

Youth Pedagogical Development in Youth Teaching Rehearsals

YPD in Youth Teaching Rehearsals

How young people navigate multiple roles and identities while rehearsing to teach younger students to program robot Finches

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This study explores how a few high school-aged youth, employed as Youth Teachers at an after-school fabrication laboratory (FabLab), talk to one another as they rehearse part of a lesson in preparation to teach elementary school-aged youth to program robot Finches. Rehearsals, which usually consist of running through lines, walking through direct instruction, and transitioning between speakers in front of other Youth Teachers, are a regular practice at Learn 2 Teach, Teach 2 Learn as youth prepare to teach at an outreach site the next day. Using interaction analysis of one typical rehearsal, we illuminate linguistic shifts as youth negotiate identities, meanings, and leadership. These movements help us understand how youth teachers navigate the multiplicities of their identities as Black and Brown young people positioned as teachers while learning to program.

CCS CONCEPTS • Computing education

Additional Keywords and Phrases: Youth pedagogical development, Youth teaching, Identity development

1 INTRODUCTION

This study views youth teaching in outside-of-school informal learning spaces—such as a fabrication laboratory—as real teaching. When youth who are engaged in STEM literacies through learning to use fabrication tools prepare to teach

younger students how to use these tools, they undergo a process we call *youth pedagogical development* (Yu et al., 2023). In this case study, we look deeply into how youth teachers at a community-based organization speak to one another during a rehearsal for teaching about programming small robot Finches to younger students the next day. The organization of interest is Learn 2 Teach, Teach 2 Learn (L2TT2L), a youth fabricating, learning, and teaching space founded in 2002 by the late activist Mel King that employs predominantly youth of color in the Greater Boston Area to learn to use fabrication tools and teach with those tools. Rehearsals are a regular practice at L2TT2L. Using interaction analysis of one typical rehearsal, we interpret youth's engagement in various forms of talk as a negotiation of their identities and roles as young people, teachers, learners, and STEM doers.

2 LITERATURE REVIEW

Approximations of practice (Grossman et al., 2009)—such as role-playing simulations, micro-teachings, and rehearsals—are commonly used in teacher preparation spaces and studied in teacher preparation research. Approximations of practice are notably “not the real thing” (p. 2078), and engage the learning teacher in deliberate practice with varying degrees of authenticity, depending on how involved the learning practitioner is, how complete the approximation is to real practice, and how close to real time the approximation takes place. In pre-service teacher preparation, rehearsals are often done among student peers or with teacher-educators, with one learning practitioner role-playing as “teacher” and many others role-playing as “students.” These rehearsals vary in degrees of scriptedness and can perpetuate deficit perspectives about the “students” that the adult learners portray (Barno & Benoit, accepted).

Our study explores a rehearsal practice among high-school aged youth who learned fabrication tools together (e.g., 3D printing, laser cutting) just weeks prior and who would be teaching about these tools together to younger students the next day. We pay particular attention to how the youth teachers shift their language between their role-playing rehearsal practice and their conversing with one another about other related teaching responsibilities during a single 20-minute block of time allotted for “rehearsing.” We interpret youths’ talk during this allotted rehearsal time through an emerging framework we call *youth pedagogical development* (Yu et al., 2023).

3 THEORETICAL FRAMEWORK: YOUTH PEDAGOGICAL DEVELOPMENT

Youth Pedagogical Development (YPD) offers a way to explain how youth (ages 14-24) learning to teach (i.e., *youth pedagogy*) distribute authority as they engage in interwoven teaching and learning of disciplinary ideas and attune to responsive pedagogical strategies that support the learning of others. Youth teaching transforms the ways in which young people come to identify as doers, teachers, and learners across academic disciplines, including STEM (Tucker-Raymond et al., 2016). We conceptualize *development* as the socially, culturally, and historically situated processes through which individuals learn by doing, which involves negotiating and possibly transforming those processes together (Vygotsky & Cole, 1978). To further theorize YPD, we highlight its interrelated components—*interwoven teaching and learning*, *distributed authority and collective responsibility*, and *responsive pedagogy*—all of which are mediated through and made possible by *centering youth identities and culture*.

Oftentimes, young people employed as facilitators in informal environments are not formal experts in whatever it is they are supposed to teach. In YPD, *teaching and learning are explicitly interwoven* as young people learn about and engage with disciplinary ideas, literacies, and practices for the purpose of teaching them. Through that preparation for teaching, they learn more about those disciplinary ideas, literacies, and practices. In these ongoing and iterative processes, new youth teachers, working in collaboration with more experienced ones, learn alongside the children they are poised to “teach.” This component of YPD disrupts normative distinctions between “teacher” and “learner,” as well as the idea that only “experts” in a discipline can make meaningful intellectual contributions.

When the conceptual barriers of teaching and learning are porous, as in the youth organizations that we study, mentors and mentees in these organizations develop an understanding that *authority is distributed and responsibility is shared* amongst all members of the group. This component of YPD recognizes that agency in a group setting is relational: while individuals retain their agency, the actions that an individual takes as part of a group reflects how the individuals relate to

one another. This constant negotiation of authority and responsibility in relation to one's positioning in the group informs the group's collective movement. When authority is distributed, the opportunity to teach and learn ideas, literacies, and practices is a collective endeavor rather than an individual one.

Thirdly, in YPD, *responsive pedagogy* refers to the actual instructional strategies and facilitation moves that the youth use, as well as the climate of the teaching and learning space that they share with the younger learners that they serve. Drawing on the youths' own community and cultural wealth (Yosso, 2005), the instructional strategies that young people engage in when teaching other young people with proximally close age, socio-economic class, and culture are culturally responsive (Gay, 2018), relevant (Ladson-Billings, 1995), and sustaining (Paris, 2012). Sometimes organizations set up particular spaces to help draw out and make explicit these pedagogical strategies to form the nexus of responsive pedagogy in youth teaching.

Finally, or even "firstly," permeating and mediating YPD are *youth identities and culture*. Identities are situated within specific social practices and developed over time as part of social interaction and negotiation with others (Nasir & Cooks, 2009; Gee, 2000). This component is important to understanding that YPD will look differently in different youth teaching contexts because the relationships between the commitments, practices, and engagements of each unique organization and the youth teacher participants will be different.

4 RESEARCH QUESTION

How does participation in a rehearsal practice contribute to youth teachers' pedagogical development?

5 METHODS

The data in this paper come from a multi-year, NSF-funded study of youth teaching and mentoring in three community-based organizations, including L2TT2L. L2TT2L employs predominantly students of color from the Greater Boston Area to serve as high school-aged Youth Teachers and college-aged College Mentors. The Youth Teachers and College Mentors work together in various groups to design mathematics and engineering workshops for elementary, middle, and high school-aged students in local public schools and camps during the academic year and summer. To prepare for teaching at outreach sites, teaching groups—which are made up of several Youth Teachers and a College Mentor—first rehearse their lessons amongst themselves. During this rehearsal, they assign each member sections to teach, arrange the speaking order, and practice explaining and teaching their parts. Within their groups, the Youth Teachers and the College Mentor give each other feedback about their teaching. After about an hour working through this rehearsal in their small groups, each group then rehearses their lesson in front of all Youth Teachers and College Mentors. Similar to the small group in which all participants provide feedback to each other, large group rehearsals work in the same way. All teaching groups are expected to provide feedback to each other.

For this paper, we focus on a 20-minute-long audio recording of a small group rehearsal where five Youth Teachers prepare to teach their Feisty Finch lesson. This rehearsal took place the day before their first day of teaching at an outreach site. As a research team of seven, we adapted Jordan and Henderson's (1995) interaction analysis protocol for audio by noting such features as timing, cadence, pitch, and vocal inflections. We collectively listened to the audio recording of the rehearsal, read the transcript, and juxtaposed our findings with fieldnotes before identifying three themes based on our noticings. This iterative process allowed us to view the points in the transcript that supported YPD's tenets.

6 FINDINGS

The day before a planned teaching engagement at an outreach site, Youth Teachers and College Mentors at L2TT2L engage in a series of rehearsals to prepare for their teaching. The day-long activities at the outreach site are broken off into segments, each of which is led by a small group. The Youth Teachers and College Mentors involved in the next day's teaching activities first rehearse in their small groups before simulating the full day's activities in front of the entire

contingency of Youth Teachers and College Mentors. During the role-playing rehearsals, Youth Teachers and College Mentors sometimes interrupt each other to give feedback.

In this particular rehearsal, we hear three Youth Teachers—James, Sofia, and Robin—take their turns to practice teaching how to program the movement, sights, and sounds of small robots called Finches. These Finches are about the size of a roll of duct tape and, while connected via Bluetooth to a computer, can be programmed using Snap!, a blocks-based drag-and-drop programming language developed by University of California, Berkeley. In this same group are Mateo and Fatima, fellow Youth Teachers who play “students” and offer feedback on their colleagues’ teaching.

In this section, we share four excerpts from this rehearsal and provide some context and interpretation for each of them. All names are pseudonyms, and we have added gray highlighting, bolding, and all-capitals for emphasis. We thematize these excerpts and connect them to YPD in the Discussion.

6.1 Excerpt 1

This first excerpt begins as James, one of the Youth Teachers, signals to the other Youth Teachers that he is going to start practicing his direct instruction of how to program the Finch’s wheels.

- (6) James: Alright. Let’s get back to it, shall we? Alright, so we just set our right arrow’s wheel power to left 50, and we’re going to set the right wheel to negative 50, so that it’s even and it can turn right.
- (7) Sofia: I wanted to do it.
- (8) James: Oh, right. I gotta...
- (9) Sofia: Can I hold the camera like if I’m vlogging?
- (10) Mateo: Nah, nah. Let her, let her.
- (11) Sofia: Yes, can I be vlogging?
- (12) James: Anyways.
- (13) Sofia: Can you please let me vlog?
- (14) James: And now, I’m just going to move this so y’all can see. And now, we’re going to set the left arrow. The left arrow is literally the opposite of the right arrow, just set left to negative 50 and right to 50.
- (15) Robin: No you’re not.
- (16) James: Okay?
- (17) Sofia: Aaron got his back.
- (18) Robin: Don’t lie to him, Aaron.
- (19) Sofia: Aaron got his back forever.
- (20) Robin: Period. I wish you were like that.
- (21) James: And we have a fifth one so that you can stop it whenever you need to. Wi—
- (22) Fatima: It says “always stop.”
- (23) James: Huh?
- (24) Fatima: It says “always stop.”
- (25) James: No.
- (26) Fatima: Yeah, it says “stop.”
- (27) James: It would, it would turn off any lights you have though. So in this case we just set the wheel power to absolute zero.

James signals to his fellow Youth Teachers that he is going to start the “rehearsal” by using the verbal transition marker, “Alright. Let’s get back to it, shall we?” In this first turn (6), James makes his voice louder, slower, and more enunciated compared to the exchange of and with his peers between (7) and (13). While James is trying to rehearse his teaching, it seems as though his peers are focused on a camera that Sofia has in her hand rather than paying attention to his teaching. He transitions his voice into the louder, slower, and more enunciated pattern in (14), again signaled by another transition marker, “And now.” The tone and diction of James’ voice in the highlighted turns (6), (14), (21), and (27) when he

practices his instructing are markedly different from his voice when he engages with his peers, such as in (8), (12), (23), and (25).

6.2 Excerpt 2

Right as James finishes demonstrating arranging and setting the blocks to program the wheel's movement, Mateo, another Youth Teacher, role-plays a "student," and chimes in:

- (28) Mateo: I didn't understand NOTHING you said from the beginning. But I know what you mean.
- (29) James: Okay good. Any questions?
- (30) [...]
- (31) [...]
- (32) James: Any questions?
- (33) Fatima: Do you think we are students?
- (34) James: That's the entire prompt. That is the entire prompt here.
- (35) Mateo: What is this?
- (36) James: I have no idea what this is. It's literally just there, bro. It's there by default.
- (37) Fatima: Okay, keep going.
- (38) James: Anyways.

Mateo's turn (28) spans the length of two articulated complete thoughts, or statements, but each statement is delivered differently. The first, "I didn't understand NOTHING," is spoken in a slower cadence, with a louder, more emphatic pause on the word "NOTHING." His second, "But I know what you mean" is uttered more quickly and almost under his breath. This difference in cadence from one statement to the next indicates to James that Mateo is pretending to be a student who does not understand what James just explained, but that Mateo, the Youth Teacher himself, was able to follow. He also signaled to James in the two different ways that he uttered the two statements in his turn that he did not intend for James to actually try to explain again how to program the wheels to move the Finch.

In the second half of the excerpt above, lines (32) through (38), prompted by James' question, Fatima and Mateo jump between identities, between being a Youth Teacher who knows what James is explaining but observing for the first time and being a student learning programming for the first time. On the one hand, Fatima is slightly confused about her role in this simulation, as suggested by her inquisitive tone directed to James (33). James clarifies to Fatima (34) that the "prompt" is for observing Youth Teachers to role-play as students. On the other hand, Mateo, understanding his role-playing responsibility, asks James a question as a "student" (35).

6.3 Excerpt 3

In the following excerpt, there is a guest visiting the space who Robin calls out for sleeping during the rehearsal. The guest quickly replies that they do this when they're in school, implying that this space would be an appropriate place for the guest to continue sleeping while a "teacher" is presenting. The other Youth Teachers respond:

- (75) James: Fair enough.
- (76) Fatima: Yeah, but **here is not school**.
- (77) Robin: Yeah, it's **not school**.
- (78) Mateo: Yeah, this **isn't school**, it's **work**.
- ...
- (79) Robin [to Guest]: You don't even **work**.
- (80) Mateo: Does she just come here for **fun**?
- (81) Robin: What?
- (82) Mateo: She comes here for **fun**. That's **weird**.
- (83) Robin: Mateo, do not call [Guest] **weird**. You're **weird**.
- (84) Robin [to Guest]: Mateo just called you **weird**.

- (85) Mateo: You can win money to come **here**.
 ...
 (86) Mateo: You don't need to come **here** for free.

In this exchange, we get a glimpse of how the Youth Teachers see their work at L2TT2L and what it means to *do school* and *do work*, as the Youth Teachers negotiate the meaning of school and work. This conversation is interesting because these same Youth Teachers had just spent the past four weeks learning how to use various fabrication tools, yet at this moment, they are emphatic that (76) “here is not school.” As Mateo points out, what distinguishes their job from school is at least the fact that they are getting paid to be here.

In the other bolded words in this excerpt, terms emerge that are also being negotiated in this exchange. The word *fun* (80, 82) does not imply that Youth Teachers and College Mentors do not find joy in their work, but rather is connected to receiving payment for work. That is, coming to *work* (78) *for free* (86) would mean coming for *fun* (82), which Mateo evaluates as *weird* (82). This excerpt illuminates that, during their small pockets of relationship building in between practicing their pedagogy, Youth Teachers engage in relational meaning-making of their purpose, role, and work in this space. They make meaning together by layering off of each other's words, from one turn to the next.

6.4 Excerpt 4

In this last excerpt, Fatima makes a bid for the group to return to the rehearsal, (119) “Alright, come on. Let's go.” The group briefly discusses whether to wait for Andres—the College Mentor in the group who has been out of the room for this whole exchange—before Robin resumes their part with Sofia, which they signal using the marker, “Okay,” in a louder, slower, and higher pitched voice.

- (119) Fatima: Alright, come on. Let's go.
 (120) Robin: We're waiting for Andres. Right, are we?
 (121) Mateo: Andres is taking a huge dump.
 (122) James: We don't need Andres, he knows, he knows.
 (123) Robin: Okay, so, basically what me and Sofia are gonna be teaching is how to do lights and sounds. So, when you're on the Finch website, you're gonna see these little blocks that say “Looks and Sounds.”
 (124) James: Where, where are these blocks located? You have to specify.
 (125) Robin: They're located right at the top right of your screen.
 (126) Fatima: Next to the motion.
 (127) Robin: Right—
 (128) James: Which category?
 (129) Robin: Left of your screen.
 (130) Sofia: Where's our Finch?
 (131) James: Question: Where's the category? I'm asking a legitimate question.
 (132) Sofia: Looks. Looks.
 (133) Robin: The category is “Looks and Sounds.”
 (134) James: Excellent.
 (135) Robin: Okay.
 (136) Sofia: Is it connected?
 (137) Robin: So, for sounds, obviously, you're gonna go to Sounds. And you're gonna pull out, um.
 (138) Sofia: It's connecting.
 (139) Robin: Okay.

After Robin's first turn, James begins asking Robin questions. The tone of James' voice is markedly different from when it was his turn to deliver instruction. Here, James seems to ask questions he already knows the answers to (e.g., 124) as if coaching Robin on their teaching rather than role-playing as a student. To James, it's important that Robin specifies

which category of blocks to navigate to in order to pick out the correct blocks to control the Finch's looks and sounds, and James is not satisfied (134) until Robin articulates the name of the category in a complete sentence (133).

7 DISCUSSION

We highlight three themes that emerge from this rehearsal that support YPD at L2TT2L: negotiated identities, negotiated meanings, and negotiated leadership. We relate these three themes back to the components of YPD—interwoven teaching and learning, responsive pedagogy, and distributed authority and collective responsibility—respectively.

We use the term *negotiated* to foreground how the components of YPD are characterized by iterative, back-and-forth movement. For example, interwoven teaching and learning is a negotiation between what one knows and learns in order to teach, and responsive pedagogy is a negotiation of what one wants to teach and what another needs in order to learn. While the nature of rehearsals is to engage in a role-playing of teaching and learning within a shared space, we foreground the term *identities* to describe the fluid and dynamic nature of how youth participate in these spaces as an alternative to the term *roles*, which has been critiqued as overly fixed and static (Davies & Harré, 1990).

7.1 Negotiated Identities

Youth negotiated what identities they were taking up in the rehearsal space within multiple excerpts. In Excerpt 1, James not only utilized verbal transition markers (“Alright. Let’s get back to it, shall we?”) to signal to his group the start of his part of the lesson, but he also changed the pitch, tone, and speed of his speech. Both linguistic tools were used to signal to himself and his peers that he was entering and enacting a teaching role. In Excerpt 2, Mateo bounced between identities as Youth Teacher and role-playing student by asking two questions in differing cadences that signaled to James whether he was acting as a Youth Teacher or student asking for clarification. Both excerpts demonstrate that during rehearsals, Youth Teachers are constantly negotiating teacher and learner identities, seamlessly moving back and forth between the two and even being both simultaneously, which signals the interwoven teaching and learning component of YPD. In typical school systems, youth are positioned as students and are expected to meet expectations that fall into that role. However, at L2TT2L, youth constantly create and define what teaching and learning look like on their own terms.

7.2 Negotiated Meanings

Youth negotiated the meanings of “work,” “school,” and “fun” as it takes place “here” at L2TT2L. In Excerpt 4 (123-134), James, Robin, and Sofia engage in a meaning-making negotiation in order to arrive at more specificity in their direct instruction. We contrast this with the exchange that Fatima, Robin, and Mateo engaged in during Excerpt 3 (80-95) to make sense of what Robin’s guest was doing in this space and how they saw themselves in this teaching work. We interpret James, Robin, and Sofia’s exchange about the curricular content as doing so in their identities as teachers who are also learning. That is, they are preparing to teach this lesson the following day, meaning they are making sense in order to teach it. The language they take up mimics how they believe teachers ought to command language in a teaching space. In explaining the work of L2TT2L to Robin’s guest, however, they do not take up the same pitches and tones of voice as when they are “teaching.” Rather, they engage in a negotiation and communal grappling of the meaning of their work. This demonstrates a shift in responsibility when explaining their work to a new person in the space versus explaining their work to the younger students during the performance of their teaching role in rehearsal. As they attempt to make sense of their world to the guest, they build an attunement to the responsive pedagogy component of YPD.

7.3 Negotiated Leadership

Youth negotiated the transition between who is rehearsing their teaching as negotiated leadership. In Excerpt 1, there are two instances in which James shifts his cadence to signal to his peers that he is rehearsing his part of the lesson. The aforementioned verbal markers that James uses to cue his peers that he is starting his instruction point to the fact that the role of who is leading is not a stagnant designation in this group of Youth Teachers. Rather, one has to make the call to have the leadership “mic” be passed to them. Later, in Excerpts 2 and 4, Fatima facilitates the passing of that mic. In

(37), Fatima gives permission to James to continue on with his lesson despite the clarification question he had stopped to entertain. In (119), Fatima tries to move the group on to Robin, the next presenter, as Robin asks if the group should wait for Andres. James suggests that Andres already knows his part (122), so the group continues the rehearsal without Andres. As distributed authority and collective responsibility are theorized in YPD, these negotiations take place without Andres, the College Mentor, being present in the room, which points to how authority is distributed in this space. Furthermore, the Youth Teachers recognize a collective responsibility in rehearsing to teach the lesson for the next day, even as they decide not to wait for Andres to return.

8 CONCLUSION

This study looked closely at one typical rehearsal at L2TT2L in which high-school aged Youth Teachers prepared to teach programming a robot Finch to younger students at an outreach site the next day. As the Youth Teachers wove in and out of their identities as teachers, pretend-students, learners, and paid workers in the space, they took part in an emergent process that we call YPD. Rehearsals offer Youth Teachers at L2TT2L the opportunity to negotiate identities, which takes place as teaching and learning is interwoven in their practice. Rehearsals also offer the opportunity to negotiate meanings, as they develop intuition for what responsive pedagogy looks like in practice. Finally, rehearsals offer opportunities for Youth Teachers to negotiate leadership, as they share responsibility for teaching and learning and distribute authority for knowledge in the space. The ways in which Youth Teachers take up rehearsals at L2TT2L that are different from how pre-service teachers take up approximations of practice in university-based teacher preparation programs suggest that YPD can offer us a lens for seeing youth teaching as a disruption.

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