had a lot of information and pictures about Jordan. Their talk generated few questions and no opposition.

Speaker to audience plus activity plus feedback drew yen and yang responses as well. One group made pre named science logs for each member of the class and made an effort to draw them into their experiment on how to make colors. Their downfall came in not thinking clearly about the science of what they were doing. They had duplicated a project listed in a science fair book without understanding basic ideas like red and blue make purple. In contrast, another team of girls gave a presentation that included designed questions and prizes for the audience. More importantly, they understood a lot of the science behind their presentation and their audience " raised the roof " in response.

However, kids seemed to learn in both the cases of effective and ineffective presentations. From the perspective of TFU there are no bad understanding performances because each one shows what kids know and builds new understanding.

CONCLUSION

What strategies might increase kids ability to teach kids? That is one question that most stands out to me, and it seems to be one implication emerging from the findings.

Beneath that question is the assumption that in a classroom using the Harvard University Project Zero teaching for understanding framework it is valuable to have kids teach each other as a regular feature of understanding performances. Within the TFU context what better way to see how students show what they know and build new understandings than to have them in the position of presenter. Not only does this bring to mind Paulo Friere's notion of liberating and empowering the learner, it down right makes sense as an assessment of understanding. The teacher sees both what the presenter and audience understands about the subject and is in position to confront misunderstandings in teachable moments during feedback sessions. The children show what they know and build new understanding.

More to the point, in a science or mathematics class that fosters teaching for understanding, mindful, depth of coverage replaces rapid, mindless coverage; thematic units and projects replace fragmented lessons. The payoff for students is that they become experts on selected topics and engage a range of intelligences and subjects to understand that topic. As little experts, they are in position to present their ideas to others.

Then, from the perspective of the teacher, the content and method of the each self-selected presentations as well as audience involvement in relationship to the method become fodder for assessments of understanding. This busy way of viewing self-selected presentations gives ongoing assessments at both the process and product levels.

New research might explore ways teachers construct TFU classrooms to promote the practice of kids teaching kids as understanding performances. The set of new questions might include the following:

1. What counts for involvement from the point of view of children?
2. How do children see their minds working (in Jerome Bruner's terms)?
3. And most importantly, What strategies increase student involvement, including opportunities for children to teach children?

Finally, if extended to Howard Gardner's ideas in *Disciplined Mind,* finding ways for kids to teach kids is an intervention within Gardner's larger context of having them search for ideas about *truth, beauty and goodness* in selected projects such as evolution, Mozart's *Marriage of Figaro,* and the Holocaust. Indeed, such a classroom empowers. Every one becomes a member of the global community of learners and teachers.

It is as the African proverb says: " One who learns, teaches."

FURTHER READING

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COMMENTS

In keeping with the teaching for understanding framework, the staff of Smile of Africa invites you to send your reflective comments to us.

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