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Can We Science the Poop, Too?

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Synopsis

This article describes how an innocuous question from a primary schooler taught me to pay attention to the dynamic meaning making activities of children—particularly, those of my young daughter. Through this lens, I examine how the verb-based world of children might compel us to think differently about the largely nominalized project of schooling and, more specifically, about the craft of teaching mathematics.

A colleague of mine once told me a story about his grade three classroom and it remains one of the most memorable episodes from my decade of working as a teacher. As a part of their science class, he and his students were studying farmyard animals. This involved the adoption and care of a group of chicken eggs. The eggs quickly hatched into a family of baby chicks, and when the day came to release the chicks from their cage for closer inspection, the chicks tumbled out onto a network of newspapers to explore and interact with the third graders. The students vibrated with excitement as the teacher talked about the lifecycle, habitat, and diet of the hatchlings. It wasn't long until one of the chicks took advantage of the newspaper (if you know what I mean), but the situation was addressed in a quick and efficient manner — the work of a veteran teacher. After all, nothing can derail the focus of young children faster than poop. But this event didn't derail the group. Actually, it proved captivating for one youngster who, moments later, shot his hand in the air and asked an all-important question: “Can we science the poop, too?”

At first, I thought this story was memorable simply because the bathroom humour coupled so nicely with the sincerity of primary schoolers, but, for whatever reason, I couldn't shake the curious character of the student's question.

It seemed to walk the line between the nonsensical and the profound. Half of me wanted to dismiss the suggestion with a smile, while the other half remained adamant that sciencing the poop is an important part of a thorough investigation. And the longer I thought about it, the more I began to appreciate the truths this question holds about *kids*, *teaching kids*, and *teaching kids mathematics*.

Kids

People who spend a lot of time with young children are familiar with the playful way that kids make sense of their surroundings. In order to warp their world to the demands of their fantasy, children assume the role of protagonist, acting objects into being and banishing them from existence as their utility expires. This is the exact position I find myself in when my two-year-old daughter decides to play doctor. Of course, the phrase “play doctor” is an adult one. In that version of the game, the child assumes the role of doctor, and the parent becomes the patient. But my daughter doesn’t ask me to play doctor; our game abruptly begins when she confidently declares: “I am doctoring you, Daddy.”

She has decided to invite me into the sense-making, and my reactions now play a role in establishing what’s possible. Certain objects in her environment become well-suited to take on the roles and responsibilities of objects she has encountered in her world or in the pages of her storybooks. It becomes a tightrope walk between sense and nonsense where the unwitting adult might fall to either side (too real or too imaginary) at any given moment. Imagine her frustration when I suggest that I need a touch more recovery time when, in actuality, her treatment had come to an end and I was now cured. Imagine her frustration when I suggest that a wooden block is my medicine.

Obviously, medicine comes in containers, and that block clearly does not fit in any of her containers. My reactions to the toy needle being thrust onto my sternum or the cloth bandage being applied to my “big owie” affect the possibilities when doctoring. In these moments, she is revealing what she knows about her reality — one that is vaguely familiar to my own but where she is the final authority. She remains in firm control of a world that is real

enough to learn about her surroundings but make-believe enough to keep the story going. This acting is more than pretending. Her actions (and our interactions) establish ways of making sense of her unfolding world.

Both knowing and learning are active exploits. In my daughter's world, there are no such things as doctors and non-doctors; there is her, and now she is doctoring. She brings forth a world that is organized by, and not disconnected from, her experience, and it is through her doctoring that she will eventually construct the role of doctor. It is in this same manner that we can begin to appreciate that, for both my daughter and the curious student we started this essay with, there is no science, only sciencing.

As adults, we are tasked with tagging along. We are required to pack away our truths and bring forth truth on a need-to-know basis. Being with kids requires us to become co-inventors in the worlds they are in the process of bringing forth — ones that are a mix of reality and convenient fantasy. This is the role of a parent who delicately balances their child's agency with their own reality, and while it is crucial that adults play along in this constitutive activity, we don't ever play along perfectly. It's rare that we completely lose ourselves in the action, and that's what makes questions like, "Can we science the poop, too?" noteworthy. They grind against the pieces of our polished sense that we are unable to pack away.

Teaching kids

Given the active way that kids manufacture sense in their early years, it is not overly difficult to recognize the time bomb — known as formal schooling — placed in their developmental trajectory. The early years begin in a familiar manner. In primary classrooms, students are often expected to collectively engage with their surroundings and distill their sense into recurrent patterns that make up a reality. It is through this process that school aims to make children aware of the "other," and the process of inward-focused sense-making moves toward the norm of making sense together. However, the process of making sense remains active, and we can see this through the curious child's question. He uses "science" as a verb. Science is still a process of noticing patterns, asking questions, conducting experiments, and drawing conclusions. Although the focus is now on the plural "we," science (in an adult sense of

the term) hasn't made an appearance yet; these kids are still sciencing — in the same manner in which they grew up doctoring.

However, school doesn't play along forever. Soon it decides that the game now needs to follow a particular script. It shifts what constitutes knowing away from making active sense (being in a world) and into a passive sense (gazing upon a world). It decides that the path is pre-determined, rather than laid down in the course of walking. Learning becomes about the alignment to a set of established knowledge and not an active pursuit of coherence. In short, school permanently falls out of sync with the perpetual activity of coming-to-know indicative of the early grades. Of course, this switch is not instantaneous; it is a slow nominalization until we are left with a collection of things — of nouns — that belong in one of two categories; known and unknown. This nouning eventually becomes the industry standard in school; it treats knowledge as a list of facts, laws, or rules, and communicates that the way to understand is to separate oneself from the practice of something (be it science or mathematics) and learn the disembodied details.

To be fair, nouning provides two critical affordances for the project of schooling: control and breadth. In exactly the same way that children control the script of their knowing, adults, too, prefer to be in control of reality. School just does this in a much more suffocating, predictive, and systematic fashion. Once knowing has been nouned, it can be possessed. By extension, knowing and learning become the process of granting selective control to specific nouns. They are handed out piecemeal by teachers, parents, and state-fabricated examinations. Processes like sciencing, doctoring, and mathing are converted into static chunks under the assumption that their dynamic character can be resuscitated when the appropriate time comes. This control also grants school the capacity for an enormous breadth, because aligning oneself to meaning previously made is much less time intensive than making meaning in real time. As the grades progress, the volume of topics in a bloated curriculum necessitates nouning or the structure of school would collapse under its weight. Nouning becomes a matter of efficiency and standardization. The subject matter now plays the role of protagonist and the children are written out of the script altogether. The students are now in the audience, left to observe from a safe distance.

Teaching kids mathematics

No discipline contains a more rampant nouning than school mathematics. By the time secondary school arrives, most of the dynamic character of mathematical knowing has been eradicated — expunged from memory. The action of combining is now addition; the action of taking away is now subtraction. (And rather than undoing one with the other, they are now inverse operations). Even the phrase “take away” is banned because it feels too childish, too elementary. Processes like sharing and halving become division and fractions, and what we used to refer to as sorting gives way to set theory, filled with collections of conventions, definitions, and classifications.

The meaning-making of a dynamic process like patterning is slowly squeezed until we no longer ask students to think about growth at all. Rather, the growth is named and we interact with growing through a proxy of nouns. We collect intercepts, slope, end behaviour, domain, and range. Mashing these things back together is supposed to re-connect us with the question that should have been guiding our activity the entire time: How is the pattern growing? Thus nouning moves us away from pattern forming and toward patterns formed.

All of this manages to expertly conceal what mathematicians actually do. Popular culture gives students an image of scientists in labs tinkering, observing, predicting, and verifying (even if they rarely get to experience this sciencing in school), but images of mathematicians bringing forth meaning are nearly non-existent. What does mathing even look like? If the (largely painful) nostalgia of school mathematics is brought to bear, mathematics is about execution, precision, tight structure, and answer keys.

The reaction of some has been to blame the specific set of nouns that our standards require us teach, with certain villains rising to the top. Martyrs like multiplication tables, long division, and polynomial factoring become emblematic of the issues in mathematics education. Proposed fixes generally lie in two camps. Some educationalists focus in on these undesirable nouns first in the same way a child might eat around the entire perimeter of a sandwich, completing the undesirable crust before the real payoff. The theory is that once the basics are mastered, they can introduce a more interesting set of nouns. Others call to rebuff these undesirable nouns altogether and

create a curriculum composed of new nouns that (apparently) hold more natural curiosity in and of themselves. The problem is, both approaches are still noun-focused. No noun inherently evokes curiosity; curiosity is sparked through interaction. Inspiration occurs in the space between knower and environment through the ways in which knowers weave together meaning — in the ways that knowers verb.

And so, we can learn from this young child and his wide-eyed stance. He does not consider knowledge as something that is disjoint from himself. Rather, he is taking on a much heavier burden. He is committing to an act of creation — of sciencing.

I am convinced that his comments, although probably a common occurrence to teachers of young children, have stuck with me for this particular reason: They disrupt the default noun-based world of the secondary mathematics teacher. They remind me that mathematics is a verb — a convoluted, contextual, interpretive, and present-tense enterprise (see [1, 2]). It is a lens through which we make decisions and organize our reality as we engage in the perpetual search for truth, or at least a truth that coordinates with our current understanding. And in our adult attempt to delineate between play and rigor, we overlook that verbing is at the very root of both activities. Both play and problem solving involve navigating an environment on the cusp of coherence. It is in this vein that I believe that the request to science or math anything should be irresistible to teachers. It is a request to take a leading role in sense-making, and it deserves a response that honours the worldview from which it came:

“Can we science the poop, too?”

“Absolutely! How should we start?”

References

- [1] Jim Barta, Ron Eglash, and Cathy Barkley, *Math Is a Verb: Activities and Lessons from Cultures Around the World*, National Council of Teachers of Mathematics, Reston, Virginia, 2014.
- [2] Lisa Lunney Borden, “Language, World View, and Teaching Mathematics,” *Principal Connections*, Volume 18 Issue 3 (2015), pages 26–29.