True educational change occurs when educators reframe problem solving with a practice-to-research model.

Innovating from the Ground Up

T. Philip Nichols

As educators, we are so accustomed to hearing the phrase "from research to practice" that it's easy not to think about the assumption at its core: that ideas and innovations travel unidirectionally, from university labs and school-based studies ("research") into the everyday activities of classrooms ("practice").

On the surface, this trickle-down view of educational change—what I call *innovation-from-above*—makes sense. We learn about new devices, apps, teaching techniques, and leadership strategies as they show up in articles, reports, and other professional resources, or after they have already been implemented elsewhere. We then work to incorporate these innovations into our own practice, lest we fall behind the curve.

Innovation-from-above, however, is not the only (or always the best) approach to educational transformation. Over the last six years, I've studied how technological and pedagogical innovations circulate in U.S. schools. What I've found is that "research to practice," the prevailing model of school change, has significant shortcomings. "Research," after all, is not a monolith, and can often arrive in classrooms freighted with assumptions that work against the intentions of those putting it into practice. Research geared toward maximizing classroom efficiency, for instance, can undermine educators' efforts to nurture forms of learning that are less amenable to data-driven optimization: imagination, tinkering, and play.

Instead, when we use educators' values and commitments as a starting point for innovation, an alternate orientation to research and practice emerges. I call this *innovation-from-below*. This approach reframes innovation from something implemented in classrooms to something that grows out of them.

The "Trickle Down" Model

The idea that innovations trickle down from research to practice isn't unique to education; it's been the dominant theory of social transformation for nearly a century. Economists base what they call "the linear model of innovation" on the premise that new inventions emerge through three linear stages: from *research* to *development* to *diffusion*. The model also assumes that innovations improve on one another in a gradual march of progress, backing what economist Joseph Schumpeter (1939) termed "creative destruction"—the process by which old innovations are disrupted or destroyed to make room for newer and better ones.

The linear model rose to prominence during World War II, when

> **Innovation-from-below recognizes that educators play a crucial role in not just applying, but producing and sharing, research-based innovations.**

it became the template for U.S. government investments in scientific and technological advancement. After the war, this massive infrastructure for military, industrial, and academic research was redirected to address social problems and enhance public life—including education improvement (Urban, 2010). To this day, the federal spending model for education innovation in the United States continues to allocate funds for research that develops new interventions for schools and classrooms, rather than investing in schools' efforts first.

It's hard to overstate the linear model's influence in shaping our understanding of how innovation works. Clayton Christensen's best-selling book *The Innovator's Dilemma* (1997) argues that organizations fail when they don't embrace the "disruptive innovations" that flow from research into practice, an implication that disruption is an exogenous force to which people must adapt rather than a solution they build in response to situated problems. Whenever we rationalize a change in policy or practice because it's "the future of assessment" or because it "prepares students for jobs that don't yet exist," this is the linear model at work—projecting visions of an inevitable future as justification for disrupting the present.

The Limits of "Linear"
Commonplace as it is, the linear model has three significant shortcomings.

1. *The linear model only evaluates the effectiveness of an innovation in hindsight.* According to the model, new ideas are not innovative unless they trigger "creative destruction" in practice, but the actual impact of a development cannot be known in advance. This puts educators in the precarious position of placing

bets on new research-based resources. As any educator who has endured some of the more embarrassing "innovations" in the last half-century knows, these gambles don't always pay off (think teaching machines, open classrooms, and Smartboards). By forcing schools to absorb the risks and costs of adopting new practices, innovation-from-above tends to serve those who develop, market, and sell innovations more than those who actually use them.

2. *The linear model doesn't account for innovation's different effects across contexts.* Drop the same research-based practice into two different classrooms and you'll likely see different results. This is because new ideas do not operate in a vacuum; they mix and mingle and morph in relation to the teacher, students, classroom culture, school history, district resources, and the other innovations already in place. Innovation-from-above papers over these dynamics by presenting innovation as something that flows linearly from research to practice, rather than being subject to a negotiation carried out in actual classrooms.

3. *The linear model treats innovation as an external force.* Innovation often comes from prestigious research sites like universities, laboratories, think-tanks, or commercial firms. This means that much of what traffics as innovation does not actually emerge in response to the problems or needs of teachers or students, but as an experimental application of someone else's research and development agenda. The model casts schools as testing grounds for innovation-from-above, not as sites where knowledge and innovation already exist.

The Innovation School
The shortcomings of innovation-from-above became evident to me while facilitating a university-school partnership between 2014 and 2018 with The Innovation School (a pseudonym), an urban public high school. The school was part of a district initiative to bring research-based innovations to students who, due to enrollment caps or location, might not qualify for the city's more selective project-based learning or STEM programs.

The Innovation School was organized around three makerspaces, where students could complete inquiry-based projects for their core science, math, and humanities courses. Classes were asynchronous; students worked through the curriculum at their own pace, supported by one-to-one devices, peer collaboration, and weekly conferences with teachers. Teachers used competency-based standards rather than conventional grades for evaluation. On paper, the school was a model of the research-based innovations that many schools have rushed to adopt.

In practice, however, these innovations were not delivering on their promises. Though some students thrived in the flexible environment and used the makerspaces to create personally meaningful and academically rigorous projects, others were disoriented by its openness. The makerspaces, for instance, were often noisy, forcing those who had difficulty concentrating to seek refuge in quiet hallways. Teachers, too, faced challenges supporting students' asynchronous learning. Though they had rich one-on-one conferences with students each week, there was less time for addressing students' in-the-moment questions during class.

Over time, these factors became ongoing frustrations. When teachers and research team members debriefed about successes and challenges, many educators voiced confusion. They seemed to be doing everything right, using the most up-to-date research-based practices. Why were only a handful of students flourishing?

Students at "The Innovation School" work quietly in the recently created Literacy Lab.

Some wondered if they weren't implementing these innovations correctly. Others wondered if perhaps years of routinized schooling had made students unable to adapt to these latest innovations.

Such responses are a side effect of innovation-from-above. After all, if "research-based" innovation moves linearly, then anything that doesn't feel like progress must be user error, not a problem with the innovation itself. Over the years that I partnered with these teachers, we gradually came to unlearn this impulse—to recognize that the problem was not teachers or students, but the way we were thinking about how innovation works. It was through this process that we began articulating an alternate orientation: *innovation from below*.

Innovating from Below
Unlike the linear model, innovation-from-below uses classrooms as the starting point for meaningful transformation in schools. It does so through four phases of inquiry: *everyday practices*, *emergent*

inventions, *values-aligned research*, and *sustainable infrastructures*.

Phase One: Everyday Practices
Innovation begins with teachers reflecting on their goals and commitments for classrooms, and the obstacles that prevent instruction and learning from reaching these ideals.

The Innovation School teachers were committed to nurturing students' autonomy, both in hands-on projects and self-directed study, but the makerspaces that were meant to support this aim were having uneven effects. The openness of the classroom structure that allowed some students to thrive was disorienting others—leaving many students to withdraw from the asynchronous lessons altogether out of confusion about the assigned tasks.

Instead of viewing this as a problem of teachers' implementation

> **Much of what traffics as innovation does not actually emerge in response to the problems or needs of teachers or students, but as an experimental application of someone else's research and development agenda.**

or students' abilities, innovation-from-below offered an alternate explanation. Though the makerspaces were effective at promoting one form of autonomy (hands-on projects), they could also work against others (forms of self-directed study that often precede, or accompany, hands-on learning). Without a space for focused work and clear guidance for how to navigate the asynchronous curriculum, it was more difficult to support important aspects of autonomous learning. Identifying this incongruity helped clarify an under-lying problem—how to reconcile competing forms of "autonomy"—which teachers could then work to address.

Phase Two: Emergent Inventions
The second phase involves attending to problems of practice by looking for already-existing solutions emerging in classrooms. Students and teachers are inventive and resourceful. When they face obstacles, they don't wait for innovations-from-above to drop from the sky; they devise creative workarounds themselves. Innovation-from-below means recognizing these adaptations as a foundation for more lasting transformations.

Taking this view, the Innovation School teachers noticed two practices emerging in the makerspaces. First, in the absence of a quiet work area, many students were taking refuge in other corners of the school. Second, since teachers were often occupied in one-on-one conferences, students

were seeking out members of our research team for help with in-the-moment questions about their work. Detecting these patterns allowed teachers and researchers to ask how we might learn from these sponta-neous workarounds and use them as a foundation for building more sustainable solutions.

Phase Three: Values-Aligned Research
This phase involves seeking out research-based resources that enrich the on-the-ground solutions already in use and are aligned with the values and commitments of the school. Taking this stance helps shield edu-cators from the pressures of adopting the latest innovation and focuses on tailoring resources to their specific school or classroom context.

The Innovation School teachers reviewed resources related to school libraries, literacy makerspaces, academic support centers, and tutoring spaces, and determined that none of these innovations would independently suffice. Students needed a hybrid of them. Thus, the Literacy Lab was born.

Enlisting students to help in the design, we turned a free room in the school into a quiet work area, equipped with books and resources to support self-directed study and hands-on project planning (Stornaiuolo, Nichols, & Vasudevan, 2018). Students were enthusiastic throughout this process. Many volunteered to stay after school

to assist with assembling book-shelves and organizing lab mate-rials. The Literacy Lab quickly became a go-to space for students to engage in focused independent and collaborative work.

In a key move, we staffed this room with research team members who could aid students as needed, providing additional support when questions arose that teachers in the makerspaces were not always able to address. Far from an innovation-from-above, the Literacy Lab was the result of using values-aligned research to enhance the problem solving already at work in the school.

Phase Four: Sustainable Infrastructures
Innovation-from-below differs from the linear model of innovation-from-above by suggesting that, though "disruption" may sound exciting, the real work of innovation lies in the maintenance and care necessary for sustaining transformative teaching and learning over time.

In the Innovation School, we knew the initial version of the Literacy Lab we devised was not self-sustaining. The model depended on research team members to staff the space, and our partnership would not last forever.

The team deliberated with teachers and students about what infrastructures might allow our innovation to endure and agreed to make the Literacy Lab a student-run initiative. Interested students would

be trained—first by our research team, and eventually by a faculty advisor—as peer coaches who could staff the lab to offer tutoring and support to others. These coaches would have regular meetings with a faculty advisor, where they would discuss the workings of the lab and what additional supports they might need (e.g. training, staffing, books). Because of the school's competency-based grading system, these students would also earn credit by documenting their tutoring practices and using them to demonstrate mastery of concepts in their advisory meetings.

By the third year of the partnership, the Literacy Lab was an entirely self-sustaining program maintained by a dozen student coaches.

From Practice to Research (and Back Again)

The Literacy Lab illustrates the powerful possibilities that reveal themselves when we conceptualize innovation not as something dropped into schools from above, but as something cultivated through everyday practices, emergent inventions, values-aligned research, and sustainable infrastructures.

Innovations-from-above rarely offer such assurances. If readers of this article were to try to implement a Literacy Lab in their own school, they could not expect the same results. Instead, if you were to go through the phases of innovating-from-below, then you might find values-aligned resources in the Literacy Lab that could become the inspiration for your own on-the-ground innovating.

Such an orientation frees schools from the pressure to seek out the latest gadgets and expensive quick fixes and lets them focus, instead, on the innovations that matter most: those that best serve the situated needs of students. Though the Innovation School was not an especially well-resourced school (even its makerspaces were simplified versions of the technology-rich environments associated with the term), investing in an innovation tailored to the school itself yielded far more powerful results than might have been possible with a flashier (and pricier) "disruptive" solution.

In this way, innovation-from-below highlights how moving "from practice to research" reframes, instead of downplays, the importance of research. Innovation-from-below recognizes that educators play a crucial role in not just applying, but producing and sharing, research-based innovations. Indeed, in the years since the Literacy Lab formed, its students and teachers have presented at research conferences and even co-authored research articles (Plummer et al., 2020).

By wresting innovation from the domain of outside experts or product developers, innovation-from-below invites educators to rethink the relationship between research and practice and their place within that relationship. In doing so, it opens opportunities for transformative teaching and learning nurtured through lived classroom experiences. **EL**

References
Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, MA: Harvard Business Review Press.

Plummer, E. C., Stornaiuolo, A., Li, G-G-S., Lott, J., Marrero, C. L., McLaine, D. Z., et al. (2020). Participatory ethnography: Developing a high school writing center in partnership. *Perspectives on Urban Education, 16*(1), 1–8.

Schumpeter, J. (1939). *Business cycles: A theoretical, historical, and statistical analysis of the capitalist process*. New York: McGraw Hill.

Stornaiuolo, A., Nichols, T. P., & Vasudevan, V. (2018). Building spaces for literacy in schools: Mapping the emergency of a literacy makerspace. *English Teaching: Practice & Critique, 17*(4), 357–370.

Urban, W. J. (2010). *More than science and Sputnik: The National Defense Education Act of 1958*. Tuscaloosa, AL: University of Alabama Press.

T. Philip Nichols is an assistant professor of curriculum and instruction at Baylor University. He is the editor of *Contemporary Issues in Technology and Teacher Education (English)*, and the author of *Innovation from Below: Infrastructures for Equity in 21st Century Schools*, forthcoming from Teachers College Press. Follow him on Twitter @philnichols.

REFLECT & DISCUSS

How have you seen the "innovation-from-above model" at work in your school?

What steps can you take to support an innovation-from-below approach to solving problems of practice in your school?

How can leaders support a culture that gives teachers and students the resources they need to lead problem solving?