Correspondence - Transforming Pedagogy - Classrooms as Math
Harvard Educational Review; Winter 1995; 65, 4; Research Library
pg. 670

Transforming Pedagogy — Classrooms as Mathematical Communities: A Response to Lensmire and Pryor

Advocates of writing workshop approaches seek to move traditional writing instruction in school away from an emphasis on mechanics and form and away from teacher control of topics. The problem, as writing workshop advocates see it, is that school writing inhibits children and that children lack opportunities to develop voice and to play with language and text. According to Lensmire, "with the support of the teacher and numerous opportunities to collaborate and share texts with peers, children (in writing workshop classrooms) are supposed to gradually become more and more able to realize their intentions in text" (1994a, p. 3). A romantic image is of children writing about topics, ideas, and experiences that matter to them. Unfettered by teacherly control, young writers are freed to express themselves, to explore, critique, and remake their worlds, to play with language and form. Teachers serve as interested audience to their students' work, seeking to understand children's projects, and offering help and advice in support (Roosevelt, in press).

With classrooms more open to student voice, the cacophony is not always pleasant, however. Some students produce texts that are troubling, and for which teachers feel unprepared: Roosevelt (in press) describes his struggles with a young boy's violent story, filled with blood and horror, and Lensmire (1993) exposes and explores his experience with children using their writing to hurt or demean classmates along class and gender lines. Teachers are in the difficult position of trying to understand whether their young authors are calling for help, seeking to tantalize and shock, or critically challenging the world they see around them. As teachers open their classrooms to the world, inviting students to engage in meaningful work, the world creeps into school. It is a two-way street. This connection, envisioned and promoted by John Dewey over seventy-five years ago, is one about which we still have a lot to understand as we develop our visions of what we want schools to be places for (Dewey, 1900/1956).

Watching all this in his own classroom, Lensmire draws on Bakhtin to propose a view of writing workshop as carnival, a space and time within the institution of school in which young people can freely play, turn the world upside down, and experiment. Yet, as he points out, "the bite of carnival" — its potential to use expression to challenge larger societal problems and to seek change — is "blunted" because the writing workshop vision, as promoted by its vocal advocates, contains no such political agenda (Lensmire, 1994b, p. 379). Choices of content or intention are left to individual child-writers, while the focus of pedagogical change is on the more structural and relational issues of children's control over time, purposes, and interactions. Lensmire wonders how to develop the writers' workshop to become a deliberate forum for collectively engaged social critique and change. He envisions projects in which children might jointly examine, challenge, and change the texts of the worlds they inhabit. His questions point the development of the writing workshop explicitly outward, toward *society.*

Pryor, too, wonders — but differently — about the extension of the writing workshop. He turns the issue on its side, observing that if writing workshops are to leverage significant change, they must be used to transform schools beyond the teaching and learning of writing. While Lensmire seeks to use writing workshop as a forum for children to read, write, and rewrite the *world,* Pryor seeks to use writing workshop as a lever for a broader reconstruction of *school.* He asks what mathematics class might look like, for example, were it to be remodeled in the spirit of writers' workshop. How could the possibility and spirit of the workshop inspire wider change in *school?*

As is the case with traditional school writing, school math is also a target of complaint. Consider what is typical in most U.S. mathematics classes: children spend their time practicing procedures presented by teachers, performing calculations, and going over homework; the mathematics in which children engage consists of algorithms, procedures, and terminology; teachers show and tell, but students are only expected to copy and practice. Math classes have not typically abounded with language, aims, or imagination. Although many students have found it difficult, for too many, mathematics has not been the challenging, exciting kind of difficult. Additionally, school mathematics has served as a barrier for many groups of students. The image of a math classes inspired by greater connection to the real world and greater personal sense of student ownership seems both reasonable and appealing.

Paradoxically, in either writing or mathematics, a first step seems to be to get a solid pocket of activity where the tasks, the discourse, the relationships, and the climate are different from those that characterize either the rest of school or the outside world. The writing workshop has succeeded as a function of its novelty; indeed, Lensmire's view of the workshop as carnival, a world apart from the routines of school life, reveals it as a space where a relaxation of "the grip of established norms and relations" allowed a productive freedom to be, think, and act (1994a, p. 373). Still, as both Lensmire and Pryor point out, life within the protected pocket can remain detached from the larger realities of school and society.

The very thing that has made school math the target of critics — that it is disconnected from the everyday worlds and realities of children — has, however, made it a more protected pocket of the school day. Less dependent on unevenly distributed cultural capital, mathematics has often been a path for working-class students to break academic barriers. It has been an arena in which a limited English speaker could participate successfully. To make mathematics more connected to the surrounding world may increase interest, but ironically risks lessening access.

In my own teaching of young children, I have seen this risk as a dilemma inherent in the work of reconstructing the context and content of school math. The school in which I have taught for over fifteen years is diverse culturally and linguistically, with a multinational population, including students from countries in Africa, the Middle East, and the Far East. The U.S. students are from all over the country, and almost half of them are children of color. Although over half the class qualifies for free lunch, they are mostly middle class. Their parents are enrolled at Michigan State, either in the English Language Center or in undergraduate or graduate programs. There is a high mobility rate in this school, and students arrive and leave all year. Few students remain in the school for more than two or three years.

In this setting, mathematical work situated in the everyday worlds of my students sometimes divides and differentiates in ways that can lose the mathematics. Take the following incidental, but telling, example: It was the first day of school. As students introduced themselves, I asked them to tell what year they were born. Using the year, I asked the class if they could figure out how old the child was. Cassandra, a tall African American girl, offered 1979 as her year of birth. When children clamored that she was ten, she shook her head. Born in December, she was still nine in September. The mathematical puzzle of it all was engaging to some of the children. How could Cassandra be nine and yet be born in 1979, ten years earlier? A few worked to solve the mystery. But some students also sneered. How could Cassandra not even know how old she was? Cassandra stood in front of her classmates silently, and I cringed. The resource of the children's everyday real interests and needs was intertwined with the students' accustomed out-of-school relations and ways of knowing. Familiarity brought with it, insidiously, patterns I wanted to deconstruct.

Across time, I observed that using the outside world as a context for my young children's mathematical development at times invited in that world in ways that seemed, paradoxically, to deflate the transformative possibilities of our pursuits. Sometimes it was because personal examples and contexts created arenas for meanness or disrespect. At other times it was that concrete contexts were unevenly familiar or interesting to boys and girls, to international and U.S. children, to children with big families and children with no siblings living with a single parent. As a result, the children were distracted or confused, or the differences among them were accentuated in ways that diminished the sense of collective purpose and joint work.[1] Whether or not using such everyday contexts is wise is not the right question. Using school to explore, analyze, and challenge differences makes sense. However, whether situating mathematics in the everyday world is the best way to transform mathematics in school is a question worth asking. And, given the status of mathematics in our society, whether it is the best way to gain access to the power of mathematics for all children is also worthy of attention.

What else might a mathematician's workshop be? How might the practice of mathematics animate a different kind of mathematical work for children in school? What might be its nature? What might be its purposes? Over the past fifteen years, I have repeatedly been impressed with the fascination that "pure mathematics" holds for young children from diverse cultural backgrounds. Un-

[1] See Buchmann and Schwille (1983), and also Floden, Buchmann, and Schwille (1987).

like the parade of drill worksheets, and similarly unlike the applied problems of "everyday situations," theoretical explorations often intensely engage young children. Rarely do I see students become as engrossed as when they are debating whether zero is an even or an odd number, what a sensible answer might be to 6 + (–6), or from which bag one would be more likely to pull a green chip:

2 green chips 2 yellow chips — 3 green chips 4 yellow chips

Theoretically, none of these relies directly on students' outside experiences. Not necessarily reliant on or connected to the outside world, these investigations often seem paradoxically more inclusive. And, with theory and abstraction central, they provide opportunities to engage fundamental aspects of mathematics that comprise some of its unique contributions to human experience and interpretation.

Take an example from later in the same school year of the birth date discussion. The third and fourth graders (many of the fourth graders were students I had taught the previous year) were holding a "meeting" — a joint discussion for which both classes had prepared — about whether zero was an even or an odd number. A brief glimpse of the discussion offers a view of the intensity with which the children were exploring the nature of zero, and what it means for a number to be even. The first position argued was by Arif, an Iraqi fourth grader.[2] He argued:

> I think zero's *even* because, take an even number like, maybe 10 and if you keep on going down to like, 8 is even, and 6 is even, and if you get like to zero, and I don't think it's odd or a special number because like, negative 1 is odd, and 1 is odd, so in between that I think it should be *even.*

Valerie, a White fourth-grade girl, offered a different perspective:

> I'm going to argue that, um, zero isn't even or odd. It's special . . . I think um, zero is special because zero's kind of like, nothing. There was not really even or odd. Um, because it's just there, it's not really anything. When you go through the numbers you hit zero and it's kind of like nothing. So, it's just, I think it's special because you can't really even or odd because it's nothing.

This generated a bit of discussion. Sipho, an African American fourth grader, asked Valerie if she was arguing that zero was not a *number.* "Well, it's a number, but it isn't even or odd. It's just nothing, but it really is a number," she replied thoughtfully. I asked the class if there were questions they wanted to ask Valerie.

[2] Note: children's names are pseudonyms.

Tembe, a Black third grader from Kenya, said there were "other zeroes," and gave as an example, the number 50. He wanted to know if she thought 50 was nothing, too, since it had a zero in it. Valerie did not quite seem to understand what he was raising:

> Oh, no, 50 is *something*. 50, like, you can have 50 things, but if you have zero things there's nothing.

Riba, a third-grade girl from Egypt, picked up on Tembe's point and connected it to something another child had said:

> Is, that's the same thing Sean brought up, like um, everybody, well, most people think um that if zero isn't anything, then 50 shouldn't be a number because if you took off the zero it would just be 5.

Valerie was beginning to get it:

> I'm not really sure. I think it's just the zero afterwards is to show that you don't have like 51 or something yet. I think it's just to show that you've got a 10 and you've got no ones yet.

Scott, a White fourth grader, raised his hand and said, "I agree because zero is like trapped in between the negative numbers and the normal numbers, so I don't really think it's nothing. I don't think it's even or odd."

> *Ball:* So you're agreeing with Valerie?
>
> *Scott:* Yeah.
>
> *Ball:* Tembe?
>
> *Tembe:* I think I'm going to agree with Arif.
>
> *Ball:* Do you want to say why?
>
> *Tembe:* I agree with Arif because, if you go 10, 9, 8 and you get to 1, then it would be odd, then if you go one more it would be zero and it would be even. So I agree with Arif.
>
> *Ball:* Sheena?
>
> *Sheena:* I think I agree with Valerie because I sort of think that zero isn't an even number or an odd number, it's kind of there when you need it. It's like you don't need it all the time, but it's there when you need it.

The discussion continued. Students clarified what particular students had said, agreed and disagreed with previous speakers, added to previously made comments, and introduced new points. Agreeing on the definition of even numbers ("numbers you can split in half without having to cut anything in half"), students nonetheless reached different conclusions:

> *Bob:* If you take like, say 2, you can split that in half to make one on each side, but if you have zero there's nothing to split on each side.
>
> *Riba:* This is what Betsy said last time. She said that, um, if you have zero things on each side you cut it in half and there's zero on each side.

Students changed their minds as they listened. They worked at understanding what others were saying, listening generously and curiously.[3] At no time was anyone openly disparaging or disrespectful of others' ideas. The level of engagement was intense; indeed, getting them to end the discussion and go out to recess was difficult. And this discussion was no anomaly in the class. Few topics interested the children as intensely as number theory, about which they had many ideas and theories: Are negative numbers the same as zero? How many numbers are there? Is six both an even and an odd number since it has three groups of two, and three is an odd number?[4]

Three points stand out here, one about the content, one about the discourse, and a third about the culture of the classroom. First, the students were attracted to an esoteric bit of mathematics, filled with the fascination of the number zero and the orderliness and patterns of definition. Nothing about the content or the task related to the students' everyday lives, or to a "real world." Neither useful or practical, it was nonetheless engrossing. And so engrossed, their activity was as much play as intellectual pursuit. Zero appeals to children's fancy, not unlike the appeals of magical characters in fiction they read and write. Exploring what zero might be capable of being and doing is an activity of imagination for eight- and nine-year-olds.

Second, they were participating in a mathematical discourse, considering arguments, relying on previously agreed-upon definitions, wrestling with consistencies and contradictions, and changing their ideas. They were trying to push what they thought and understood about the topic at hand. At one point, Bob suggested that the class ask a mathematician. David was skeptical that this would tell them much:

> *David:* Um, just because you ask a mathematician doesn't mean that you . . . that the mathematician is going to be right all of the time, because mathematicians are people . . .
>
> *Bob:* I know, but I never said that they always were right.
>
> *David:* I know, but you said if you ask a mathematician, you said you'd have to ask a mathematician . . .
>
> *Bob:* Well, I mean, maybe they might not.
>
> *David: Nobody* knows.

A couple of months later, a professional mathematician visited the class. Almost immediately, several of the children demanded to know if he thought zero was even or odd. Although he responded that zero was an even number, this assertion did not satisfy those who believed it to be a special number. Weeks later, Betsy reminded the class about this at one point as a demonstration of the fallibility of mathematicians, and of the children's own relative reliability.

[3] See Jardine (1990, p. 2). Jardine describes the "following along behind" others' thinking in the effort to understand.

[4] See Ball (1993) for an extended analysis of children's engagement with such ideas.

Third, although these students had plenty of playground and neighborhood fights, in a mathematical discussion such as this one, those out-of-school relations seemed to have been left outside the classroom door. The children used tools and resources they had been developing together across the year; their interactions were shaped by norms of the math class. They listened to and tried to understand what others were saying, referred to one another's ideas, took positions, and also kept an open mind. These norms were special to school, inside the constructed pocket of the math class. It seemed a change turned inward rather than outward: inward on themselves as thinkers, and inward on the class as a special kind of community. Inside that pocket, the children had opportunities to participate in unaccustomed ways — to experience a kind of thinking, sorts of intellectual inquiries and playful pursuits. They played in and with qualities of relation not part of their everyday worlds.

The special pocket, within school, is a radical challenge to both school-math-as-usual and to much of the current move to situate math in real-world contexts. What has typically constituted mathematical work in schools is one aspect of the challenge. A second challenge is to the individualistic tradition of math class, reinforced by the individualism of testing. Collectively engaged with a mathematical question, children as diverse as the ones in this discussion met on a common ground. It was not the outside world that breathed life into the "mechanical, dry space" (Lensmire, 1994a, p. 153) of math class; it was the intellectual excitement of a little piece of number theory. Engaged together, the children's differences were woven into their collective pursuit.

The title of Joseph Schwab's (1976) famous essay, "Education and the State: Learning Community," highlights the double meaning of "learning community." Community — collective engagement, interdependence, and respect among diverse people — is something that can — indeed, must — be *learned.* And, learning is a *communal* endeavor: Knowledge is the product of communities, and communication about knowledge draws on the representations and modes of discourse of different communities. Schwab saw these two meanings of community intertwining in practice:

> The propensities that constitute community are learned only as we undergo with others the processes through which we learn other things. Meanwhile, the support, communication, and example that make it possible to learn these things become accessible and acceptable to us only as our propensities toward community develop. (p. 235)

Like Dewey, Schwab envisioned a balance between the centrifugal force of the home and the centripetal force of the public common school. Balancing the two, he believed, could allow room for diverse voices, habits of mind, perspectives, and ideas to found a rich common ground for collective engagement. This, he thought, could enhance both the community and the individual. Schools could serve as places where children would learn to engage in and *practice* a "discourse of exchange" through which they, in the heterogeneous environment of the public school, could learn to understand and learn from one another in ways that would support joint action and mutual concern.

A mathematics class in which children have opportunities to practice a civilized discourse, to engage with diverse others in pursuit of a common mathematical problem, issue, or fancy, may not be barricaded from the outside world, or from school, after all. What seems like a protected pocket of activity suspended from larger realities of school and society might be a medium for the development of new relations, habits of mind, and perspectives. What seems like more abstract mathematics, unconnected to the real world, may be one step toward the reconstruction of mathematics as common property and pursuit. Rather than seen as an escape from realities of everyday life as in carnival, the mathematics class might be deliberately re-positioned relative to ideas, relations, discourse and community, and serve as an agent of change, not an intellectual retreat from it. Understanding whether and how this inward turn can effect change in school and beyond is a question well worth our collective effort and attention.

DEBORAH LOEWENBERG BALL
Michigan State University

References

Ball, D. L. (1993). With an eye on the mathematical horizon: Dilemmas of teaching elementary school. *Elementary School Journal, 93,* 373–397.

Buchmann, M., & Schwille, J. (1983). Education: The overcoming of experience. *American Journal of Education, 92,* 30–51.

Dewey, J. (1956). *The school and society.* Chicago: University of Chicago Press. (Original work published 1900)

Floden, R., Buchmann, M., & Schwille, J. (1987). Breaking with everyday experience. *Teachers College Record, 88,* 485–506.

Jardine, D. (1990). On the humility of mathematical language. *Educational Theory, 40,* 181–191.

Lensmire, T. (1993). Following the child, socioanalysis, and threats to community: Teacher response to student texts. *Curriculum Inquiry, 23,* 265–299.

Lensmire, T. (1994a). *When children write: Critical re-visions of the writing workshop.* New York: Teachers College Press.

Lensmire, T. (1994b). Writing workshop as carnival: Reflections on an alternative learning environment. *Harvard Educational Review, 64,* 371–391.

Roosevelt, D. (in press). There the kid was, stranded in a car: Dilemmas of teacher responsiveness in a writing workshop. *Curriculum Inquiry* .

Schwab, J. (Ed.). (1976). Education and the state: Learning community. In *Great ideas today.* (pp. 234–271) Chicago: Encyclopedia Britannica.

Lensmire Responds to Pryor and Ball

Before anything else, I want to say that I am grateful to be in such generous, thoughtful company. Thank you to John Pryor for initiating this exchange, and to Deborah Ball for joining us.

Pryor's response has helped me clarify my own sense of carnival and writing workshops. I interpret the carnivals and festivals of the Middle Ages and Renais-