Toward a theory of Youth Pedagogical Development: How young people learn to teach

Author 1, Author 2, Author 3, Author 4, Author 5, Author 6, Author 7, Author 8

ABSTRACT

This article introduces the concept of Youth Pedagogical Development (YPD), defined as an ongoing process of youth learning to teach other youth as they engage with academic knowledge and pedagogical strategies. To conceptualize and provide empirical support for YPD, we look at three case studies with community-based organizations that teach young people how to teach and mentor in STEM. We examine how youth's teaching, mentoring, and learning from other near-peer youth transforms how youth identify as STEM teachers, learners, and doers. We propose that this development of youth teaching other youth creates more humanizing learning spaces where Black and Brown youth feel supported, cared for, and agentic.

OBJECTIVES/PURPOSES

Radical changemaker and founder of The Algebra Project, Robert "Bob" Moses wrote in *Radical Equations*, "I think you got to go where the kids are. And that place is different from the place where teachers have been taught to be" (Moses & Cobb, 2001, p. 117). Our paper explores how youth learn how to teach in informal learning spaces through their participation in community-based organizations (CBOs), which offer a "place […] different from the place where teachers have been taught to be." First, we propose a framework of Youth Pedagogical Development (YPD), which consists of four components: teaching and learning, pedagogy and instructional strategy, disciplinary literacies and ideas, and identity. Next, we explore the practices of three CBOs in how they create environments where youth learn to teach to illuminate these components of YPD. Finally, we use the YPD framework to argue that youth teaching is "real" teaching that can create more humanizing spaces.

POSITIONALITY

Seven of us are part of a research team that consists of three principal investigators who are professors, three doctoral students, and one masters student. One of the graduate student authors is also a director at one of the CBOs featured. The remaining author is a college math literacy worker at one of the CBOs and a participant in the research study who is not affiliated with the university. Six of the authors identify as people of color. The authors' multi-institutional, intergenerational, and ethnically diverse nature reflects the cascading, collaborative teaching and mentoring spirit of the research project.

THEORETICAL FRAMEWORK: YOUTH PEDAGOGICAL DEVELOPMENT

When we say *youth*, we generally refer to people ages 13 through 25, who, if they have a formal academic affiliation, are typically high school students and college undergraduates. *Pedagogical development* refers to the interrelated, multimodal, and iterative transformation that a person undergoes when learning to teach.

When youth are positioned to teach other youth, they participate in an ongoing process of learning to teach, or *Youth Pedagogical Development (YPD)*. That is, as youth engage with disciplinary academic knowledge and attune to pedagogical strategies, this transforms the ways in which youth come to identify as teachers, learners, and doers in that discipline. We introduce four interrelated components of YPD (see Figure 1):

1. *Teaching and learning:* Young people engage in the act of teaching other young people and learning with them.
2. *Pedagogy and instructional strategy:* Young people learn about how to teach other young people.
3. *Disciplinary literacies and ideas:* Young people develop disciplinary literacies and further their academic knowledge.

4. *Identity:* Young people continue to transform how they see themselves as teachers, learners, practitioners, and changemakers.

Below, we distinguish between these components and theorize them in more detail through case studies.

METHODS

For several years, the research team partnered with three organizations in the Greater Boston Area that employ youth and support their development as teachers and mentors: The Young People's Project (YPP); Learn 2 Teach, Teach 2 Learn (L2T); and the Teacher Learning Program (TLP). YPP is a national organization based in Cambridge, MA in which college students mentor high school students and work together to design mathematics programming for younger students. L2T is a program at a vocational high school that develops high school and college mentors to learn emerging technologies in making and teaching STEM in Boston community centers. TLP (pseudonym) is a public school district-based after-school teacher pipeline program that supports middle and high school students to become educators through mentoring and teaching opportunities. A total of 52 participants across the three CBOs agreed to be part of the study.

Members of the research team attended weekly meetings during the school year and daily programming during the summer for these three CBOs. The researchers collected 400 hours of ethnographic fieldnotes (Emerson et al., 2011), video, and audio recordings. Key participants from the CBOs were interviewed using a semi-structured interview protocol.

Our larger paper includes data from all three case studies. Here, we present one case study due to space constraints.

DATA

CASE STUDY 1: THE YOUNG PEOPLE'S PROJECT

Each meeting at YPP is a gathering of high-school-aged Math Literacy Workers (MLWs), undergraduate-aged College Math Literacy Workers (CMLWs), and a few non-youth staff members. The following are four practices that the authors have observed MLWs and CMLWs take up in order to design mathematics programming for their younger audience. We describe each practice in this section and later elaborate on how these practices connect to various components of YPD.

Practice 1: Do an activity together.
Much of the curriculum for the YPP programming is around The Flagway Game (Flagway; Moses et al., 1998), a physically active game that involves the Mobius Function. Players run through a tree-like structure on the ground and categorize positive integers into one of three colors based on their prime factorization.

To prepare for the teaching of Flagway, CMLWs learn the game first. They teach it to the MLWs, who then teach it to the elementary and middle school students at YPP's outreach sites. For the MLWs, the process of learning to teach the game involves undergoing a series of workshops led by CMLWs. These workshops review key vocabulary terms, prime factorization, and algebraic forms. The culmination of this process is a collaborative development from scratch, but with support, of the mutually exclusive groupings that would allow integers to be classified according to the Mobius Function.

Practice 2: Lesson plan together.

Most of YPP's outreach programming—where CMLWs and MLWs work with younger students—takes the form of a one-hour lesson. To plan for this lesson, the CMLWs and MLWs sit in one room and toss ideas back and forth to come up with a 10-15-minute icebreaker and about 40 minutes of mathematics activities. Every lesson concludes with a 5-10-minute debrief. One person suggests an idea for an icebreaker or activity, and another person might ask for an explanation or question the logistics. One person is designated as the facilitator and writes the instructions for the activity on a shared document clear enough for someone else to be able to follow. All facilitators are responsible for knowing the rules for all of the lesson's activities. The entire lesson is developed collaboratively in about 30 minutes.

Practice 3: Debrief together, a lot.

Debriefing—a collective analysis and reflection at the end of each day or outreach session—happens constantly in YPP spaces. There are two instances of debriefs that happen most commonly. One is where CMLWs facilitate debriefs with MLWs, and another is where MLWs facilitate debriefs with the younger students at YPP's outreach sites. Debriefs hold a consistent structure: what went well, what did not go as well, and what could be improved for next time. This debrief session is a space where MLWs can hold each other and their students accountable for what happened that day. The debrief conversations often include feedback on activities, individuals' participation, or logistics.

Practice 4: Practice mathematics together.

The mathematical content knowledge that YPP's Flagway curriculum requires is multiplication facts and divisibility rules. However, it is not always the case that the MLWs already have their multiplication facts and divisibility rules memorized. Part of their MLW preparation one summer involved reviewing this content together through an activity led by CMLWs. Even though only some MLWs needed help with multiplication, everyone engaged with the remediation activity. The goal, as one participant said, was not to "single people out."

DISCUSSION

Using the YPP case study, below we elaborate on the four components of YPD. (The full paper will discuss YPD across all three case studies.) Table 1 summarizes how YPP's practices connect to the four components of YPD.

Teaching and Learning

In order for youth to learn to teach, they must have opportunities to teach! This component of YPD honors the relational process that is teaching and learning simultaneously when authority is distributed in learning environments (Author et al., 2017; Cobb et al., 2009; Nasir, 2002).

All four of YPP's practices work together to support CMLWs and MLWs to be ready to lead activities in their outreach spaces. They practice their own activities as students before leading them (Practice 1), collaborate with one another to lesson plan (Practice 2), engage in reflective practice with each other and with their outreach students (Practice 3), and support each other in making sure all the facilitators know the mathematical content (Practice 4). This constant cycle of teaching and learning for CMLWs and MLWs is deeply related to their commitment to their outreach students, the mathematics itself, and each other.

Pedagogy and Instructional Strategy

When youth are positioned as teachers, mentors, and tutors, they learn how to teach. This component of YPD describes ways in which young people develop pedagogical skills.

The first three of YPP's practices explicitly help youth develop pedagogical skills. When CMLWs lead MLWs through an activity that MLWs will have to lead (Practice 1), the MLWs experience the productive struggle of the task first-hand. When the MLWs then collaboratively generate the activities they would lead in their next outreach lesson (Practice 2), they engage in a negotiation of coordinating the logistics of each activity, as well as a short rehearsal in explaining the rules of the activity. When CMLWs debrief with MLWs and when MLWs debrief with their outreach students (Practice 3), they build a consistent practice of reflection that helps inform their next day's lesson.

Disciplinary Literacies and Ideas

The act of teaching a discipline, such as mathematics, enables the "teacher" to hone in on their own disciplinary content knowledge, literacies, and ideas. Through the acquisition of pedagogical content knowledge (Shulman, 1986), the youth teacher, mentor, or tutor furthers their own disciplinary knowledge and literacies (Author et al., 2016; Author et al., 2019) and ability to do that discipline as part of situated social practices (Heath, 1983; Street, 2003), which is the focus of this component of YPD.

When the CMLWs led the MLWs through an interactive mathematical activity that contained new mathematical content (Practice 1), the MLWs deepened their own knowledge of number theory in order to understand the core mathematics of Flagway. When the MLWs needed

more practice with their multiplication and divisibility rules (Practice 4), the CMLWs facilitated an activity for the MLWs to practice these ideas in a safe, supportive environment.

Identity

As youth are positioned as teachers, mentors, and tutors to other youth, their own conception of self transforms as they perform the role (Lave & Wenger, 1991; Furman & Calabrese Barton, 2006; O'Neill, 2005). How they identify as a teacher, a learner, and practitioner or "doer" of the discipline grows with their engagement in the teaching of the skills and concepts in that discipline (Holland et al., 1998; de Peuter, 1998).

When the CMLWs lead the MLWs and the MLWs lead their students in a debrief (Practice 3), they strengthen their relationships with one another. All the youth are given the opportunity to critique the day's activities, and the facilitators reflect on their teaching. Both when the math literacy workers practice new mathematical tasks (Practice 1) and old mathematical skills (Practice 4), they do so in a supportive environment and strengthen how they see themselves as teachers, learners, and doers of mathematics.

SCHOLARLY SIGNIFICANCE

Our paper's goal is to center the work of youth who choose and learn how to be near-peer educators at CBOs in order to signal the experience as worthy and legitimate. If "formal" teaching often becomes a cycle of perpetuating dehumanizing practices (Paris & Alim, 2014, Carter Andrews et al., 2019), then we must look to how youth learn to teach outside of these formal teacher-education spaces. By proposing YPD and illuminating its four interrelated components, our research adds to scholarship on understanding how youth learn to teach. We argue that youth can be effective teachers, for YPD is a way to re-humanize disciplinary learning spaces for youth. No matter the direction, discourse, or debate around what it means to teach, we must move together. Our posterity is secured as long as we leverage the intelligence of *all* funds of knowledge, whether it be familiar or *unconventional*.

REFERENCES

Author et al., 2016

Author et al., 2017

Author et al., 2019

Carter Andrews, D. J., Brown, T., Castillo, B. M., Jackson, D., & Vellanki, V. (2019). Beyond damage-centered teacher education: Humanizing pedagogy for teacher educators and preservice teachers. *Teachers College Record*, *121*(6), 1–28.

Cobb, P., Gresalfi, M., & Hodge, L. L. (2009). An interpretive scheme for analyzing the identities that students develop in mathematics classrooms. *Journal for Research in Mathematics Education*, *40*(1), 40–68.

de Peuter, J. (1998). *Bakhtin and the Human Sciences: No Last Words* (By pages 30-48). SAGE Publications Ltd. https://doi.org/10.4135/9781446278949

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing ethnographic fieldnotes*. University of Chicago press.

Furman, M., & Calabrese Barton, A. (2006). Capturing urban student voices in the creation of a science mini‑documentary. *Journal of Research in Science Teaching*, *43*(7), 667–694.

Heath, S. B. (1983). *Ways with words: Language, life and work in communities and classrooms*. Cambridge University Press.

Holland, D., Lachicotte Jr, W., Skinner, D., & Cain, C. (1998). *Identity and agency in cultural worlds*. Harvard University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge university press.

Moses, R. P., & Cobb, C. E. (2001). *Radical equations: Math literacy and civil rights*. Beacon Press (MA).

Moses; Robert Parris, Moses; Maisha V., & Moses; Tabasuri W. (1998). *Methods of playing games which enhance mathematical understanding* (Patent No. 5520542). https://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&u=%2Fnetaht ml%2FPTO%2Fsearch-adv.htm&r=1&f=G&l=50&d=PTXT&p=1&S1=5520542&OS=5 520542&RS=5520542

Nasir, N. S. (2002). Identity, goals, and learning: Mathematics in cultural practice. *Mathematical Thinking and Learning*, *4*(2–3), 213–247.

O'Neill, T. (2005). Uncovering student ownership in science learning: The making of a student created mini‑documentary. *School Science and Mathematics*, *105*(6), 292–301.

Paris, D., & Alim, H. S. (2014). What are we seeking to sustain through culturally sustaining pedagogy? A loving critique forward. *Harvard Educational Review*, *84*(1), 85–100.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4–14.

Street, B. (2003). What's "new" in New Literacy Studies? Critical approaches to literacy in theory and practice. *Current Issues in Comparative Education*, *5*(2), 77–91.

FIGURES AND TABLES
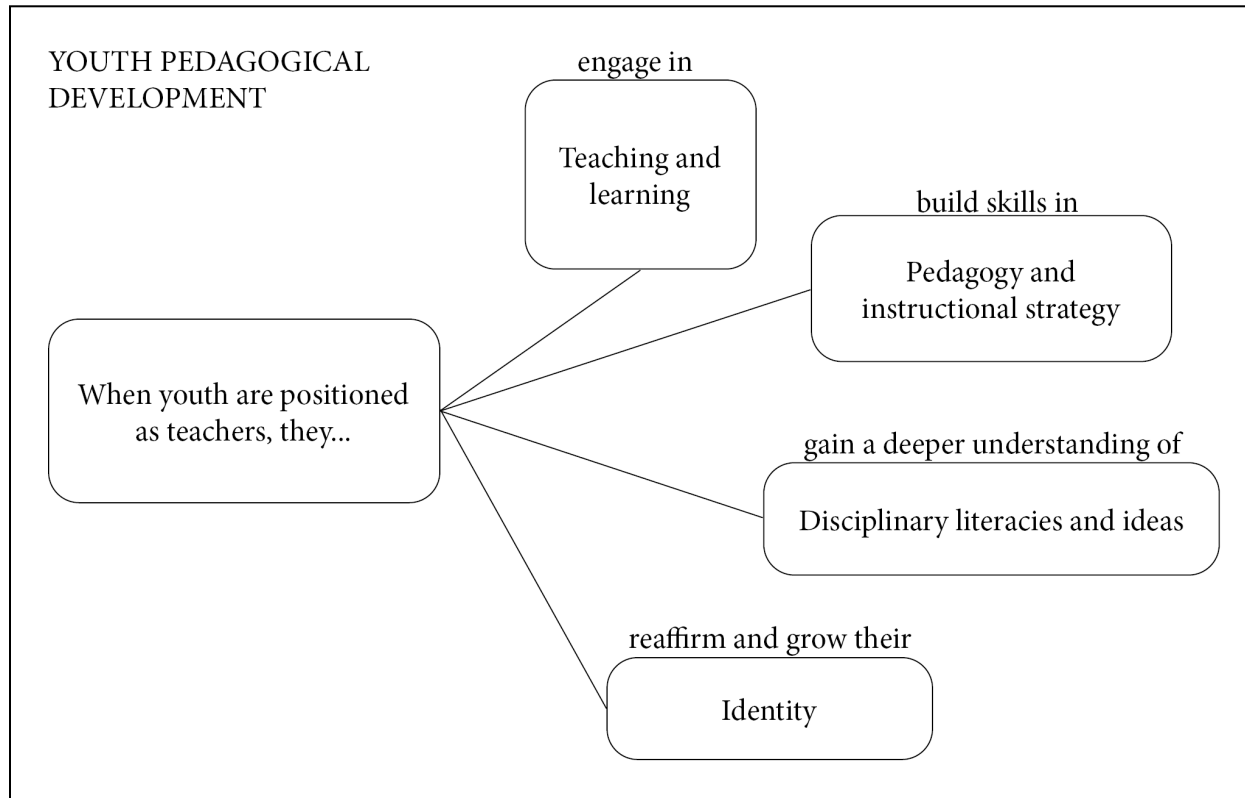
Figure 1. Four Components of Youth Pedagogical Development.

YOUTH PEDAGOGICAL DEVELOPMENT

engage in

Teaching and learning

build skills in

Pedagogy and instructional strategy

When youth are positioned as teachers, they...

gain a deeper understanding of

Disciplinary literacies and ideas

reaffirm and grow their

Identity

Table 1. How YPP's Practices Connect to Youth Pedagogical Development.

Components	Qualities	YPP Practices
1. Teaching and learning	Collaborative, constant, cyclical, relational	1, 2, 3, 4
2. Pedagogy and instructional strategy	Collaborative, iterative, reflective, relational, spontaneous	1, 2, 3
3. Disciplinary literacies and ideas	Deepened, illuminating, reinforcing, supportive, transparent	1, 4
4. Identity	Affirming, empowering, relational	1, 3, 4