



Spring 2006

## Making Schools Safer Places: Teachers Share Insights on Cool Tools

by Christine Ong

Students deserve safe schools. Yet school safety is much more than metal detectors and armed guards. Creating a safe school environment begins with teaching children how to resolve conflicts and express their emotions in a constructive manner. For the past eight years, teachers, administrators, students and parents at UCLA's Corinne A. Seeds University Elementary School (UES) have been developing and using Cool Tools, a safe school system that promotes a physically secure and emotionally nurturing environment for all members of the school community. The system was developed by UES Health Educator Ava de la Sota in collaboration with UCLA Psychology Professor Jaana Juvonen and UES faculty. It was designed to provide elementary school students, parents, and teachers with tools to resolve conflicts and a common language in which to discuss them.

As a means to begin understanding the effects of Cool Tools on a school community, I worked with de la Sota in the 2002-2003 and 2003-2004 school years to document the process of introducing Cool Tools in a Southern California public school. In this article, I provide insights into the ways in which teachers at the school use Cool Tools, their perceptions about the program and its implementation, and the role they believe the program plays in making their school and classrooms safer.

### What is Cool Tools?

Cool Tools was first introduced into the UES community in 1997. Since then, it has been adopted in 20 schools in the greater Los Angeles area. There are three main components to the program:

- A set of guidelines and expected behaviors for the school community—posters listing the guidelines and behaviors are prominently displayed throughout the school

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## A Work of Goodness: When a Simple Vote Reveals Children's Representational Ideas and the Classroom That Helped Produce Them

by Joshua Danish

The students spend several minutes making representations of a leaf when 5-year-old Lynn\* places a long block along the ground. This prompts objections from Robert and Jackson. Robert argues that Lynn is building a balance beam instead of a leaf, which is what they were supposed to be making out of blocks. Jackson argues that Lynn's leaf is too close to the one he is building. After a brief argument, 7-year-old Michael addresses the entire group, saying, "Raise your hand if you think that it's just a work of goodness..." Michael and Sara both raise their hands before Michael concludes, "...and not a leaf." Lynn also raises her hand, voting that her own placement of wooden blocks is in fact not a leaf. Jackson quickly votes as well, followed a moment later by Caitlynn. Robert doesn't raise his hand. "That means it's not a leaf," concludes Michael. After summarizing the results of this vote (the blocks are not a representation of a leaf) Michael reassures Lynn that what she made is in fact a "work of art". Michael then asks what kind of leaves the other students are making and suggests the students, including himself, all admit their leaves

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\* Note: The names of all students and teachers in this article are pseudonyms.

## CONNECT and UES are Developing Web Based “Explorer” for Sharing Science Teaching

Teachers and researchers at UES and CONNECT have received support from the National Science Foundation to develop a web based tool for helping elementary educators teach science for deep conceptual understanding, CONNECT Director Frederick Erickson and UES Principal Donna Elder announced recently. The project, the Classroom Ecosystem Explorer (or CEE), has been developing at UES over the past five years. The NSF grant of \$340,000 will enable the team to build a prototype that can be tested with teachers from the Los Angeles area. “What is especially exciting about this project,” Erickson said, “is that it represents the potential for communicating to the wider world about the kind of teaching and learning that take place throughout UES.”

The project began in the Early Childhood classrooms of teachers Lisa Rosenthal Schaeffer, Doris Levy and Alejandra Rivera, who “wanted to tell the story of what happens in these classrooms that promotes higher level thinking, deep understanding of concepts and engaged learners,” Schaeffer said.

Together with Erickson and other researchers, the teachers spent months looking at their program and “articulating what we do behind the scenes to create life in the classroom,” Schaeffer said. “As we talked and looked at videos of what took place in our classroom, we saw that it was a life, an ecosystem with interconnected elements, rather than a linear process. It was clear it was a system at work.”

Multimedia offered the best way to show these complexities. From the start the goal was to convey

that what happens in the classrooms is not simply a set of projects or activities to be copied one by one, but an approach to teaching science for young children with the goal of promoting high level thinking and inquiry. The plan for the CEE is to show in rich detail how teachers at UES put these ideas into teaching practice.

“What is distinctive about the teaching portrayed is that firsthand experiences are followed up thoroughly by discussion and reflection, which is in turn followed up by student work that is diagnostic of their understanding of the scientific principles involved in the firsthand experiences,” Erickson said.

For example, in a study of how plants reproduce, children might make clay models of the parts of a flower. If a child creates a model that does not include stamens, it is a clue to the teacher that the child may not adequately understand the function of the stamen in plant reproduction. This provides an opportunity for the teacher to check the child’s understanding through discussion of the model with the child. If necessary, such a discussion can then be followed by re-teaching.

One of the special features of the CEE, Erickson added, is that it will include video “shot in ways that effectively illustrate the concepts/instructional strategies they are intended to portray.” They are long enough to show aspects of instruction thoroughly but not so long as to bore the viewer. The video is edited with freeze frames and voiceover discussion, includes replay features, and is accompanied by scaffolding text to help the viewer learn how to see and understand what the video clip represents. This is especially important, he said, because although many people have experience observing classrooms, it is a difficult process to understand how to see all the complexities and subtleties there.

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- A procedure for mediating conflicts that involves using a “Sort It Out” form
- A unique set of concrete objects (see Table 1) that serve as “tools” for deflating conflict
- A common language and set of cue words related to the tools that everyone (adults and students) in the school recognize and use and parents are encouraged to use with their children at home

Students’ use of problem solving and communication skills is key to the system. First, students are encouraged to verbally express their feelings and their point of view with peers as well as adults. Cool Tools also encourages students to think metaphorically, learn challenging concepts, and use more sophisticated language. To teach these skills, de la Sota has assembled a “toolbox” filled with props related to the strategies themselves. Such props create tangible connections or visual metaphors for what may be otherwise abstract concepts and values such as integrity, self-reliance, and responsibility. Table 1 lists the tools that are included in the toolbox and their uses.

## Methods

This article is based on research I conducted at a school that I will call Monroe Elementary. Cool Tools was introduced to Monroe during the 2002-03 school year. During that year, teachers, parents, and staff were trained in using Cool Tools and provided with all the materials necessary to implement the system. De la Sota led weekly teacher trainings on how

to use the Cool Tools language and props. The following year she conducted a training session at Monroe to refresh teachers about the tools and program language. As part of a larger study of the implementation process of Cool Tools at various sites, I collected data at Monroe for two years using a variety of data sources, including observations of training sessions, interviews with administrative personnel, focus groups with teachers and parents, and surveys of teachers. Since this article focuses on teachers’ use of and perceptions of Cool Tools, I am limiting my analysis to data collected with Monroe teachers.

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**Table 1. Tools From the Cool Tools System and Their Uses\***

Concrete Object	Concept/Skills	Cues to Use Tools	Corresponding Values
Toolbox	Handling Conflict	“What tools in the toolbox can help you handle the conflict?”	Self-Reliance
Bubbles / Bubble Wand	Personal Space	“How can you situate yourself to anticipate and avoid conflict whenever possible?”	Consideration
Foam Dice	Communication	“How can you communicate to prevent conflict?” (Put-ups vs. Put-downs)	Kindness
Inflatable Microphone	Choice of Voice	“Are you using ‘I’ statements?”	Integrity
Kaleidoscopes	Compromise / Consideration of Different Points of View	“When would using ‘We’ statements help resolve the conflict?”	Empathy Fairness
Inflatable Feet	Closed Door Exit	“What do you do when the conflict heats up and the chance of compromise goes down?”	Self-Respect
Ice Cube Trays	Coping	“After you exit the conflict, can you find ways to calm down and cope with your feelings?”	Patience
Toothpaste	Cleaning Up Communication	“Are there words that need to be cleaned up in order to repair hurt feelings?”	Responsibility
<i>Big Mistakes Eraser</i>	Compassion	“Once the conflict is resolved, can you forgive and move on?”	Forgiveness
Plastic Mazes	Critical Thinking	“What choices can I make to help resolve different types of conflicts?”	Determination Perseverance

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### Monroe Elementary

Monroe Elementary School is located in a middle to upper-middle class neighborhood in Sunnyvale, a beach community in the greater Los Angeles metropolitan area. Although a majority (70%) of Monroe's students are white, minority students make up almost a third of the student population, including 14% Latino, 9% African American, and 7% Asian. Among the total student population, 9% are English learners and 13% receive free or reduced lunch.

Cool Tools was introduced to the Monroe community in 2002-2003. Faculty, staff and parents were offered extensive training in use of the system. The following school year, important changes occurred at Monroe that may have influenced Cool Tools' implementation. Specifically, there were four new teachers at Monroe as well as a new assistant principal. In addition, during Year 2, the amount of time devoted to Cool Tools in faculty meetings decreased considerably as implementation was already underway. De la Sota made only two visits to the school—for a Cool Tools “re-tooling” at the beginning of the school year and an additional training session during the winter.

### Teacher surveys

Teachers were surveyed about their perceptions and experiences using Cool Tools. Monroe teachers (including a small number of resource teachers and counselors) were surveyed three times over the first two years of implementation—in the late Fall, 2002 (n=39), Spring 2003 (n=39), and again in the Winter of 2004 (n=34). The first survey took place shortly after introducing Cool Tools to Monroe faculty in Fall 2002. The second survey took place near the end of that school year, in Spring 2003. The final survey took place in the second year of implementation, in Winter 2004. Teachers were given approximately 10 to 15 minutes to complete the anonymous survey at the beginning of faculty training sessions. Teachers were surveyed on their own use of Cool Tools props and language when mediating conflicts as well as their perceptions of Cool Tools as a school-wide safety system.

### Teacher focus group

In addition to these methods, a focus group comprised of Monroe teachers and teaching assistants was conducted in the spring of both school years. The first focus group

consisted of six teachers (representing grades K- 5) and four teaching assistants. The second focus group consisted of five teachers (representing grades K-5). The purpose for the focus groups was to gain a better understanding of how faculty and staff (teachers and teaching assistants) felt about the Cool Tools program, the types of tools they were using in their practice, and challenges they may have encountered in implementing the program in their classrooms.

## Findings

### Teachers Using Cool Tools

An important aspect of this work was to examine whether and how teachers were using Cool Tools. As with most school programs, Cool Tools can only have an impact on students if it is used. Teachers are particularly important players since they must introduce the tools to students, use them when conflicts arise in the classroom, and encourage students to use the tools to resolve their conflicts in and outside the classroom.

Results from the Fall 2002 survey indicate that by early November an overwhelming majority of Monroe teachers had used at least some of the Cool Tools in their classrooms. This is interesting, as Monroe teachers had only been introduced to Cool Tools at the beginning of the 2002-2003 school year. This suggests that they were quick to adopt the tools. By the spring of the school year when the second survey was administered again, teachers' use of tools remained relatively unchanged and in some cases increased. Table 2 compares the percentage of teachers reporting their use of tools in the Fall 2002 survey and the Spring 2002 survey.

One factor that may have contributed to a large number of teachers using the tools was that administrators highly encouraged all teachers to implement Cool Tools in their classrooms. All the teachers reported using at least some Cool Tools in their practice, and a small number (n=3) said that they used Cool Tools constantly. A kindergarten teacher wrote, “We use Cool Tools from the moment the kids enter the room to the friendship circle at the end of the day when we go around and give put-ups to people.”

As seen in Table 2, the most frequent tools or cues teachers reported using included: “That’s not OK” (90%), Nice dice (90%), and “I felt” statements (82%). (See Table 1 for explanations of these tools). Interestingly, the most commonly used tools continued to be popular at the end of the school year when the spring survey was conducted, indicat-

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ing that teachers may have found these particularly useful.

The first-year surveys also asked teachers to rate how important Cool Tools was at Monroe or for the school community. Table 3 shows that a majority of teachers described the program as “very important” (on both fall and spring surveys). Although there was a drop in the percentage of teachers who characterized Cool Tools as very important from the fall survey (79%) to the spring survey (69%), this does not necessarily indicate that interest in the program was waning. Such a drop is perhaps to be expected as teachers’ initial enthusiasm and excitement about a given program is replaced with familiarity as time progresses. It is also interesting to note that Cool Tools was not the only new curricular initiative introduced at Monroe during the 2002-2003 school year. During a focus group, teachers expressed some frustration at not having more time to simply talk about issues or problems at Monroe during faculty meetings, including those directly related to Cool Tools (i.e., recent bullying incidents), rather than the new curricula.

The survey administered in Winter 2003 attempted to provide a better understanding of the impact of Cool Tools on the school. Table 4 includes teacher responses to survey questions specifically dealing with teachers’ use of Cool Tools and their perceptions of how it was functioning at their school. As can be seen, most teachers indicated using Cool Tools language “often” in the classroom. However, most teachers reported using Sort It Out forms rarely or never. This seems to be a drop from the 46% of teachers who indicated using Sort It Out Forms at the end of the first year in

**Table 3. Teachers’ Perceptions of Cool Tools’ Importance at Monroe**

	Fall 2002 (n=39)	Spring 2003 (n=39)
Very important	79%	69%
Somewhat important	5%	18%
OK	8%	8%
Not important	0%	0%
Did not answer	8%	5%

**Table 2. Percentage of Teachers Who Reported Using Cool Tools Components in Fall 2002 & Spring 2003**

Cool Tools Components	Percentage	
	Fall 2002 (n=39)	Spring 2003 (n=39)
That’s not OK	90	90
Nice dice/ 5 put-ups to repair	90	77
“I felt” statements	82	82
Integrity statement	72	67
Microphone voice	60	60
Kaleidoscopes/multiple points of view	60	56
Exit strategies	54	85
Bubble of space	33	49
“We can” statements/compromise	31	41
Toothpaste challenge	21	18
Teachable moments	*	60
Cool down strategies	*	74
Sort It Out forms	*	46

Note: \* indicates tools were introduced after the fall survey was administered

Spring 2003 (see Table 2). However, responses to questions about the impact on the school seem to be quite favorable. Most teachers agreed that Cool Tools has had a positive impact on the school climate and has made the school a safer place. Conversely, teachers disagreed or disagreed strongly with the statement, “There has been *no* change in student behavior since Cool Tools started.”

### Teacher Perceptions of Students’ Use of Cool Tools

In Year 2, teachers also were asked to answer questions and speak about their perceptions regarding students’ use of Cool Tools. Table 5 shows responses to questions related to student use of Cool Tools in the Winter 2003 survey. It indicates that almost all teachers reported they had heard their students using Cool Tools language often.

Some teachers commented that students had become more sensitive and able to recognize put-downs:

*My kids are very aware of what a put-down is. They point it out in stories, etc.*

*Each time I read (the word) ‘stupid,’ the kids gasp... [It’s] a lot closer to the surface than it was before.*

However, teachers also talked of students using put-ups and/or put-downs in unexpected and undesirable ways.

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For example, a teacher attending the focus group described her third graders as “obsessed” with put-downs. Students chased each other on the playground demanding put-ups to repair put-downs. Others spoke of students being ridiculed when asking for put-ups. More importantly, teachers said that students seemed to have difficulty in knowing how to give a real put-up. Teachers reported that students struggled to give meaningful put-ups that went beyond superficial compliments, such as, “I like your shirt”. (This may not be a fault of the program but rather an indication of how much it is needed.)

When asked what worked least well, focus group participants discussed some students’ difficulty in exiting a situation or achieving a sense of resolution. The following is an excerpt from this discussion:

**Teacher 1** – *I think the walking away, because it’s very difficult for kids to just say how they feel and walk away. They want a resolution right away and they still come to me and say, ‘I walked away but she was still teasing me...’ It’s very hard to teach that to students. I think that’s been the most difficult.*

**Teacher 2** – *Yes, same type of thing because they have walked away and they have used their Cool Tools and they tried a different tool, but then they still feel compelled to get that person to apologize and to say they were sorry. And until they get that, they won’t let it go. And they’ll say, ‘they wouldn’t give me 5 put-ups’. We try to talk about how some people aren’t ready to be nice, some people aren’t ready to admit their mistakes. And that’s so hard for them because, they’re like ‘but why?’ They need that and so it’s just really hard to get through to them that kids sometimes aren’t ready to be that nice person. And maybe they’ll come along tomorrow but today they aren’t ready. It’s hard.*

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**Table 4. Teachers’ Self Reports of Use and Perceptions of Cool Tools at Monroe, Winter 2003 (n= 32)**

	Did Not Answer	Never	Rarely	Often	Almost Always
I use Cool Tools language during classroom time	6%	0%	19%	59%	16%
I use Sort It Out forms with my students	0%	25%	37%	25%	13%

  

	Did Not Answer	Strongly Disagree	Disagree	Agree	Strongly Agree
Cool Tools has made our school a safer place for kids to learn	12%	0%	6%	66%	16%
Cool Tools has helped to improve school climate	9%	0%	3%	69%	19%
There has been no change in student behavior since Cool Tools started	9%	13%	69%	9%	0%
Conflicts are handled more effectively since Cool Tools was introduced	10%	0%	9%	72%	9%

**Table 5. Teacher Responses Regarding Student Tool Use in Winter 2003 Survey**

	Never	Rarely	Often	Almost Always
I observe my students using Cool Tools language*	6%	28%	60%	0%
Students use Cool Tools language and strategies to resolve conflicts with their peers	3%	28%	66%	3%
Students use “I” statements when talking about conflicts	0%	25%	63%	12%
Students are able to explain in their own way why certain behaviors are not OK at school	0%	9%	44%	47%
Students are able to say what they should do in a conflict, even if they are not necessarily able to act on it	0%	6%	53%	41%

\* Two teachers did not answer this question

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In addition, a majority of teachers (n= 20, 63%) responded that students often used “I statements” when talking about conflicts; more than 10% (n=4) reported that students almost always used such statements. When focus group teachers were asked what related to Cool Tools had worked best, a first-grade teacher responded:

*I think it's the 'I statements' that kids start their conversations with, that tends to diffuse a lot. Whether it's in the classroom or when I'm on yard duty. It's just this common language. Have you spoken to the other person doesn't mean have you gone and accused them. It means, going and telling them how you feel about what they've done. They know that, they do it without prompting.*

Interestingly, most teachers seemed to think that students were often or almost always able to explain why certain behaviors were “not OK” at school or what they should do in a conflict (n=29, 91%; n=30, 94% respectively).

When asked whether Cool Tools had influenced student behaviors, teachers most commonly cited how students were now able to use a common language to solve conflicts (36%). Seven teachers (22%) responded that students were more aware of put-downs and were more tolerant of others. Similarly, six teachers (19%) wrote of how students were more empowered and better able to handle conflicts. It is important to note, however, that Cool Tools has not eliminated anti-social behaviors at Monroe (nor is this the program’s goal). Teachers reported that teasing and excluding other students is still an issue at the school. A Monroe administrator reported that there were still a small number of “habitual offenders” or students who continue to bully others. “I think Cool Tools makes the average student so much better in terms of their interpersonal skills. So even if it may not be working for the habitual offender, it’s working for the other children.”

### Areas for Program Improvement

One concern that came up during focus groups was the age appropriateness of the tools and whether some tools may be more appropriate for younger children while others may be more appropriate for older children. For instance, some teachers felt that Cool Tool cues such as “bubble of

space” (i.e., respecting one’s individual space) appears to be targeted toward younger elementary students. In contrast, kindergarten and primary grade teachers reported that the kaleidoscope tool was “too much” for their students.

Another concern brought up during focus groups was that Cool Tools usage was affected by staffing shortages during key points in the day<sup>1</sup>. Research has demonstrated that student conflicts tend to arise during the lunch/recess period, when adults are not in as close proximity (Olweus, 1993). In the case of Monroe, lunch/recess periods were also times when far fewer adults were physically present. In addition, the adults who were in charge of supervising these periods were not necessarily familiar to students. Many of them were parents or college-age volunteers who had had little Cool Tools training in comparison to classroom teachers. A teacher who works with upper elementary students summed up her concerns, stating, “During yard time, kids feel like they’re on their own.”

The most common concerns or barriers to successful implementation of Cool Tools that teachers raised were finding time and feeling comfortable in using Cool Tools. A number of teachers indicated that they either had difficulty finding the time to do Cool Tools’ activities or that they felt overwhelmed with all the other curricular demands on their time. “Good ideas, but we have too much to do already...” Along the same lines, several teachers (n=5) reported that more time was required for them to learn the tools (n=5).

Teachers also spoke of their comfort in using Cool Tools, especially when interacting with students they did not know well. For instance, a first-grade teacher told a story about intervening when she saw three boys wrestling on school grounds and in sight of their parents after school. Although the students stopped after they were reminded of school rules, an angry parent confronted her before realizing that she was a teacher. This teacher suggested that more parent education about the program was necessary. Hearing this, a fourth-grade teacher suggested she may not have felt as comfortable intervening in the situation. “If I get attitude (from a parent)... It’s going to stop me,” the teacher said.

A final barrier that emerged from observations and focus group discussions was the confusion over the “pathway” or guidelines for when to send students to the office for mediations or disciplinary action. Sort It Out forms were consistently described by an administrator as an optional tool that teachers could use as they see fit. Yet, students sent to

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the office were required to complete a Sort It Out form. As of December of the first year, the school had not decided on a pathway; and in March, focus group teachers still seemed to be confused about how to deal with certain issues. A debate ensued when one teacher asked, “Have we decided as a staff when it is time to say ‘do not collect your \$200, do not pass go’, go straight to the principal?” This confusion, in addition to concerns about the time-consuming nature of Sort It Out forms, may have led many teachers to view the forms more as disciplinary documentation versus a classroom mediation tool.

Although by the second year there was a more systematic pathway for using Sort It Out forms and taking care of particular conflict issues, a number of teachers (n=4) still identified Sort It Out forms as what worked least well in Cool Tools. Looking across survey, interview, and focus group responses, there still appeared to be mixed feelings about how and when to use these forms. Moreover, as a Monroe administrator pointed out, the forms are not necessarily appropriate in all conflict resolution matters.

*The Cool Tools form works very well in sorting out problems between children, but not always really well when there's like something with an adult, or it's just that child in and of themselves and it's not something they did to someone else... One of the weaknesses of the Cool Tools form is there is not a place on it for an adult witness or teacher to say what they saw happen. So it's what the kids say happen and then it says what is the mediation and what are the consequences. If someone is sending a kid to me, I don't want to read just what the kid wrote. I want to know what the adult saw, what the adult knows happened.*

## Implications

Schools are complex. Studying why and how a system such as Cool Tools is adopted by a given school community requires a great deal of effort and investigation over an extended period of time. This report serves as a “first glance” in Monroe’s implementation process. Nevertheless, these survey and focus group data give some promising insights into how Cool Tools works at Monroe. For example, teacher

comments and survey results indicate that in the second year of implementation, most teachers were using Cool Tools and believed it was having a positive effect on students in the school community as a whole. In addition, they reported a perception that students were also using Cool Tools to some extent. What is especially promising is that both the use of Cool Tools by teachers and students as well as the reported positive effects seemed to increase from year 1 to year 2.

The data also provide insights into some of the more common difficulties teachers at Monroe have found with the program, thus providing information on areas that could be modified. Since the program is not scripted and does encourage local adaptation, this is especially important for future program users. One specific area that may need rethinking is whether some tools should be targeted to lower grades and others tailored for upper grades. There also appears to be a need to address concerns expressed about children’s responses to put downs and put ups. In addition, it may be useful to examine how Cool Tools functions during times of high conflict where fewer adults are present, as well how to provide greater training and support to supervisors, such as playground personnel.

Finally, providing teachers with sufficient support in implementing Cool Tools is necessary. As with any additions to the school curriculum, a concerted effort needs to be made to help teachers deal with the increased demands upon their time and their skills.

## For Further Information

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## Work of Goodness

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do not look like “actual” leaves, thus prompting a debate about whether a sculpture of a leaf needs to look exactly like a leaf.

I had been participating in Mrs. English’s kindergarten and first-grade classroom for approximately three months when I had the good fortune to videotape the above interaction during a science activity. The simple interaction culminating in the vote I have described can tell us a great deal about these students’ representational ideas, the classroom that enables them, and the vote that demonstrates them. This interaction is particularly interesting because Mrs. English never suggested using a vote to evaluate the students’ representational choices or debates; that idea appears to have originated with the students. In this article I will discuss the importance of representations and what I believe we can infer about these students’ beliefs about representations from this activity. Then, I will discuss the ways in which the structure of the activity and the classroom itself enabled this vote despite the fact that the teacher never asked the students to vote on the meaning of a representation. Finally, I will discuss the implications of this study for other teachers and classrooms.

### Representations

Stephen Palmer (1977) describes a representation as “something that stands for something else” (p. 262). In the activity described above, the students are attempting to use wooden blocks to represent the leaves they have been learning about in science.

Other types of representations these students have created include drawings, paintings and clay sculptures. Such representations play an important role for students when learning or solving problems in science by helping them to reflect on their ideas, changing the nature of the students’ problem-solving tasks, and aiding in communication of ideas to others. For example, in this activity the students are forced to think about which parts of the leaf are most important to include in their representation, how they are arranged within the leaf, and how to convey this to their peers. In addition, by creating a leaf out of wooden blocks, students are able to communicate their understandings without speaking or writing.

In order to take advantage of the power of representations to support students as they learn, communicate, and solve problems, students need to be able to invent, modify, and discuss representations beyond specific conventional representations (diSessa & Sherin, 2000; Greeno & Hall, 1997). Representations created by students also provide an important opportunity for teachers to assess the students’ developing understanding (Rosenthal & Michaelson, Winter 2002).

The point of my analysis is not to evaluate whether the students created a “good” representation, but to begin to document what they think about representations, and in particular what they think makes for a good representation, as well as how they make different choices when creating a representation. An improved understanding of the way students think about representations will allow us to help students better

understand how to create and use representations effectively.

Perhaps the most obvious claim to be made concerning these students’ notions of a good representation is that they believe it is something they can vote on. This may seem trivial but it is actually a sophisticated notion.

In my time with Mrs. English’s classroom I saw the students settle their disagreements in a number of ways including debate, verbal and physical conflict, and seeking intervention by a teacher. The students had taken votes about a number of things, such as what to name the class turtles, but they had never voted upon the meaning of a representation before.

In this case, however, Michael chooses to initiate a vote to settle a lengthy debate about the meaning of a representation. The other students then choose to participate by raising their hands, which implies they either agree this is a topic to be voted upon or they do not choose to argue the point. The fact that Lynn also votes against her own arrangement of blocks is particularly telling. Although it is possible she is simply voting along with the majority to keep from looking bad in front of her peers, Lynn points out immediately following the vote that she had never claimed to have made a leaf, but had simply claimed she had not created a balance beam. This is validated by a review of the video. By making this claim, she is demonstrating she understands exactly what the stated goal of the vote is, and that she agrees with its assessment concerning the degree to which her block represents a leaf.

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It is possible to assume some of these students, including Lynn, were simply bowing to peer pressure. However, because they did not resort to other methods they have used in the past, such as calling for the teacher, it is also reasonable to assume that on some level they are buying into the notion that this decision can be decided by a vote. Therefore, the students are implicitly recognizing that they each have an equal contribution to make in determining the interpretation of the representation (in the form of one vote). Furthermore, the interpretation receiving the majority of the votes is the one they will accept as their preferred interpretation. It is important to note that this does not imply Lynn is happy with the vote or its outcome; she may understand the need to be on-task and yet be frustrated or uncomfortable with the way in which her peers are disagreeing with her representation. However, because the students were all distracted by the discovery of a spider shortly after the vote, it is difficult to make any claims concerning Lynn's response to this debate beyond her acknowledgment of the need to be creating leaves.

There are two additional ideas also represented in this vote: (1) the students believe representations can be interpreted and (2) the preferred interpretation is the one that fits the objectives of their current activity.

Although it may seem obvious to adults that representations are interpreted by those who observe them, this is not necessarily the case for 5- to 7-year-olds. By participating in a vote to determine whether the blocks are a leaf, as opposed to a "work of goodness", the students are demonstrating they believe what one may see in an

arrangement of blocks is something that varies depending on who is looking at them and what they are looking for.

In addition, the act of looking for a majority decision by voting demonstrates that the students believe the most important interpretation is the one shared by the majority. In other words, they are not simply determining which interpretation is correct, as might have been the case if they asked the teacher to settle the discussion. Instead, these students use the vote to determine which interpretation is supported by the majority of the students.

It is also important to note that the students are using this vote to evaluate the representation with respect to the goals of the task as they understand them; the students were asked to create leaves out of blocks, and that becomes the measure of success for them. This can be seen in a number of different moves during the interaction.

First, when the students are initially debating the blocks that Lynn has placed, there are two arguments occurring simultaneously: whether the blocks are a balance beam, and whether they are too close to Jackson and Robert's leaf. However, when the students join the discussion and the vote takes place, the discussion of whether the blocks represent a leaf is privileged. Even the way in which Michael initiates the vote demonstrates the importance of the task in this debate. The students are voting on whether the blocks are a leaf or a work of goodness. They are not voting on whether the blocks are a balance beam or some other interpretation even though that has been an important part of the debate leading up to the current vote. Therefore, it appears that these students are very aware of the goals of the current task—to create a representation of a leaf—and the way in which

they interpret and value the representations they are creating is heavily tied to this task.

Finally, because the vote takes place and influences the students' representations (by causing Lynn to change hers), it is clear the interaction between the students is ultimately influencing their representational activity in a number of different ways. The presence of other students in the space and the fact that they are making their opinions known is influencing the ways in which the students each create and interpret their own representations.

### This activity, this classroom

The above analysis demonstrates that the types of interactions that occur between students have a profound effect upon their representational activities and understandings. Therefore, it is also important to understand the ways in which this particular classroom culture and the activities in which the students are participating may have influenced the students' interactions.

One of the important aspects of these students' representational work is that it takes place in a way Hutchins (1993) refers to as open interaction. That is, the students' activities are being completed in a way that is open, or available for the other students to see what they are doing as they are doing it, affording them the opportunity to comment upon it.

The work with blocks is particularly open in that the students are all walking around the same space, often walking past each others' work in order to retrieve additional blocks from the storage bins, and because the block constructions are three-dimensional,

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which makes it easier for other students to see them at a distance or even with a casual glance. This can be contrasted with a situation where the students are working individually upon drawings at a table. It is still possible for each student to see the other drawings, but it requires more effort to get a good look and make a comment since the drawings are flat upon the table and the students are often focused on their own work with no reason to leave their seat and do more than glance at their neighbors' drawings.

In contrast, the open interaction established in the block area allows for a great deal of collaboration, observation, and discussion as can be seen in the vote that took place during this leaf building activity. This collaboration, as discussed above, ultimately leads to changes in the students' representations.

It is also important to note that votes initiated by the teacher have occasionally been used in this classroom to make decisions such as what type of tree the students should build in their whole-class tree construction project. However, this is the only time I witnessed a vote being used to decide upon the interpretation of a representation.

There is another aspect of the classroom culture, other than experience with voting, that may have led to this vote. Instruction in the early childhood classrooms at UES is influenced by the Reggio Emilia Approach (see Rosenthal & Michaelson, Winter 2002 for a full discussion). Briefly, this means that representations play an important role in this classroom, and the students are often asked to reflect upon their own representations and to discuss their representations with

the class. It is quite possible that this experience in discussing and thinking about representations contributed to the students' comfort in debating the block representations, and ultimately voting upon one interpretation to be accepted by the group.

Another important aspect of this activity worth noting is that the students were allowed to settle their own disagreement just outside the classroom, seemingly independent of adult supervision. Although the teachers could see everything that was happening through the window, and could easily intervene if there was a problem, the students appeared to be acting on their own. In fact, the teacher might not have been aware there was a debate unless the students told her, or it degenerated into a fight.

This sense of freedom combined with the fact that the students in this classroom are frequently encouraged to settle their own disagreements calmly and politely may have led to the idea of attempting to agree upon an interpretation of the leaf through a vote. There have been other occasions when the students chose to settle a disagreement by running to find a teacher or other authority figure. However, the students' choice to settle this particular debate in this way implies that they felt it was appropriate to attempt to handle this on their own. In turn this implies that they were capable and that their interpretation was good enough (it did not require an expert teacher to identify the blocks as a leaf).

There are no doubt a number of different ways in which the daily activities of this classroom led to a situation in which the students could vote upon their interpretation of another student's representation. However, what is important to note here is that the students'

interactions and ideas as defined by and expressed in the vote are a combination of their individual histories and ideas, the activity that they were participating in, and the larger classroom culture in which it took place.

## Implications

I have argued that this vote is a result of the activity leading up to it, and the classroom that enabled such an activity. The question is: What implications might this have for other classrooms with different cultures and activities?

First, it is clear from the present analysis that the way in which a particular activity is designed has definite implications for the types of interactions that may occur, which in turn affects the students' ideas and creations. I have identified only one particular type of interaction and the way it influenced the students' activity—the open interaction occurring around a block construction. However, it is clear that different types of activities will enable different types of interactions, and therefore can be designed to lead to the desired form of interactions. If the goal is to encourage students to discuss their representations with each other as they are creating them, so they might affect each others' ideas or the teacher might observe and potentially assess their understandings, then activities with open interaction seem to encourage this type of activity. If, however, it is important for students to think about their own work and not be distracted or influenced by the ideas of other students, this type of activity might not be ideal.

At a more general level, it is possible to design activities to enable particular types of interactions between

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students, and therefore particular ways of thinking about and using representations. It is also important to remember, however, that the larger classroom culture does have an impact upon these smaller activities. I argued above, for example, that frequent discussion of representations and encouraging the students to resolve their own conflicts peacefully may have led to the vote.

Finally, it seems clear from the above example that when examining students' representations in order to assess their understanding of either the representational process or the content with which they are engaged, it is important to keep in mind that a number of rich environmental factors above and beyond their individual understandings influenced the creation of their representation. An examination of Lynn's final leaf in the above interaction would be inaccurate if it assumed the leaf she created was based solely upon her ideas. This would ignore the role her peers played in removing her initial representation of a leaf. It is also possible the leaves the other students created were influenced by witnessing and participating in the vote, leading them to decide to focus more upon the task of creating a leaf in order to avoid a similar vote. Therefore, this simple vote highlights the importance of students' interaction and classroom culture in interpreting their activities and ideas.

## For Further Information

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