



Research Report

Recruiting and Retaining High School Students in Out-of-School Work- Based Learning: Lessons from New York City

By Clare Buckley Flack, John Sludden, Kathryn Hill, and James J. Kemple

Steering Committee

Jennifer Jones Austin, Interim Chair
Chief Executive Officer & Executive Director, FPWA

David Banks
Chancellor, New York City Department of Education

Georgina Dopico
Interim Provost, New York University

Mark Dunetz
President, New Visions for Public Schools

Frances Lucerna
Co-Founder and Executive Director, El Puente

Christine Mangino
President, Queensborough Community College

James Merriman
Chief Executive Officer, New York City Charter School Center

Félix Matos Rodriguez
Chancellor, The City University of New York

Michael Mulgrew
President, United Federation of Teachers

Henry Rubio
President, Council of School Supervisors and Administrators

Michelle Yanche
Executive Director, Good Shepherd Services

Leadership Team

Cheri Fancsali
Executive Director

Kathryn Hill
Research Director

Chelsea Farley
Communications Director

About the Research Alliance

Housed at NYU Steinhardt, the Research Alliance for New York City Schools is an independent, nonpartisan research center that conducts rigorous studies on topics that matter to the City's public schools. We strive to advance excellence and equity in education by providing evidence about the policies and practices that promote students' development and academic success.

Acknowledgements

This report benefited greatly from many direct contributions and insights provided by colleagues at the Research Alliance and ExpandedED Schools.

At the Research Alliance, Chelsea Farley, Dariana Almeyda, and Cheri Fancsali provided useful comments and suggestions on multiple versions of this draft. We especially thank Chelsea and Dariana, who helped make the report accessible to a wide audience through multiple rounds of revision, editing, and formatting. We are also thankful for the early contributions of Zitsi Mirakhur, William Spagnola, and Edgar Rivera-Cash to the overall ES Options project.

At ExpandedED Schools, we are grateful for the thought partnership and commentary of Candace Brazier-Thurman, Monia Salam, Isabella Fante, Elaine Mensa-Wilmot, Nasdesha Clayton, and Asuka Watanabe. The guidance of Bruce Randel of Century Analytics has also been valuable.

Finally, we are thankful to all of the program staff, coordinators, and students who took the time to share their experiences with us.

This study is supported by a US Department of Education Innovation and Research (EIR) Early Phase Grant (Award # U411C180023) to ExpandedED Schools.

Research Alliance publications are supported by a small group of funders who underwrite our core operations, including research capacity, communications, and public engagement efforts. These funders include Carnegie Corporation of New York, the Catherine and Joseph Aresty Foundation, the New York Community Trust, the Wallace Foundation, and the William T. Grant Foundation.

Our publications reflect the findings, interpretations, and conclusions of the Research Alliance and not necessarily those of our funders or individual Steering Committee members.

Recruiting and Retaining High School Students in Out-of-School Work-Based Learning: Lessons from New York City

Executive Summary

In September 2022, New York City Public Schools (NYCPS) announced a major expansion of work-based learning programs for high school students. The initiative, which provides 3,000 students with apprenticeships in technology, business, education, and healthcare, is one part of a larger vision for career-connected learning for all students throughout the system (NYCPS, 2022). While the scope of this apprenticeship program and the broader Student Pathways initiative is new, the effort to link students to work has been underway for decades. ExpandedED STEM Options (ES Options)—part of the broader Options initiative led by [ExpandedED Schools](#)—is one example.

ES Options connects interested students with STEM-focused, credit-bearing apprenticeships each year during the spring. Students who successfully complete the apprenticeship continue into paid internships where they teach the STEM content that they recently learned to younger students in such settings as city-funded summer camps. During the spring and summer of 2022, the Research Alliance for New York City Schools gathered data from program providers, instructors, and students involved in ES Options as part of our ongoing study of the program, funded by a U.S. Department of Education Innovation and Research (EIR) Early Phase Grant (Award # U411C180023).

Prior research suggests initiatives like ES Options are difficult to sustain and scale. Apprenticeships are time-consuming. Participants (on both the school and industry sides) typically have conflicting responsibilities and resource constraints. Students often lack access to transportation, and those from historically marginalized backgrounds may be more likely to face barriers to participation, including competing demands on their out-of-school time (Bailey, 1993; Haimson & Bellotti, 2003; Jacoby & Dougherty, 2016; Silverberg et al., 1996). In line with these findings, our study of ES Options highlights a number of challenges for student retention and program expansion. In 2022, only 25 percent of the nearly 400 students who initially applied to the program completed a spring apprenticeship and then moved on to participate in a summer internship. Understanding and overcoming the barriers to sustained student participation will be crucial for the success of ES Options and similar work-based learning initiatives.

During this phase of our study, the Research Alliance focused on learning why more interested students were not completing the program. We identified two junctures where students were most likely to disengage from ES Options. The first occurred soon after their initial application: Of the 362 applicants who were invited to an interview/orientation session that year, 46 percent never attended, and another 10 percent attended but did not enroll in an apprenticeship program. The second juncture occurred after the program started: Of those who enrolled in an apprenticeship, slightly more than one in three left the program before the summer internship began.

Findings

Based on our analysis of students' progression through the program, as well as interviews with staff, observations of ES Options programming in action, and student surveys, we found that four key factors affected student participation in the apprenticeships and internships: school support, financial incentives, length of time between application and enrollment, and competing demands. We believe that these factors may serve as leverage points to increase participation in ES Options and other similar programs.

School support was key.

Strong, active school partnerships appeared to bolster all aspects of recruitment and program participation. When school staff were invested in the recruitment process, they were able to identify students who may benefit from the program, help guide them through the application process, and provide reminders about program enrollment. When school staff were less invested in ES Options, recruitment and enrollment appeared to suffer. Program staff suggested a few ways to build trust and deepen relationships within schools, including creating spaces for additional collaboration through career panels or information sessions and tapping ES Options alumni to pitch the program to younger students.

Financial incentives were a main driver of program interest.

Our survey of ES Options applicants who did not complete the program found that the paid, summer internship was the most common reason cited for applying. Yet more than one in three students who started an apprenticeship did not participate long enough to enjoy this benefit. By reinforcing the paid internship opportunity as a key component of the program throughout the recruitment, application, and interview/orientation processes, school and program staff may encourage more students to persist. Further, if funding could be secured from public and/or private sources, a paid school-year apprenticeship would likely have a meaningful impact on student participation.

The time lag between application and interview contributed to leaks in the recruitment pipeline; consistent nudges from providers to students may help.

In 2022, just under half of the students who completed an application never attended the scheduled interview and orientation sessions that were a required precursor to enrolling in the apprenticeship program. The length of time (for some, two months or longer) between application and interview may have contributed to difficulty getting students to attend the interview. Communication with students was a challenge, with some students not responding to invitations and others not receiving them. Program staff who were most successful at recruiting students reported that repeated, consistent nudges to students via email or text helped maintain engagement through the extended enrollment process. In response to these findings, ExpandedED has worked to reduce the time between application and interviews for succeeding program cohorts.

After enrollment, competing demands contributed to students' leaving the program. Building community, providing supports, and emphasizing flexibility may help more students stay engaged.

Students who enrolled but did not complete ES Options typically had positive perceptions of the program. They mostly left because of competing demands, namely their responsibilities at home and school. These competing priorities were largely outside of the program staff's control. Program providers and instructors cited reducing commuting times, cultivating social connections among apprentices, providing one-on-one support to students, and allowing some scheduling and content flexibility as important strategies to promote sustained program engagement.

Recommendations

Our findings point to several strategies that may increase program persistence for future cohorts of ES Options students and for similar afterschool-to-work-preparation programs.

- **Focus on strengthening connections with school staff.** Providers like ExpandedED have years of experience connecting teens to work and can support schools through career panels or information sessions. Frequent communication can help build program buy-in among school staff who, in turn, can support program recruitment and retention.
- **Offer incentives where feasible.** ES Options nonparticipants suggested that additional financial incentives would have kept them engaged in the program. Although funding incentives may pose a challenge, organizations offering work-based learning (WBL) to teens, particularly those from families navigating poverty, should compensate them for out-of-school time whenever possible.
- **Shorten the recruitment process and frequently communicate with applicants prior to enrollment.** When several months pass between hearing about an opportunity and enrolling in the program, students may lose interest or commit to something else. Providers of WBL opportunities for teens should minimize the length of the recruitment and application process. Frequent messages from program staff also may help reduce attrition between the initial application and enrollment.
- **Provide robust support for program completion.** Prioritizing communication with students, developing relationships, and building community helped keep some students engaged in ES Options. Strategies like providing food, leading icebreakers, personalizing activities, offering flexibility, and holding one-on-one check-ins also appeared to support program persistence.

Introduction

Nationwide, there is increasing recognition that schools and districts should focus not only on preparing students for college, but also on offering work-related learning experiences like internships and apprenticeships, as well as opportunities to earn credentials that lead to high-quality jobs (Jeffrey & Jimenez, 2021). In recent months, New York City Public Schools (NYCPS) have made substantial investments in expanding work-based preparation for high school students, as part of a larger vision of providing career-connected learning opportunities to all students (NYCPS, 2022).

Past efforts to link high school students to meaningful work-based learning (WBL) suggest that NYCPS and its network of partners will face a number of obstacles to realizing this vision. Such initiatives are time consuming for students, school staff, and employers, all of whom have finite capacity, and benefits—particularly for industry partners—are not guaranteed (Bailey, 1993; Haimson & Bellotti, 2003; Jacoby & Dougherty, 2016; Silverberg et al., 1996). Further, offering such opportunities during out-of-school time (OST) can make it more difficult to attract and retain high school students—who may have conflicting responsibilities or insufficient access to transportation (Anderson-Butcher, 2005). Students contending with poverty and/or racial/ethnic discrimination may be even more likely to face barriers to participation (Gardner et al., 2009).

The Research Alliance serves as the independent evaluator of the Expanded STEM Options (ES Options) program as part of the US Department of Education’s Education Innovation and Research (EIR) Early Phase Demonstration grant (Award # U411C180023). In this report, the first of two from our study of the ES Options program, we examine student recruitment, enrollment, and retention for the 2022 cohort. The dynamics of student participation in apprenticeships and internships are especially relevant to New York City given the current effort to expand such opportunities for all high school students. A subsequent report will examine student participation and outcomes for the 2023 cohort.

Background

ExpandedED Schools is a nonprofit organization with 20 years of experience designing and implementing career-connected learning opportunities and OST programs for teens. In part, ExpandedED views its role as an innovation lab, designing and incubating research-informed models for small-scale piloting and evaluation. This approach allows ExpandedED to refine its programs before extending them to wider numbers of young people.

ExpandedED developed the ES Options program in 2018 to serve as a model for diversifying the STEM workforce and future STEM leaders. In 2017, Black and Latinx individuals represented 27 percent of the United States workforce, but accounted for just 16 percent of the STEM workforce and 14 percent of the computer science workforce (Funk & Parker, 2018). These disparities are reflective of larger societal inequalities associated with race and class. Disrupting them requires a range of policy solutions, including prioritizing opportunities for students who are currently underrepresented in high-wage work and overrepresented among the underemployed and unemployed (Jeffrey & Jimenez, 2021).

ExpandedED reaches such students by being strategic about where to offer ES Options. In 2022, Options program providers, in partnership with ExpandedED and local school staff, recruited students from 29 NYC high schools located primarily in the Bronx and Brooklyn. They targeted schools with high proportions of students of color, students living in high-poverty neighborhoods, and students learning English. By doing so, ExpandedED strove to reduce disparities in access to high-quality WBL and engagement in STEM.

The specific goals of the ES Options program are to increase student interest in STEM, promote student engagement in school, and prepare students for college and careers in STEM fields. ES Options combines three strategies in pursuit of these ends: 1) spring apprenticeships in STEM fields; 2) student-driven project-based learning during the apprenticeships; and 3) paid summer internships during which the apprentices teach what they have learned to younger students. Research supports the efficacy of each of these strategies in other settings (see, e.g., Barron & Darling-Hammond, 2008; Kemple & Wilner, 2008; Kokotsaki et al., 2016; Nestojko et al., 2014; Sadler et al., 2010). Combining these components in one program represents an innovation.

Program Design

To provide career-connected opportunities for teens, ES Options relies on a tri-sector approach involving collaboration by ExpandedED, community-based organization (CBOs), and schools. Apprenticeship programming occurs in six sites, each run by a CBO focused on STEM education. ExpandedED staff select these apprenticeship sites and provide support for programming, including help with program recruitment. ExpandedED also plays a lead role in identifying high schools to work with and in formalizing relationships with school staff. Partnering schools review and approve apprenticeship program curriculum, help organize recruitment sessions, and assign a subject-certified teacher to award a school credit.

Students who complete at least 54 hours in their spring apprenticeship receive placements in summer internships primarily through NYC's Summer Youth Employment Program (SYEP). These internships often take place at NYCPS- or Department of Youth and Community Development-funded summer learning sites. In some instances, the CBO that runs the apprenticeship also operates the summer internship programming. ExpandedED interns provide STEM-focused instruction to youth, with supervision from internship staff.

Table 1 on the next page provides an overview of the apprenticeship and a sample of the internships associated with each of the six sites in 2022.

Table 1: Overview of Apprenticeships and Teaching Internships

Site	Apprenticeship	Teaching Internship
1	Apprentices learn and learn to teach basic STEM principles, theories and technical skills related to computer science, circuitry, electronics, mechanical systems, physical computing, and robotics.	Interns teach middle school students the basic computer science and engineering skills needed to create interactive electronic devices.
2	Apprentices design an interactive website and remix archival footage while learning about a community issue.	Interns coach peers through the process of using media art technology to create a website.
3	Apprentices work with various media, particularly textiles, and technology, to learn multiple methods of fabrication.	Interns work in summer camps to teach younger students design principles through craft lessons, often using materials created during the apprenticeship.
4	Apprentices learn how to use creativity, logic, and problem-solving skills to design and construct solutions to engineering challenges.	Interns teach elementary school students basic STEM principles.
5	Apprentices explore industrial and local food production, nutrient and waste cycles, biodiversity, and the effects of anthropogenic changes in an urban environment.	Interns teach garden-based STEM concepts to younger youth at community gardens.
6	Apprentices learn to become digital health advocates by developing user-friendly programs that increase health literacy by educating users about health disparities and disease prevention.	Interns lead younger students and peers in designing and launching digital health advocacy campaigns.

Source: Information obtained from ExpandED Schools.

Research Questions, Data, and Methods

Similar to past efforts to involve high school students in WBL or other OST educational activities, student retention and program scalability have proven challenging for ES Options. Though comparatively small in scale, the experience of implementing ES Options can inform broader citywide initiatives. Our research on the 2022 cohort focused on understanding ES Options recruitment and persistence. Specifically, we examined the following questions.

1. Recruitment
 - a. To what extent did students who applied end up enrolling in ES Options?
 - b. Why did students decide to apply to ES Options?
 - c. Why did some applicants not enroll in the program?
2. Persistence
 - a. To what extent did students enroll and persist in the program?
 - b. Why did some enrolled students decide not to continue?

The findings presented in this report come from analysis of qualitative and quantitative data. Our 2022 qualitative fieldwork consisted of 17 data collection activities, including at least one interview at each of the six sites, one observation at each of two sites, and one student focus group. The observations and focus group were part of case studies of two programs that we purposely selected (Maxwell, 2005; Merriam, 1998) based on conversations with the ExpandedED team suggesting these sites provided the strongest test of the model.

The research team also gathered quantitative data from ExpandedED program records and two surveys. The program records provided application and attendance data for the 2022 cohort, including baseline measures of interest in STEM fields, self-reported workforce competencies, and postsecondary plans. Our survey data came from two separate groups: student applicants who completed a 2022 spring apprenticeship (“participants”), and student applicants who did not complete a 2022 apprenticeship (“nonparticipants”). These nonparticipants included student who participated in any stage of the recruitment process and those who enrolled in but did not finish a spring apprenticeship. Table 2 displays response rates for each survey.

Table 2: Response Rates for Participant and Nonparticipant Surveys

Response Type	Participants		Nonparticipants	
	N	%	N	%
Complete	79	80	119	44
Partial	3	3	10	4
No Response	17	17	138	52
Total	99	100	267	100

Source: Research Alliance calculations based on data obtained from survey of 2022 ES Options applicants.

Note: “N” indicates the number of student respondents.

The participant response rate, defined as the percentage of the sample agreeing to answer the survey (Ruel, 2019), was about 83 percent (close to 80% completed the entire survey, while 3% answered some but not all of the questions). The response rate for nonparticipants was a little over 48 percent (with almost 45% completing the survey and 4% providing a partial response). The combined response rate for the two surveys was 58 percent. Both complete and partial responses were analyzed. The combined response rate was lower than the 70 percent threshold researchers commonly cite as sufficient to represent the perspectives of a larger population (Ruel, 2019). However, emerging evidence suggests that surveys with lower response rates are not as vulnerable to non-response bias as previously thought (Hendra & Hill, 2019). While the survey responses, particularly for nonparticipants, may not represent all of the students in our sample, we believe that they still provide useful information about many students’ experiences and perspectives.

We iteratively coded interview and focus group transcripts, as well as observation field notes, using Dedoose Qualitative Software. We completed first cycle coding using *a priori* codes from a codebook we developed through analysis of the ExpandedED ES Options theory of change, and we continued inductively using emerging thematic codes through a second cycle (Saldaña, 2009). Before coding the data, the research team established acceptable intercoder reliability (Cohen's kappa=0.76) on a subset of transcripts (Everitt, 1996). We analyzed application and survey data using basic descriptive statistical techniques.

Limitations. Due to a glitch in the application system, we did not have information on 2022 applicants' gender identities, an important data point given the biases and underrepresentation faced by women in STEM fields. In addition, we do not have consistent information on the number of students who completed their summer internship. Interns from the six apprenticeship sites spread out across a larger number of internship sites in the summer, making their attendance and completion more logistically difficult for ExpandedED to track. Learning from the experience of 2022, ExpandedED and their CBO partners worked to ensure more consistent internship data in the summer of 2023.

Lastly, this analysis does not include the perspectives of school staff. ExpandedED partnered with 29 NYC high schools in 2022. From the CBOs' perspective, school staff play a critical supporting role in program recruitment and retention. We are presently collecting data from school staff to inform our next report.

Tracing the Path to Student Enrollment and Persistence

Students must complete several steps in the recruitment and application process to gain access to ES Options apprenticeships and internships. After completing an application, apprenticeship staff screen the electronic forms to make sure students report meeting age (16 or over) and availability requirements (for example, no conflicting obligations during program hours). They then invite eligible students to an individual or group interview and orientation session to confirm students' availability and eligibility and make sure they understand the program commitment and timeline. After the interviews, program staff invite students to enroll in their program—during the 2022 program year, nearly all students who attended an interview were invited to enroll.

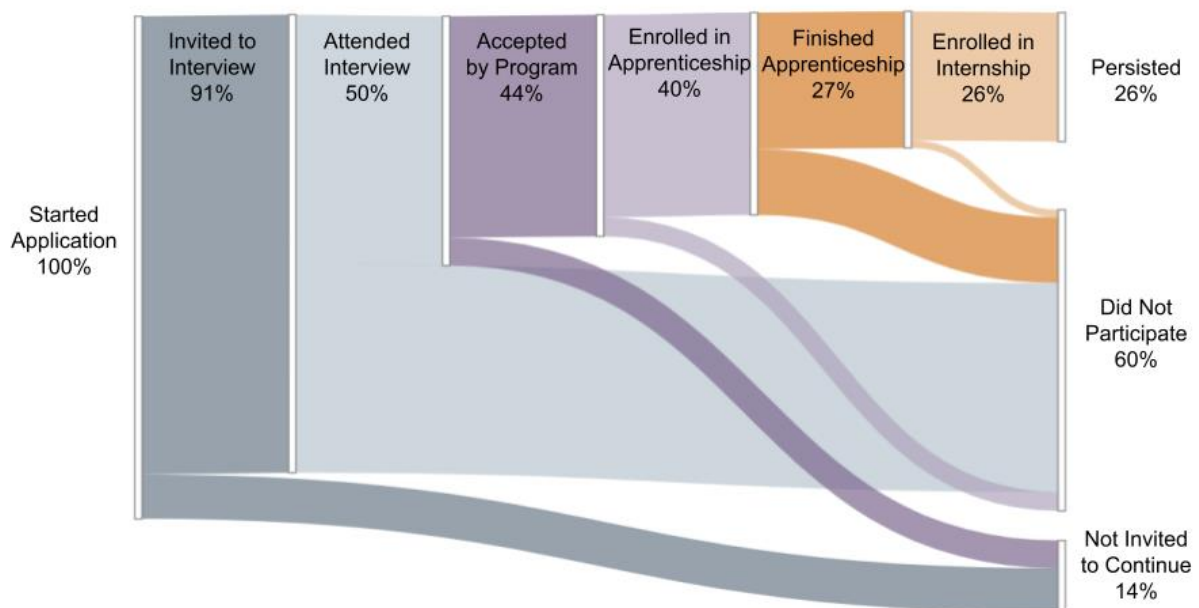
ES Options apprenticeship programs typically begin in late February or March and extend through May. Students are expected to attend two two-hour sessions per week or one four-hour session on Saturday. Sessions culminate in a group project. Students who complete a spring apprenticeship are matched to a paid summer internship. The internships begin in July and last for six weeks, during which time students work 25 hours per week. Internships are designed to build on spring apprenticeships, with interns applying apprenticeship learning as they teach STEM lessons to younger students. Figure 1 on the next page illustrates the ES Options recruitment and program timeline for the 2022 cohort of students.

Figure 1: ES Options Program Timeline


Source: Information obtained from ExpandedED Schools.

Figure 2 below is a visualization of the pathway to student enrollment and persistence, marking the proportion of students who did and did not continue through each step of the process during the 2022 programming year. As shown, two points in the process were particularly prone to attrition:

1. Between application and the required apprenticeship interview/orientation: Together, the six ES Options apprenticeship CBOs received nearly 400 applications from students in 29 NYC high schools; 362 of these students were invited to an interview (91%). However only 160 of the students ended up enrolling in an apprenticeship program (i.e., 40% of the original applicant pool—or 44% of those invited to the interview).
2. Between apprenticeship enrollment and internship enrollment: Of the 160 students who enrolled in the apprenticeship, 102 enrolled in a summer internship, representing 26 percent of the original applicant pool.

Figure 2: ES Options Enrollment and Persistence


Source: Research Alliance calculations based on data obtained from ExpandedED Schools.

Our primary objective over the past year was to better understand the factors contributing to this attrition. We focused on the two primary points mentioned above. We did not find substantial differences in attrition by race/ethnicity, as shown in Table 3 below.¹ This is a positive sign given that one of ES Options' goals is to serve students who have historically been marginalized in STEM fields.

Table 3: Enrollment and Persistence Pathways by Race/Ethnicity

	Applicants	Interview / Orientation		Apprenticeship		Internship
		Invited (%)	Attended (%)	Enrolled (%)	Finished (%)	Enrolled (%)
Asian	61	92	48	39	28	28
Black	102	92	41	38	26	25
Latinx	161	94	56	44	30	29
Multiracial	38	87	45	34	24	21
Total	397	91	50	40	27	26

Source: Research Alliance calculations based on data obtained from ExpandED Schools.

Note: Students who are Indigenous, from a Pacific Island, or White are not displayed due to small sample size per group (n<10). Students with no listed race or ethnicity are also not included (n=25).

We did, however, find notable variation in the rates of attrition, particularly at the interview/orientation stage, across the six apprenticeship sites, as seen in Table 4. The percentage of applicants who attended an interview ranged from a high of 66 percent of applicants at Site 4 to a low of about 33 percent of applicants at Site 2. We also found variation in the share of students who completed the apprenticeships, with 37 and 38 percent of applicants completing apprenticeships, respectively, at Sites 1 and 6, and just 16 percent completing at Site 2.

Table 4: Enrollment and Persistence Pathways by Apprenticeship Provider

Site	Applicants	Interview / Orientation		Apprenticeship		Internship	
		Invited (%)	Attended (%)	Enrolled (%)	Finished (%)	Invited (%)	Enrolled (%)
1	58	86	47	41	38	34	35
2	95	100	33	35	16	19	14
3	53	89	64	47	30	28	28
4	55	89	66	36	25	29	26
5	87	86	47	38	26	28	25
6	49	94	57	51	37	37	37
Total	397	91	50	40	27	28	26

Source: Research Alliance calculations based on data obtained from ExpandED Schools.

In short, some CBOs had more success getting interested students *into* a spring STEM apprenticeship, and others had more success getting students *through* the apprenticeship. These patterns seemed unrelated to factors such as whether programming was hybrid/virtual or outdoors. This suggests that: 1) other program and school practices were likely influencing entry and completion rates, and 2) student enrollment and retention may present different demands for CBOs and require different organizational capacities. We explore factors associated with both types of variation in the sections below, beginning with enrollment in an apprenticeship.²

The Path to Enrollment

Planning for recruitment into ES Options typically begins at the start of the school year, months before applications become available to students. In the fall of 2021, program staff from ExpandedED met with CBO staff to set apprenticeship enrollment targets and discuss curricula for the 2022 cohort. ExpandedED staff also scheduled introductory visits with leadership at recruitment schools, many of which had previously participated in the program or worked with ExpandedED in other ways. Apprenticeship coordinators typically attended these introductory meetings, which focused on details of the program, including expectations for schools and students.

After the introductory meetings, program and ExpandedED staff worked with schools to determine where and when recruitment for the apprenticeships would take place. Recruitment sessions occurred in November and December of 2021. Students typically accessed online application forms at these recruitment sessions. Thus, the 2021-2022 recruitment process consisted of multiple steps over several months. Interview and survey data suggest several factors associated with successes and challenges during this period.

School support was key for recruitment.

The 29 schools from which ES Options recruited students played a pivotal role in the recruitment process: School staff determined where and when recruitment pitches happened, and provided a conduit for relationships between CBOs and students (who had often never heard of the programs or met their staff).

A majority of apprenticeship program staff believed support from staff in partner schools was key to successful recruitment. Programs reported that when school-based staff were invested in the recruitment process, they leveraged existing relationships among school counselors, teachers, and students to identify and target students who would enjoy and benefit from ES Options. According to program personnel, supportive school staff helped recruit students for information sessions, reminded them of deadlines, and guided them through the application process by answering questions if they arose. One program coordinator observed that schools that were more committed to ES Options were not only more effective at recruitment; they were also more likely to have students persist through the program:

The more support [the program] had in their school community, the more successful the students were from just soup to nuts of, like, recruiting, applying, going through the interview process, actually making it to the program, attendance, and then filling out all of this very bureaucratic SYEP paperwork to actually arrive at a summer internship.

A different program coordinator said,

I think the best thing is to work with school faculties that know their students, and who are really interested in wanting to offer this experience to students... The faculty are the folks who were able to identify those students and were like, "Hey, I'm gonna make sure I tell this student about this program because they definitely need it."

Strong relationships between CBO and school staff facilitated this kind of student support. A coordinator at a third site explained that in schools with successful recruitment, staff buy-in had been built over time, as the schools had worked with staff from the CBO for years:

...when we got introduced to those two schools, they were already long-term partners. They already knew the program. They knew the benefit of the program... They liked the idea of a Saturday program. They liked that we were already in the community. They specifically chose just to work with us and totally pushed our program to their students. That's always been a goal—for the guidance counselor to find programs like that that are in the community. The kids have better access too. They feel like they're part of the community.

In this case, the program coordinator said that the school's guidance counselor did a lot of legwork before the recruitment session to pitch the program to students. Not all partner schools and school staff were so enthusiastic. This program coordinator cited an opposite case, where a school did not prioritize ES Options. Leadership at this school:

...were very adamant that students needed to do remedial work, so they said they had to get ready for state tests...Because of that, I don't think that they were as supportive in pushing the program to their students 'cause they needed to be focused on other things more importantly. I think we only got one or two students from that school.

Building trust and fostering a mutually beneficial relationship with school staff appeared to be critical to program recruitment and the program's ultimate success. But establishing fruitful relationships between program and school staff—particularly when schools and programs had so many competing demands—was easier said than done. Our data offered insight into how CBOs can continue to deepen linkages with schools. Some of these suggestions stemmed from existing practices at particular sites. For example, prior to scheduling their recruitment session, CBO staff at one site asked the school counselor how ES Options could help meet the counselor's goals. Through conversation, they mutually determined that credit recovery was an area where the program could assist the school. This helped build buy-in. Other insights came from CBO suggestions about what could be done differently in the future. For example, one program coordinator proposed that ExpandedED could facilitate a deeper connection during the school year by creating spaces

for CBOs and schools to collaborate and connect, such as career panels or information sessions about SYEP.

Buy-in was also built directly through relationships between former and prospective apprentices. Several CBOs have tapped program alumni to help pitch their program. Former ES Options students knew the program and their peers. In some cases, alumni told their friends about the program and brought them to recruitment sessions to sign up. This may be a leverage point for programs hoping to increase application numbers in the future.

The length of time between application and interview, as well as challenges communicating with students, contributed to leaks in recruitment pipeline.

In Fall 2021, New York City schools returned to in-person instruction but faced a series of short-term school closures, high absenteeism, and scheduling disruptions due to a surge in infection rates caused by the Omicron variant of COVID-19. One apprenticeship coordinator noted that in-person interviews were “absolutely impossible last year because we were in another variant at the moment.” Another coordinator suggested that the uncertainty around school openings and closings prevented students from committing:

...because of COVID, things are a little bit different in the sense that in November, December, when we go to the schools, a student's life in the spring is still unknown because they don't know if they're gonna be taking Regents exams, or they don't know what their classes are gonna look like, if they're gonna have remedial courses. Those things also did affect how [students] came into the sessions because they were like, “I really want to, but, um, I'm not really sure what's gonna happen.”

This coordinator also noted that they lost a few students due to vaccine requirements associated with the building in which the apprenticeship was housed.

These COVID-related disruptions were outside ExpandedED's control, and likely contributed to ES Options attrition. A second factor that was in the purview of program operators was the length of time between when recruitment occurs and when the program starts. The gap appeared to contribute to attrition during this phase of the recruitment.

Students applied to the 2022 ES Options apprenticeships weeks before their 2021 winter break, but typically were not invited to the interview until weeks after they returned. This gap may have contributed to students losing interest in the program. One student described being “approached at our school” in November or December, but said “by the time we had already gotten accepted, which was like four months later... our school had already given out a lot more opportunities as well.” This student attributed ES Options' declining numbers to students pursuing these other opportunities.

A program coordinator explained how the long recruitment timeline made it challenging to keep schools and students engaged in the process.

It wasn't until last year I realized, with the pandemic, that we've been recruiting too early on before holidays where a lot of students may forget that they even applied.... The early run recruitment is a barrier for schools forgetting that they even signed off on this program and also for students, and then there was COVID on top of that.

Staff from three different apprenticeship programs described difficulty in getting applicants to respond to interview requests. As one coordinator told us:

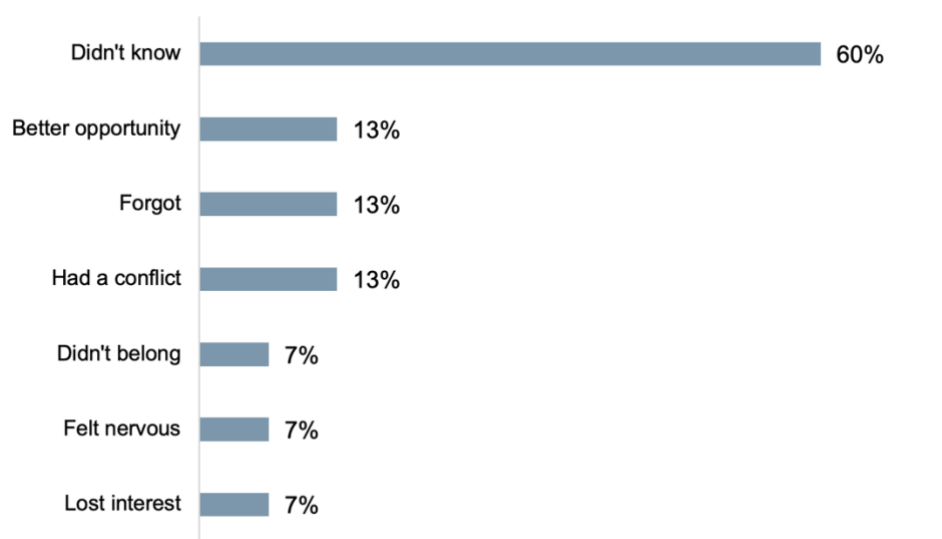
It's really trying to keep up with teenagers and the ways they communicate, which might not be the ways we communicate with each other. I can send you an email, but that doesn't mean you're gonna read my email. It's emailing, texting, calling, calling their parents... It's like a small telecommunications fatigue to get interviews scheduled.

Another coordinator thought the virtual interview format may have contributed to these challenges:

I think the amount of students that applied, I wanna say, was somewhere around 50, but we only ended up interviewing close to 30 students. I'm not sure if those other 20 students maybe had issues getting online because we definitely did have more than 30 that were invited to interview, but unfortunately, we didn't really get to interview all of the ones that applied.

Responses from our survey of nonparticipants suggested the messages about interviews were not always getting through. As shown in Figure 3, of the 15 nonparticipants who answered a question about why they specifically did not show up for an interview, 60 percent ($n = 9$) said they did not know about the interview.

Figure 3: Nonparticipants' Reasons for Not Attending an Interview/Orientation Session



Source(s): Research Alliance calculations based on 2022 ES Options nonparticipant survey data.

Note: $n=15$.

Although the sample size for Figure 3 is small, the finding was echoed in some of the open-response data, with some nonparticipants saying they “never got an email” or were “never contacted.” This suggests that there may have been a breakdown in communication at the invitation stage of the recruitment process.

As noted previously, our analysis of enrollment and retention found substantial variation across program sites. At Site 4, about 66 percent of applicants attended an interview. At the other end of the spectrum, less than 33 percent of applicants at Site 2 attended the interview.

Discussions with staff suggested that Sites 3 and 4—the sites with the lowest attrition between application and interview—may have used practices worth replicating. At Site 4, the coordinator noted that, in the past, they had experienced much higher attrition, and that they saw improvements when they began sending regular follow-up emails.

After recruitment, “Hey. Great to meet you. Sending you the application. Apply now,” x, y, and z. The next email may be right before Thanksgiving. “Happy Thanksgiving. We’ve received your application. We’ll be in touch.” Right before Christmas break, it’s “Merry Christmas. We’re reviewing applications. You should be hearing from us in the beginning of January. Let us know if you need anything.” Then January comes, it’s like, “Happy New Year. We’re now reviewing applications. Look forward to an interview.”

Site 3 reported using a similar technique. Repeated nudges to applicants may be a low-cost strategy to keep the apprenticeship top of mind and build a connection with potential future students. Our experience administering the surveys suggests that it may be ideal to use both email and text messages to communicate with applicants.

Given the large drop off between application and interviews, we asked program staff whether the interviews were necessary. According to program coordinators, these interviews fulfilled two key functions. First, they allowed program staff to confirm students’ interest, availability, and eligibility. One program coordinator noted, “For our format, our interviews are not rigorous. Basically, we wanna know, ‘Can you do this? Can you commit to this? Is this something you can do?’” The second purpose served by the interviews, according to program staff, was to build relationships with students. A coordinator explained:

I think the interview process has to happen... The instructors and the participants need to have a link to each other. They need to form that relationship. That’s gonna carry them through this year of trusting us to teach them and prepare them for this internship that they’re gonna take on in the summer.

The coordinator from Site 3 thought that the concept of interviews could be intimidating for teens. They adjusted their pitch to students to emphasize that the interview was just a conversation for getting to know them:

What we do [here], it’s like schedule them one on one. It’s not like an interview because they think they need to dress up...so, when we shoot out emails, they’re like, “Hey. We’d love to meet you. We just want to check in, have a one-on-one.” Then the interview, [the] one-on-one, is much more like, “Tell us about yourself. You’re more prepared for this one-on-one than I am. I’m learning about you.”

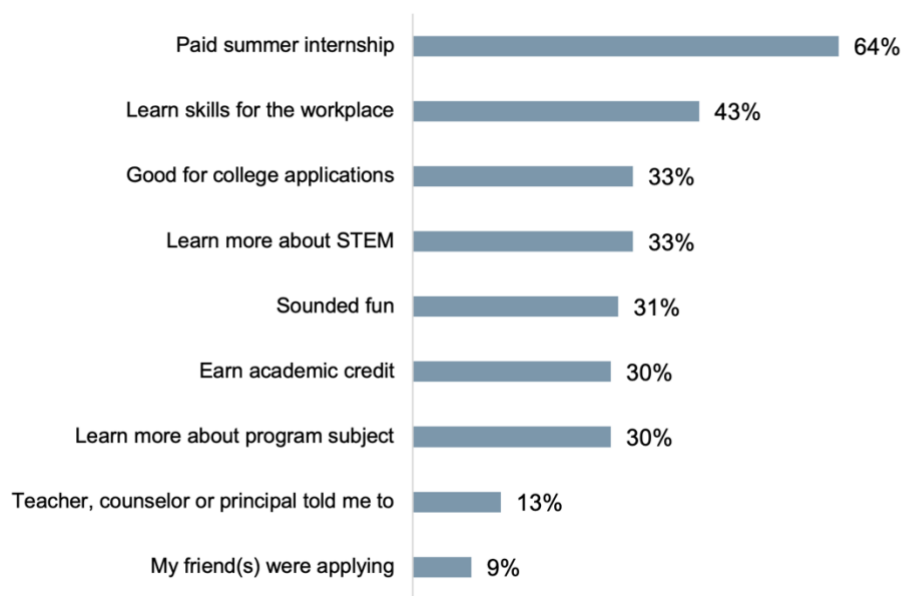
Since the interviews served distinct purposes, programs wanted to continue using them. Our data suggest that strategies such as facilitating scheduling, maintaining frequent

communication, and expediting the process may help attenuate attrition between application and interview. ExpandedED staff have reported adopting some of these changes, including increasing communication and reducing the time between application and interviews, for succeeding cohorts.

Paid employment motivated students.

Although students applied to ES Options for a variety of reasons, the prospect of earning money appeared to be a common motivator. As shown in Figure 4, the paid summer internship was the most reported reason that nonparticipants cited for applying to the program (64%, $n = 58$). However, other motivations related to skill building, academic credit, fun, and future planning also factored into their application.

Figure 4: Nonparticipants' Reasons for Applying to an ES Options Program



Source(s): Research Alliance calculations based on nonparticipant survey data.

Note: $n=90$.

Similarly, in our focus group, participants discussed being drawn to ES Options for a variety of reasons, including course credit, the potential to build connections with peers, to create things, and the prospect of a summer job. As one student shared: “What interested me was the job opportunity during the summer and the things we would create over here. I really found it, I don’t know, fun, I guess, that we could get to make things with other people.”

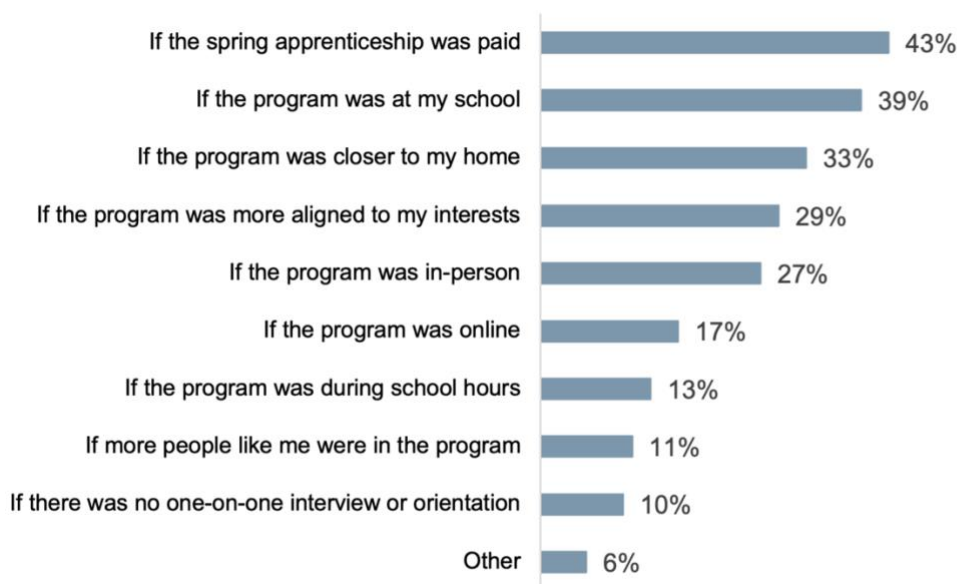
Program staff also perceived varying motivations for applying among their students, including content interest, parent or teacher nudging, or resume-building. However, the summer job and accompanying financial incentive was a theme mentioned by several staff. For example, one person shared that many students in the recruitment process reported participating because they “heard they had a chance for a job [and] would like a job in the

summertime.” Another stated: “The economic incentive is huge. They want to make money.”

Across programs, staff also reported that students were motivated to *stay* in the apprenticeship because they wanted to have a paid summer internship. For example, one CBO staff member said, “I think [students] had an understanding that the apprenticeship would lead into the internship, and that’s also what helped motivate them or, I guess, to stick around towards the end.” Program personnel also mentioned academic credit and resume-building for college as important for student persistence, but the prominence of the paid, summer internship in our interview and survey data suggest that the financial incentive was a key motivator.

Along similar lines, when we asked nonparticipants what would make them more likely to complete a program like ES Options in the future, 43 percent said the spring apprenticeship should be paid. Other responses to this question are displayed in Figure 5.

Figure 5: Factors that Would Improve Likelihood of Program Completion



Source: Research Alliance calculations based on nonparticipant survey data.

Note: n=89.

While the most frequently cited factor for improving the likelihood of program completion was the financial incentive, students highlighted other issues as well. In particular, many students said that having the program at their school or closer to their home might make a difference. ExpandedED implemented additional programming at schools in 2023; future analyses will examine whether this may have been associated with increased retention.

Persisting Through the Apprenticeship

The period from the start of the apprenticeship to the end of the apprenticeship represented the second largest source of attrition in the ES Options pipeline. Of the 160 students who

enrolled in the apprenticeship program, 66 percent ($n = 108$) finished it. In other words, across sites, one of every three students who enrolled in Spring 2022 did not complete the apprenticeship.

Again, there was dramatic variation in the extent to which program sites lost students during this stage. For example, Site 1 only lost two students after the apprenticeship began; Site 2 lost more than half. In analysis of our data from program staff and students, we sought to identify common reasons for attrition across sites, as well as site-specific factors contributing to program discontinuation.

Attrition was not attributable to negative program experiences or differences in STEM interest.

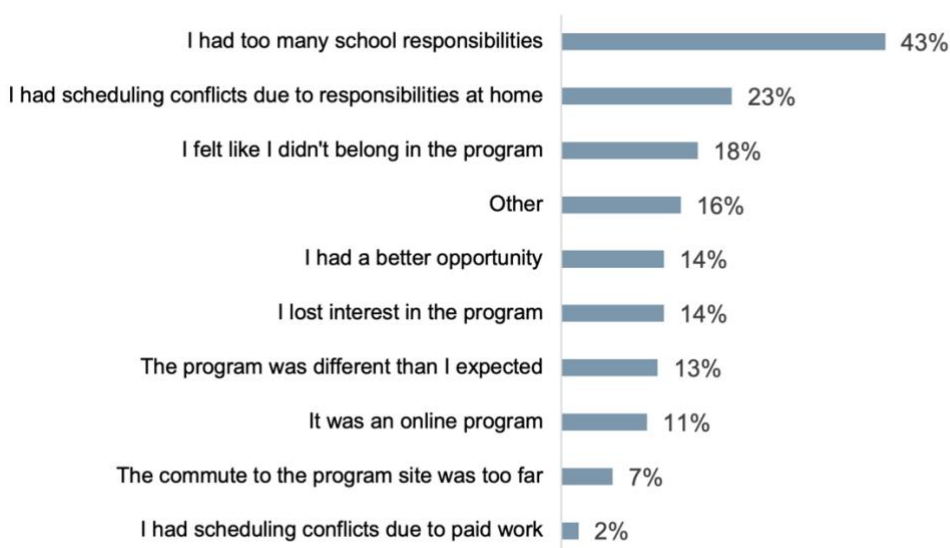
Attrition did not seem to be connected with negative program experiences. Among 39 nonparticipant survey respondents who attended one or more apprenticeship sessions, the vast majority reported positive (82.1%, $n=32$) or neutral (7.7%, $n=3$) experiences. Answers to the open response question also suggested that the nature of program experiences was not a primary driver of attrition. This question asked, “What more can you tell us about your reasons for not continuing with the [apprenticeship]?” Ten of the nearly 70 students who responded to this question discussed themes related to low engagement, which represented a small proportion of responses overall (16.4%, $n=10$). These 10 students mostly attended different programs. A similar proportion of comments were positive. Six students (9.8%) stated that the program was “good” or that they “enjoyed it” and regretted not being able to continue. Three (4.9%) wished for another chance to complete the program.

Attrition also seemed unrelated to students’ initial interest in STEM fields. We did not find a significant difference in our composite measure of STEM interest between those who ultimately completed the internship and those who applied but did not complete the internship.³ We should note that STEM is a catchall term for a range of subject matter and interests, so it is possible that the content at each apprenticeship did not match what students hoped to receive. However, our data suggest that competing priorities were a likelier cause, as described below.

Competing demands contributed to attrition.

Our analysis found that competing priorities prevented some students from persisting in ES Options after enrolling. As shown in Figure 6, according to nonparticipant survey data, the two most common reasons for discontinuing participation after enrolling were scheduling conflicts due to responsibilities at school (43.2%, $n=19$) and at home (22.7%, $n=10$). Given the time commitment associated with ES Options, along with the many competing demands placed on high school students, this finding is not surprising.

In interviews, CBO staff also indicated that scheduling conflicts and school workloads contributed to attrition. For example, one noted that many extracurricular activities that had been paused in the first year of the COVID pandemic resumed during the 2021-2022 school year, presenting potential apprentices with competing opportunities (e.g., extracurricular activities) or life demands (e.g., caring for younger siblings). As another noted, “Some people dropped out near the end because of exams, sport teams, plays, whatever else.”

Figure 6: Nonparticipants' Reasons for Discontinuing Program Attendance

Source(s): Research Alliance calculations based on 2022 ES Options nonparticipant survey data.

Note: n=44

Scheduling conflicts in the spring were sometimes site-specific. For example, students who attended an apprenticeship program that met on Saturdays experienced a conflict with test preparation classes starting in May.

The summer brought new scheduling conflicts for some students. Internship providers reported losing interns to summer travel, summer classes, and other jobs. As one internship provider told us, “Summer school, college classes, and they have a second job, a third job”—all making it difficult to prioritize the internship.

Commuting distance and cost may have affected program persistence.

In addition to scheduling conflicts, internship providers across sites mentioned the cost of commuting as a challenge in the transition from the apprenticeship to internship. As one internship provider stated,

Commuting is a big one. Commuting either here or commuting to our location in [another neighborhood], it can be challenging. One because it's expensive for some of them, and when they don't have Metro cards given by school or programs, it's a challenge. That's one of the first questions they ask when they come is, “Do we have Metro cards?”

One apprenticeship instructor also mentioned that some students had long commutes, and that other internships or programs were sometimes closer to where students lived or attended school. This may be specific to that site, which had relatively far-flung locations compared to other sites. However, as noted above, the nonparticipant survey also highlighted proximity to the program as an important factor in program completion. This suggests that commuting distance may have affected program persistence for some students.⁴

Students may benefit from additional help navigating the SYEP placement process.

Our data suggested that there were administrative and logistical challenges in the transition from apprenticeship to internship. In 2022, fewer than one in four remained in the same location as their apprenticeship; the vast majority of students were placed in new locations around New York City. Internship placements were scouted and coordinated by ExpandedED, but primarily funded through SYEP, the largest youth employment program in the country. ExpandedED staff work with CBOs and internship sites to facilitate placements or fill in the gaps if they have more interns than available internships.

In the spring of each year, apprentices complete an SYEP application, which requires documentation that may be difficult or impossible to obtain for some students (e.g., a social security card, proof of age, photo identification, proof of family income). In addition, staff reported that navigating the “very bureaucratic” online system was difficult, particularly for students whose first language was not English. As one explained, “Youth are expected to know how to navigate those systems online.... [sometimes in] languages that are not their first language. That’s a great challenge.” These difficulties resulted in students from at least two sites being placed with different internship providers than expected. As one internship supervisor explained, “[Students] got randomly placed in these various places. There’s a bunch of kids who I have originally from ExpandedED who are now placed with a different provider because they didn’t use that specific link.” ExpandedED was able to correct the placements for affected students and ensure they were paid for their internship, but the process was time consuming for staff. In 2023, ExpandedED took steps to have more frequent communication with school-based SYEP providers to mitigate these challenges.

Program staff overcame challenges using a variety of communication and community-building strategies.

Many of the challenges described above—competing demands, confusing processes, COVID-19—were firmly outside the control of CBO staff. Despite these obstacles, staff found ways of meeting students’ needs.

Communication emerged as particularly important for student engagement. Staff reported using strategies that were tailored to their student population. At many sites, there were a large number of students who were learning English. This was by design. ExpandedED understood that language may pose a barrier to entry for some students and wanted to provide equitable access. In line with this goal, ExpandedED, school staff, and providers engaged in targeted, multilingual outreach during recruitment.

Once apprentices who were English Learners enrolled, sites worked to include them in a variety of ways. At one of the sites, where program staff spoke the students’ home language and all programming was in-person, there was no language-related obstacle to the completion of program activities. By contrast, at another site, where the instructor did not speak students’ home language and a portion of the classes were online, communication posed a challenge. The instructor reported that additional support in overcoming the language barrier would be helpful, though they did say that connecting with students was easier once the program transitioned to in-person activities. At a third site,

staff modified the internship program to include peer mentoring as a way to support students who were learning English as a new language.

The COVID-19 pandemic likely contributed to communication challenges as well. Engaging students in a virtual context proved challenging. Four of the six sites had a virtual component in the spring of 2022. One site was all virtual through the end of the summer. In programs that used both modalities, staff found engagement to be more of a challenge online. As one staff member said, “A lot of people do have burnout from being on Zoom for so long, especially high school students.” Staff at two sites mentioned that students turning cameras off made virtual engagement more difficult. Further, 11 percent of students who left ES Options after enrolling cited the online environment as a reason. Requiring students to turn cameras on at times was one strategy that improved virtual engagement. Notably, the program that was all virtual had relatively high engagement even though it was online. Staff used a variety of strategies for online engagement, including icebreakers, music, breakout rooms, group activities, quizzes, and share time.

The impact of the pandemic was felt in-person as well. At two sites, staff mentioned some shyness among students. One instructor attributed this to COVID-19, saying, “I think we all lost social skills.” Program staff across sites emphasized the need to build community, particularly in the context of re-introducing in-person programming after the height of the pandemic.

At two sites, staff thought that apprentices appreciated the social aspect of the ES Options program after COVID-related school and program closures. As one described, students enjoyed being part of the program community, and this kept them coming back to program sessions:

I think the engagement within the activities, meeting new people, the project component, actually doing things, the credit, the food—we feed them every day—is what kept them coming. It’s just a very fun and engaging space of like, they make jokes, they travel together. I think this is something they do enjoy. It’s not structured like a school setting. I think that’s something that they do look for. A lot of students is like, “Well, this is something that I needed, and I didn’t know that I needed it.”

The effectiveness of providing food at program sessions was mentioned by staff at multiple sites. Other supports, such as having a guidance counselor checking in regularly with students and having adults available when students were grappling with challenging activities, also seemed to help keep students involved in the program. One site’s staff worked to engage students who seemed to need extra support by holding frequent one-on-one check-ins. As an instructor explained:

We do a lot of one-on-one check-ins, like, “Hey. How are you feeling?” We do connect with each individual student at any point of like, “Hey, let’s just check in, or let’s talk. Let’s work together.” That call of “No child is left behind.”

Although each of these individual strategies was only mentioned by one or two of our six program sites, collectively they speak to the importance of community-building and strong interpersonal relationships. These factors appear to be crucial for helping students persist through the numerous stages of the ES Options program.

Flexibility and personalization enhanced program engagement.

Our findings suggest that flexibility and personalization were also important for keeping students engaged in ES Options. CBO staff at two sites described extending activities beyond the timeline and scope of the program to give students an opportunity to pursue emerging interests. At one site, students wanted to try publishing an academic paper, and staff provided them with time and resources to work on that. At the second site, staff opened up outside of normal hours, allowing students to embark on self-directed projects. There was also evidence that programs attempted to tailor activities to students' individual strengths and interests. As staff at one site explained:

Just understanding each intern and figuring out what they want or what they're good at. Even with grade [levels]. Sometimes I put them in a younger grade and it's not for them. I then move them to an older grade, they succeed more. I really think it's just talking to them, figuring out what they want, and just observing and seeing what works for them.

Three sites reported allowing flexibility in requirements and/or scheduling in order to keep teens engaged and persisting in their programs. As one internship provider described, they found ways to accommodate students' varying needs:

We worked around that and said, "That's fine. We get it. Some of you may lose internet for a day, or you may have something going on every Monday. Just tell us ahead of time." We found a way to work around that.

At another site, the instructor provided alternative assignments to students who had missed portions of the apprenticeship but wanted to continue. At a third site, staff kept students engaged by developing structures for asynchronous communication, allowing them to participate at times that worked for their schedule.

Increasing Persistence Through Buy-In, Incentives, and Support

Recruiting and retaining 16- and 17-year-olds in an out-of-school, STEM-focused apprenticeship followed by a summer teaching internship is ambitious, especially considering that youth's lives are filled with competing demands. In 2022, typical programmatic challenges were compounded by a global pandemic that disrupted the lives and plans of students, providers, and school staff. Given these obstacles, it is in many ways not surprising that only one in four students who applied to ES Options that year completed the spring apprenticeship and enrolled in the summer internship.

Our investigation points to several strategies that may increase program persistence for future cohorts of ES Options. The current push at NYCPS to promote career pathways and linkages means that these lessons may be valuable for many other community organizations working with schools to implement high-quality WBL opportunities for teens.

- **Focus on strengthening connections with school staff.** Providers like ExpandedED have years of experience connecting teens to work. They can offer

insights to schools through career panels or information sessions, and frequent communication can help build program buy-in among school staff. In turn, school staff can provide layers of support for recruiting students and keeping them on track to complete the program.

- ***Offer more incentives where feasible.*** In 2022, ES Options apprentices were expected to attend at least 54 hours of apprenticeship programming; in return, students received one academic credit. Students suggested that additional financial incentives would have kept them in the program. Although funding is often challenging, organizations offering WBL to older teens, particularly those from low-income families, should aim to compensate them for their out-of-school time whenever possible. This recommendation aligns with those developed by the NYC Work-Based Learning Coalition (2022), which observed that *paid* WBL opportunities “reach very few high school students and do not involve many employers” (p.3).
- ***Shorten the recruitment process.*** For ExpandedED, the lengthy period of time between students’ initial application and the program start date played a role in attrition, particularly at the point of the interview/orientation session. Students increasingly have a number of competing demands on their time. When several months elapse between when they first hear about an opportunity and when they can actually enroll, the likelihood that they will commit to something else in the interim may increase. ExpandedED (and other providers of WBL opportunities for teens) should consider ways to reduce the length of the recruitment process.
- ***Increase the frequency of communication during recruitment.*** Frequently hearing from program staff about what students can learn (and earn!), and the value that programs like ES Options can bring to their resume, may help reduce attrition between application and enrollment.
- ***Provide robust support for program completion.*** Our findings underscore the importance of prioritizing communication with students, developing relationships, and building community. Strategies like providing food, leading icebreakers, personalizing activities, and holding one-on-one check-ins are promising ways to support student engagement and program persistence. Likewise, our data suggest that flexible program hours and requirements may help students overcome obstacles to program completion.

ExpandedED implemented several recommendations related to recruitment for its 2023 cohort, including reducing the time between recruitment and enrollment in the apprenticeships and increasing the frequency of communication with students, program, and school staff during this period. We anticipate reporting on these efforts in a future publication.

While our initial audience for these recommendations was ExpandedED Schools, we believe our findings are applicable to program and school staff undertaking similar work in NYC and elsewhere. Subject-focused afterschool programming for teens is challenging. To increase the odds of success, providers should think carefully about each aspect of their program and ask how they can maximize benefits for schools and students while minimizing burdens.

Endnotes

¹ Data on gender were incomplete for the 2022 cohort. We expect to explore application, enrollment, and persistence by gender for the 2023 cohort in our final report.

² Another factor is variation across the high schools from which students were recruited. A preliminary analysis found that the extent to which applicants from particular schools persisted through the apprenticeship and enrolled in an internship ranged from 0 to over 60 percent. We will explore sending high schools in greater detail in our next report.

³ The composite STEM measure was derived from a matrix format multiple-choice question. The item stem asked: “How interested are you in the following topics? For each of the topics (science, technology, engineering, mathematics, and computer science), students selected from a four-point scale (not at all interested, slightly interested, moderately interested, very interested). The value of the composite STEM measure ranged from 1 to 20. The mean score for participants was 14.3 (standard deviation=2.9), and the mean score for nonparticipants was 14.7 (standard deviation=2.8). An independent two-sample t-test to compare the means showed that this difference was not significant; $t(373) = 1.03$, $p = .302$.

⁴ Notably, as shown in Figure 6, students who began but did not complete the apprenticeship did not cite the commute as a common reason for leaving the program. This suggests that our finding here may have been driven by students who never began an apprenticeship. We hypothesize that for some students, commuting distance was a deterrent to enrolling in the program in the first place.

References

- Anderson-Butcher, D. (2005). Recruitment and retention in youth development programming. *The Prevention Researcher*, 12(2), 3-6.
- Bailey, T. (1993). Can youth apprenticeship thrive in the United States? *Educational Researcher*, 22(3), 4–10.
- Barron, B. & Darling-Hammond, L. (2008). How can we teach for meaningful learning? In Darling-Hammond et al. (Eds.), *Powerful Learning: What We Know About Teaching for Understanding* (pp. 11-70). Jossey-Bass.
- Everitt, B. S. (1996). *Making Sense of Statistics in Psychology: A Second-Level Course*. Oxford University Press.
- Funk, C. & Parker, K. (2018, January). *Women and Men in STEM Often at Odds over Workplace Equity*. Pew Research Center. <https://www.pewresearch.org/social-trends/2018/01/09/women-and-men-in-stem-often-at-odds-over-workplace-equity/>
- Gardner, M., Roth, J. L., & Brooks-Gunn, J. (2009). *Can After-School Programs Help Level the Academic Playing Field for Disadvantaged Youth? Equity Matters. Research Review No. 4*. Campaign for Educational Equity, Teachers College, Columbia University.
- Haimson, J. & Bellotti, J. (2003). Student participation in and use of work-based learning. In Bailey, T. R., Hughes, K. L., & Moore, D. T. (Eds.), *Working Knowledge: Work-Based Learning and Education Reform* (pp. 35-60). Routledge.
- Hendra, R., & Hill, A. (2019). Rethinking response rates: New evidence of little relationship between survey response rates and nonresponse bias. *Evaluation Review*, 43(5), 307-330.
- Jacoby, T. & Dougherty, S. M. (2016). *The New CTE: New York City as Laboratory for America*. Manhattan Institute.
- Jeffrey, A. & Jimenez, L. (2021, April 22). *Preparing Students of Color for the Future Workforce: Lessons from Communities in Indiana and New Mexico*. Center for American Progress. <https://files.eric.ed.gov/fulltext/ED613763.pdf>

- Khan, B., Robbins, C., & Okrent, A. (2020, January 15). *The State of U.S. Science and Engineering 2020*. National Center for Science and Engineering Statistics, National Science Foundation, National Science Board. <https://nces.nsf.gov/pubs/nsb20201/u-s-s-e-workforce>
- Kemple, J. J. & Willner, C. J. (2008). *Career Academies: Long-Term Impacts on Labor Market Outcomes, Educational Attainment, and Transitions to Adulthood*. MDRC.
- Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, 19(3), 267-277.
- Maxwell, J. A. (2005). *Qualitative Research Design: An Interactive Approach*. Second Edition. Sage Publications.
- Merriam, S. (1998). *Qualitative Research and Case Study Applications in Education*. Jossey-Bass Publishers.
- Nestojko, J. F., Bui, D. C., Kornell, N., & Bjork, E. L. (2014). Expecting to teach enhances learning and organization of knowledge in free recall of text passages. *Memory & Cognition*, 42, 1038-1048.
- New York City Public Schools (NYCPS). (2022, September 12). Mayor Adams, Schools Chancellor Banks Announce Historic Public-Private Partnership for Career Readiness and Modern Youth Apprenticeship Program. <https://www.nyc.gov/office-of-the-mayor/news/656-22/mayor-adams-schools-chancellor-banks-historic-public-private-partnership-career#/0>
- NYC Work-Based Learning Coalition. (2022, Fall). A Vision for Work-Based Learning in New York State. <https://www.expandedschools.org/wp-content/uploads/2022/11/A-Vision-for-Work-Based-Learning-in-New-York-State.pdf>
- Ruel, E. (2019). Question 32: What is a response rate? In E. Ruel (Ed.), *100 Questions (and Answers) About Survey Research* (pp. 43-44). SAGE.
- Sadler, T. D., Burgin, S., McKinney, L., & Ponjuan, L. (2010). Learning science through research apprenticeships: A critical review of the literature. *Journal of Research in Science Teaching*, 47(3), 235-256.
- Saldaña, J. (2009). *The Coding Manual for Qualitative Researchers*. Sage Publications.
- Silverberg, M., Bergeron, J., Haimson, J., & Nagatoshi, C. (1996). *Facing the Challenge of Change: Experiences and Lessons of the School-to-Work/Youth Apprenticeship Demonstration. Final Report*. Mathematica. <https://files.eric.ed.gov/fulltext/ED413402.pdf>

The Research Alliance conducts rigorous studies on topics that matter to the City's public schools. We strive to advance equity and excellence in education by providing nonpartisan evidence about policies and practices that promote students' development and academic success.

**The Research Alliance for
New York City Schools**



NYU | STEINHARDT

627 Broadway, 7th Floor
New York, NY, 10012

(212) 992-7697

research.alliance@nyu.edu
www.rancys.org