

RESEARCH BRIEF

Bridging Skills to College and Career: A Quasi-Experimental Analysis of Adult Education Bridge Programs in Illinois



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Executive Summary

By 2031, more than 70% of U.S. jobs will require education or training beyond high school, yet millions remain disconnected from learning opportunities needed to access these jobs (Carnevale et al., 2023). Many of the fastest growing occupations are middle-skills jobs, which require more than a high school diploma but less than a four-year degree, and too few workers have the right credentials to meet demand (McLeod et al., 2025). Adult education helps address these challenges by expanding education and training for adults with foundational skill needs.

An important component of adult education programming is Integrated Education and Training (IET), implemented in Illinois through Integrated Career and Academic Preparation System (ICAPS) programs. However, many adult learners are screened out of ICAPS because they do not meet minimum literacy, numeracy, or English proficiency requirements. To address this gap, the Illinois Community College Board (ICCB) supports adult education bridge programs that provide literacy, numeracy, or English language instruction contextualized within one of 16 nationally recognized career clusters. These bridge programs combine contextualized instruction, career development, and wraparound supports and are designed to be on-ramps to ICAPS and postsecondary education.

Study Approach. Using anonymized ICCB administrative data, the American Institutes for Research® examined whether participation in Illinois’ bridge programs is associated with improved educational outcomes relative to standard adult education. We constructed matched comparison groups via propensity score matching (PSM) for 6,295 bridge learners who enrolled between program years 2018–19 and 2021–22 and similar adult education learners who met bridge eligibility criteria but did not participate in bridge programming. We analyzed three outcomes in the enrollment year or the subsequent program year:

- **Educational functioning level (EFL) gain:** A learner completing a post-test on a standardized Adult Basic Education (ABE) or English as a Second Language (ESL) assessment and attaining a score determined to be at least one EFL higher than their pre-test EFL.
- **Enrollment in ICAPS:** A learner enrolling in an ICAPS program in Illinois.
- **Postsecondary enrollment:** A learner enrolling in an Illinois community college.

We also estimated effects by bridge program type (career awareness and industry pathway)¹ and by program subgroup (ABE and ESL). To better understand program dynamics, we estimated effects for learners in these program types and subgroups separately by creating distinct matched comparison groups for each of these program types and subgroups.

¹ A career awareness program introduces learners to a career cluster through foundational skill-building and exploration. An industry pathway program prepares learners for specific occupations in a cluster through more targeted, technical instruction.

Findings. The key findings from PSM are described here and shown in Exhibit ES1.

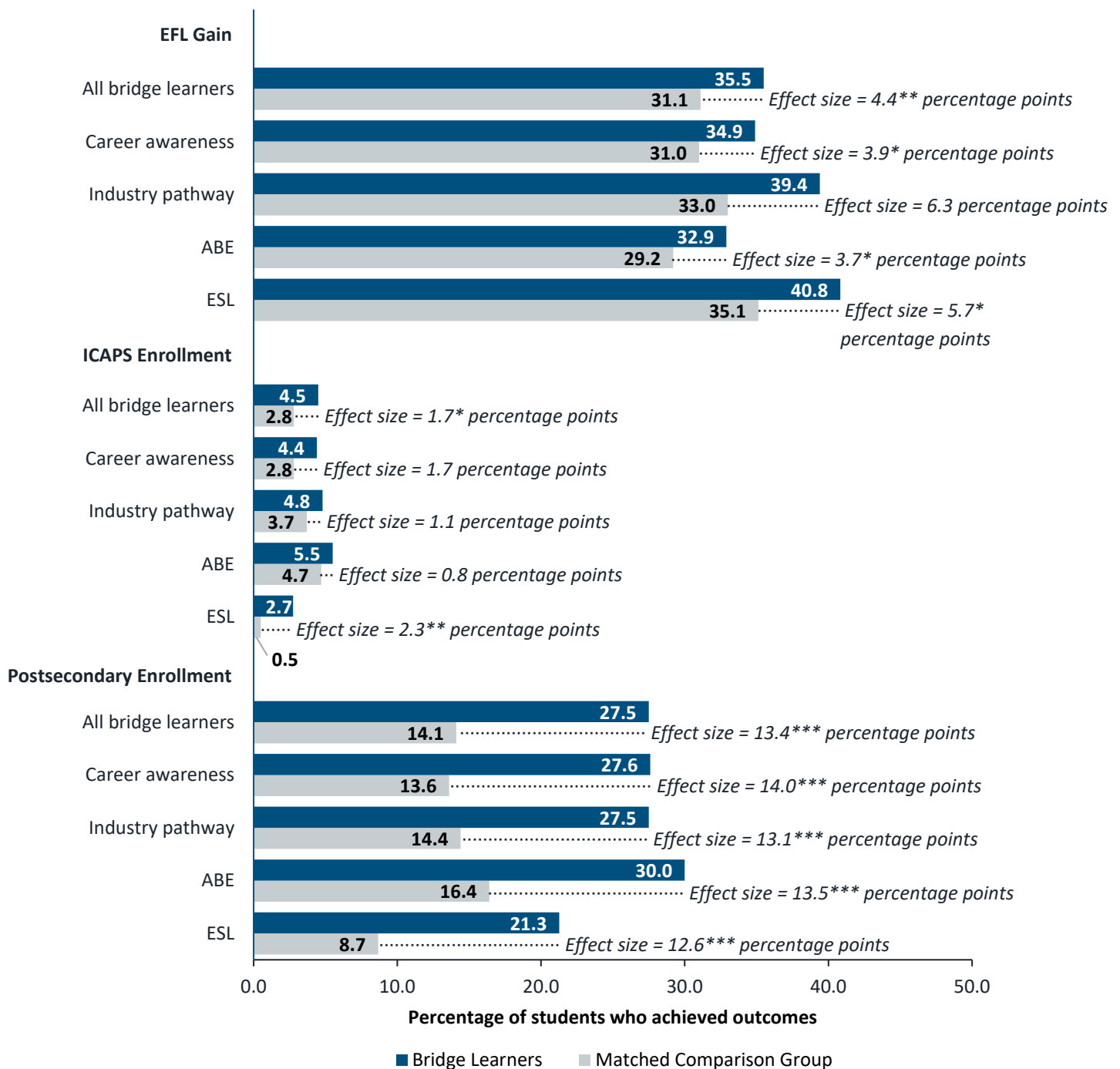
- Bridge program learners had better educational outcomes than matched comparison learners in standard adult education. Bridge learners were 4.4 percentage points more likely than the matched comparison group to achieve an EFL gain, 1.7 percentage points more likely to enroll in ICAPS, and 13.4 percentage points more likely to enroll in postsecondary education.
- **Career awareness and industry pathway bridge learners.** Compared to a matched comparison group of learners not in bridge programs, career awareness bridge program learners were 3.9 percentage points more likely to achieve an EFL gain and 14.0 percentage points more likely to enroll in postsecondary education. Industry pathway bridge program learners were 13.1 percentage points more likely to enroll in postsecondary education, relative to a matched comparison group. We did not find statistically significant differences in the EFL gain and ICAPS outcomes for the industry pathway program.
- **ABE and ESL bridge learners.** Among ABE learners, those who participated in bridge programs were 3.7 percentage points more likely to achieve an EFL gain and 13.5 percentage points more likely to enroll in postsecondary education relative to a matched comparison group. Likewise, ESL learners in bridge programs were 5.7 percentage points more likely to achieve an EFL gain, 2.3 percentage points more likely to enroll in ICAPS, and 12.6 percentage points more likely to enroll in postsecondary education relative to a matched comparison group of ESL learners.

We consider all findings associational since PSM does not capture unmeasured differences (e.g., motivation). Furthermore, postsecondary outcomes capture enrollment in Illinois community colleges only; four-year and out-of-state enrollment data were not available.

Key Takeaways and Implications. Overall, Illinois’ bridge programs function as a reliable on-ramp from foundational skill-building to postsecondary education. The consistency and magnitude of the postsecondary enrollment findings underscore the role of bridge programming in expanding access to community college for adults with foundational skill needs. Both career awareness and industry pathway bridges support movement into college programs, while career awareness bridges also appear to strengthen academic readiness. While both ABE and ESL learners benefit from bridge programs, bridges play a particularly valuable role for ESL learners, with positive associations found across the three measured outcomes.

The modest overall association with ICAPS enrollment, relative to the stronger association with postsecondary enrollment, may reflect broader structural factors—such as program alignment, geographic availability, and entry requirements—that can influence whether bridge learners transition directly into IET or pursue other college pathways.

Exhibit ES1. Impact of Bridge Participation on Learner Outcomes



Note. EFL refers to educational functioning level. ABE refers to Adult Basic Education. ESL refers to English as a Second Language. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. The absence of asterisks indicates that the finding is not statistically significant and should not be interpreted as meaningful. Rounding may result in minor discrepancies between displayed values and calculated differences.

Introduction

By 2031, nearly three-quarters (72%) of jobs in the United States will require education or training beyond high school (Carnevale et al., 2023). Yet millions of adults remain disconnected from the learning opportunities needed to access these jobs. Many of the fastest growing occupations are middle-skills jobs—roles that require more than a high school diploma but less than a four-year degree—and there are not enough workers with the right credentials to meet demand (McLeod et al., 2025). Nearly 25 million adults lack a high school diploma, and another 74 million do not have any training beyond high school (U.S. Census Bureau, 2023). In Illinois, only 47% of working-age adults hold a post-high school credential and earn wages that align with the expected economic return of that credential (Lumina Foundation, 2024). This gap, reflecting nationwide trends, leaves employers struggling to fill critical roles, while many adults face barriers to upward mobility. Addressing these challenges requires not only expanding education and training pathways, but also ensuring that opportunities for training and education are available in the communities where adults live and work.

In 2023, the American Institutes for Research® (AIR®) partnered with the Illinois Community College Board (ICCB)—the state agency in Illinois that coordinates public community colleges and adult education programming—to explore how adults with foundational skill needs in Illinois are preparing for upward economic mobility. More than 60,000 adults in the state participate in adult education to improve their skills and employment prospects (National Reporting System, 2025). These adult learners can enroll in Adult Basic Education (ABE) or English as a Second Language (ESL) programs, which are designed to close different skill gaps in the workforce. ABE instruction focuses on improving literacy and numeracy skills, while ESL instruction focuses on building English proficiency. About 71% of adult learners in Illinois are enrolled in ESL programming, and 29% are enrolled in ABE programming (National Reporting System, 2025).

An important component of adult education programming is Integrated Education and Training (IET), an emphasis of Title II of the Workforce Innovation and Opportunity Act. Adult education providers in Illinois implement IET through Integrated Career and Academic Preparation System (ICAPS) programs, which are designed to accelerate adults' progress in a career pathway by simultaneously providing contextualized academic instruction, occupational training, and workforce readiness activities (ICCB, 2024). ICAPS programs are intended to prepare participants to earn industry-recognized credentials that can unlock middle-skill careers. Similar to traditional postsecondary education, these programs have prerequisite criteria requiring adults to demonstrate a certain skill level in literacy, numeracy, or English proficiency to enroll.

However, adult learners with lower foundational skills are screened out of programs like ICAPS because they do not meet the minimum literacy, numeracy, or English proficiency levels to be successful in these programs. An innovative approach implemented by the ICCB is to offer adult learners on-ramps to IET programs or other postsecondary opportunities called bridge programs. Critically, these programs provide literacy, numeracy, or English language instruction contextualized in one of 16 nationally recognized career clusters alongside comprehensive support services that make higher-level instruction and jobs more accessible, as summarized in Exhibit 1. The goal of these preparation programs is to bridge the gap between adults' initial skill level and the level they need to enter and succeed in IET programs, postsecondary education, and career-path employment (ICCB, 2013). The bridge model supports Illinois adults who meet eligibility criteria² in gaining the necessary skills to transition successfully to postsecondary programs or IET programs in such areas as healthcare, manufacturing, and transportation.

Exhibit 1. Bridge Programming in Illinois

Adult education bridge programs provide literacy, numeracy, or English language instruction contextualized in one of 16 nationally recognized career clusters (ICCB, 2013; Nicholson-Tosh & Bragg, 2013). They are intended to serve as on-ramps toward workforce preparation and better educational and employment opportunities, and they are ultimately an important step toward closing skill gaps and strengthening the workforce. Bridge programs, by definition, include the following three core components:

- Contextualized instruction that integrates literacy, numeracy, or English language skills and industry and occupation knowledge;
- Career development that includes career exploration and career planning within a career area; and
- Transition services that provide learners with academic advising, tutoring, coaching, and referrals to individual support services (e.g., transportation and childcare).

Career clusters include Agriculture, Food, and Natural Resources; Architecture and Construction; Arts, Audio/Video Technology, and Communications; Business Management and Administration; Education and Training; Finance; Government and Public Administration; Health Science; Hospitality and Tourism; Human Services; Information Technology; Law, Public Safety, Corrections, and Security; Manufacturing; Marketing; Science, Technology, Engineering, and Mathematics; and Transportation, Distribution, and Logistics.

² Bridge programs are designed for individuals 16 years and older whose literacy or numeracy skills are at or above a sixth grade level or whose English language proficiency is at or above the low-intermediate ESL level.

Theory of Change

Standard adult education courses primarily focus on foundational skill needs in literacy, numeracy, and/or English proficiency, while bridge programs are designed to provide contextualized instruction within a career cluster, combined with industry knowledge and career exploration. Bridge programs in Illinois are designed as structured on-ramps to ICAPS and postsecondary education by combining contextualized instruction, career development, and wraparound supports. These components work together to strengthen academic readiness, increase learners' clarity about next steps, and reduce the barriers that often derail adults with foundational skill needs.

In Illinois, adult education providers offer bridge programs that serve as a bridge to an industry pathway as well as more general career awareness bridge programs. Both types of programs are aligned with career clusters. While a career awareness bridge program introduces learners to a career cluster through foundational skill building and exploration, an industry pathway bridge program prepares learners for specific occupations within that cluster through more targeted, technical instruction. For example, in a career awareness bridge program aligned with the Manufacturing career cluster, learners might explore job options in the manufacturing field, prepare résumés, and learn strategies to identify employment opportunities that match their skill sets. In contrast, an industry pathway bridge program aligned with the Health Science career cluster might provide targeted instruction in blood collection techniques and medical terminology, along with hands-on training to prepare for certification and employment as phlebotomy technicians.

Through these mechanisms, bridge programs are expected to improve educational functioning levels (EFLs)³ by meeting learners where they are and helping them make measurable skill gains. By clarifying next steps and building confidence, bridge programs aim to increase the likelihood that participants will enroll in ICAPS and postsecondary education, opening doors to further training and better jobs.

³ EFLs refer to six skill levels within ABE programming and six skill levels within ESL programming that guide instruction and assessment. For ABE programming, EFL 1 is Beginning ABE Literacy, EFL 2 is Beginning Basic Education, EFL 3 is Low Intermediate Basic Education, EFL 4 is High Intermediate Basic Education for English Language Arts (ELA) and Middle Intermediate Basic Education for Mathematics, EFL 5 is Low Adult Secondary Education for ELA and High Intermediate Basic Education for Mathematics, and EFL 6 is High Adult Secondary Education for ELA and Adult Secondary Education for Mathematics. For ESL programming, EFL 1 is Beginning ESL Literacy, EFL 2 is Low Beginning ESL, ESL 3 is High Beginning ESL, EFL 4 is Low Intermediate ESL, ESL 5 is High Intermediate ESL, and ESL 6 is Advanced ESL.

Research Questions

The theory of change directly informs our research questions, which are as follows:

- Does the bridge program offered by ICCB lead to EFL gains, entry into IET, and postsecondary education to a greater extent than standard adult education programs do?
- Do career awareness and industry pathway bridge programs lead to EFL gains, entry into IET, and postsecondary education to a greater extent than standard adult education programs do?
- Among subgroups of bridge learners, do ABE bridge learners show greater gains than ABE learners not in bridge programming, and do ESL bridge learners show greater gains than ESL learners not in bridge programming, across the areas of EFL gains, entry into IET, and postsecondary education?

Data and Methods

Using a quasi-experimental approach—propensity score matching (PSM)—this study assesses the impact of bridge programs on intended outcomes by comparing the outcomes of the bridge program group with a comparison group of learners who are observationally similar to the bridge program group but do not participate in the bridge program (see Heckman & Smith, 1999). In the absence of a randomized controlled trial, PSM methods can minimize selection bias, which is an important concern to address because those who decide to enter the bridge program may differ from those who do not in ways that could be associated with the education and employment outcomes. More details about the analysis are provided in the technical appendix, Appendix C.

We obtained anonymized administrative data from ICCB on bridge learners and comparison learners. There were 9,109 learners who enrolled in a bridge program at any point between program years (PYs) 2018–19 and 2022–23. These data contained information on the bridge program(s) in which these learners enrolled, including the career cluster, the provider, type of bridge program (career awareness or industry pathway), and the start and end dates of the bridge program. Exhibit 2 lays out the eligibility criteria for learners in bridge programs. We used these criteria to obtain anonymized records from ICCB on 124,986 learners who enrolled in adult education courses and met the bridge programs' eligibility criteria but did not enroll in any bridge programs during this time period.

Exhibit 2. Eligibility Criteria for Bridge Programs in Illinois

- Bridge programs are designed for individuals 16 years and older who are eligible to participate in adult education.
- Learners must meet minimum proficiency standards. ABE learners should have reading and/or math proficiency at or above EFL 3. ESL learners should have English language proficiency at or above EFL 3.
- A high school diploma or equivalent credential is not required.

For this study, we restricted our analysis to learners who enrolled between PY 2018–19 and 2021–22, which allowed us to observe learners’ outcomes for the PY in which they enrolled as well as the next PY.^{4,5} Consequently, the data available for PSM included 6,295 bridge learners and 97,973 potential comparison learners who did not enroll in a bridge program during this time period. Altogether, learners enrolled with 80 unique providers.

We used learners’ background characteristics and provider characteristics to match bridge learners—the treatment group—with a group of comparison learners. Exhibit 3 lists these characteristics.

Exhibit 3. Learner and Provider Characteristics Used for Matching

Learner characteristics	Provider characteristics
• Age • Gender • Race and ethnicity • Prior education level • Employment status • Public assistance status	• Type of provider (community college, community-based organization, local education agency, faith-based organization, four-year college or university, or correctional facility) • Percentage of teachers with less than one year of experience • Percentage of teachers with a teaching English to speakers of other languages (TESOL) certification

⁴ This time period, which includes four federal PYs for adult education, started on July 1, 2018, and ended on June 30, 2022.

⁵ For bridge learners who enrolled in more than one bridge program between PY 2018–19 and PY 2021–22 (37.1% of bridge learners), only their first bridge program was considered in this study. Similarly, for comparison learners who enrolled in more than one adult education course during this time period (63.3% of comparison learners), only their first course was considered in this study.

Learner characteristics	Provider characteristics
- Urbanicity, defined as whether they lived in an urban or rural county in Illinois⁶ - Enrollment in ABE or ESL programming - EFL at pre-test - Program year of enrollment between program years 2018–19 and 2021–22	Percentage of learners enrolled in ABE programming⁷

Note. ABE refers to Adult Basic Education. ESL refers to English as a Second Language. EFL refers to educational functioning level.

We used PSM as a rigorous statistical method to estimate the effectiveness of bridge programs by comparing outcomes for participants with those of similar non-participants. PSM paired each bridge program participant with comparison learners who shared similar observable characteristics—such as age, gender, race/ethnicity, prior education, and provider type—so that the two groups were as alike as possible except for program participation. This approach helped minimize selection bias that can occur when individuals self-select into programs, making the results more reliable than simple comparisons. By controlling for these background factors, PSM allowed us to better isolate the effect of bridge programming on key outcomes like skill gains and postsecondary enrollment. However, it is important to note that PSM cannot account for unmeasured differences between groups, such as motivation or personal circumstances, so results cannot be interpreted as causal. Leveraging PSM, we created separate matched learner groups for each of the treatment group subsets (overall bridge learner treatment, career awareness treatment, and industry pathway treatment) and the exploratory subgroup analyses (ABE, ESL) that compared ABE bridge learners to similar ABE comparison learners and ESL bridge learners to similar ESL comparison learners. We allowed up to five⁸ matched comparison learners for each treated learner, constrained by a caliper to ensure matches were sufficiently similar.⁹

⁶ Urbanicity data were considered missing for learners with invalid ZIP codes, which included fewer than 1% of learners in both the bridge learner group and the comparison group. Urban and rural classifications were determined for each county in Illinois based on U.S. Department of Agriculture rural-urban continuum codes, following data operationalization implemented by the Illinois Department of Public Health. Among the 102 counties in the state, 19 were identified as urban and the remaining 83 were identified as rural. We mapped county boundaries using the county shapefile from the Illinois Department of Transportation using ArcGIS Pro. This allowed us to accurately visualize and analyze the geographic distribution of counties across the state. To determine whether a learner was from an urban or rural county, we mapped the population-weighted centroid of each learner's ZIP code and assessed whether it fell within the spatial boundaries of a county classified as urban or rural.

⁷ This is the inverse of the percentage of learners enrolled in ESL programming at the same provider.

⁸ We allowed up to three matched comparison learners for the industry pathway and exploratory subgroup models.

⁹ A caliper specifies the maximum allowable difference between a treated unit's propensity score and that of its matched comparison units.

We matched each bridge program participant with comparison learners who had the same gender and were enrolled in the same type of program—either ABE or ESL. This is important because both gender and program type can strongly influence a learner’s likelihood of joining a bridge program and their educational outcomes. By matching exactly on these factors, we helped ensure that any differences in results were more likely to be due to the bridge program itself, rather than differences in gender or the type of program in which learners were participating. A detailed description of the methodology is given in Appendix C.

Outcomes

We analyzed the impact of participating in bridge programming on three learner outcomes. As previously stated, we observed learners’ outcomes in the PY they enrolled in the bridge program or adult education course as well as the next PY. For example, if a learner enrolled in a bridge program or adult education course in PY 2021–22, we observed their outcomes in PY 2021–22 and PY 2022–23. Likewise, if a learner enrolled in a bridge program or adult education course in PY 2018–19, we observed their outcomes in PY 2018–19 and PY 2019–20. The outcome could be achieved at any point during this time frame. The three outcomes analyzed in this study were:

- **EFL gain**, a learner completing a post-test on a standardized ABE or ESL assessment and attaining a score determined to be at least one EFL higher than their pre-test EFL
- **Enrollment in ICAPS**, a learner enrolling in an ICAPS program in Illinois
- **Enrollment in postsecondary education**, a learner enrolling in a community college in Illinois

Exhibit 4 summarizes the outcomes, along with the associated inclusion criteria and number of learners available for analysis.

Exhibit 4. Definitions, Inclusion Criteria, and Number of Learners for Analyzed Outcomes

Outcome details	Outcome: EFL gain	Outcome: enrollment in ICAPS	Outcome: enrollment in postsecondary education
Definition	Learners can gain an EFL by completing a post-test on a standardized ABE or ESL assessment and achieving a score determined to be at least one EFL higher than their pre-test EFL. ¹⁰ This outcome was achieved if the learner gained one or more EFLs.	This outcome was achieved if the learner enrolled in an ICAPS program in Illinois.	This outcome was achieved if the learner enrolled in a community college in Illinois. ¹¹
Type	Binary	Binary	Binary
Inclusion criteria	All learners were included in this analysis.	Learners who pre-tested at or above EFL 4 in ABE or EFL 5 in ESL and/or enrolled in ICAPS were included in this analysis. ¹² For bridge learners, their ICAPS enrollment was considered only if it started on or after the end date of their bridge program.	All learners were included in this analysis.
Number of learners in all bridge programs	6,295	4,004	6,295
Number of learners in career awareness bridge programs	5,447	3,444	5,447
Number of learners in industry pathway bridge programs	848	560	848
Number of comparison learners available for matching	97,973	50,953	97,973

Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. ABE refers to Adult Basic Education. ESL refers to English as a Second Language. We observed learners' outcomes in the program year in which they enrolled as well as in the next program year.

¹⁰ If a learner took multiple post-tests, the post-test reflecting their highest performance level was considered. Following adult education reporting norms, learners who did not complete a post-test were considered not to have made an EFL gain.

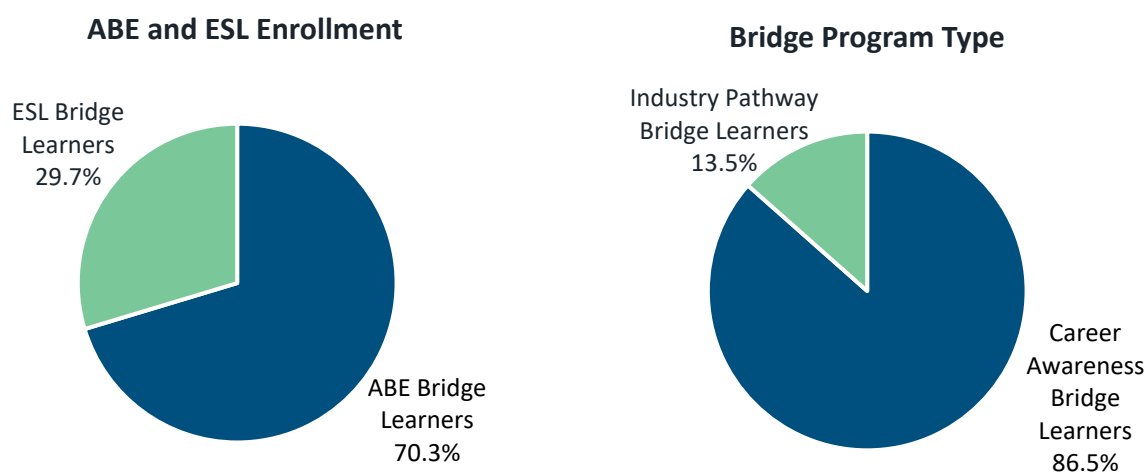
¹¹ Data on enrollment in four-year institutions and out-of-state institutions were not available from ICCB.

¹² In general, ICAPS programs are typically designed for learners with skills at or above EFL 4 in ABE or EFL 5 in ESL.

Who Are the Bridge Learners?

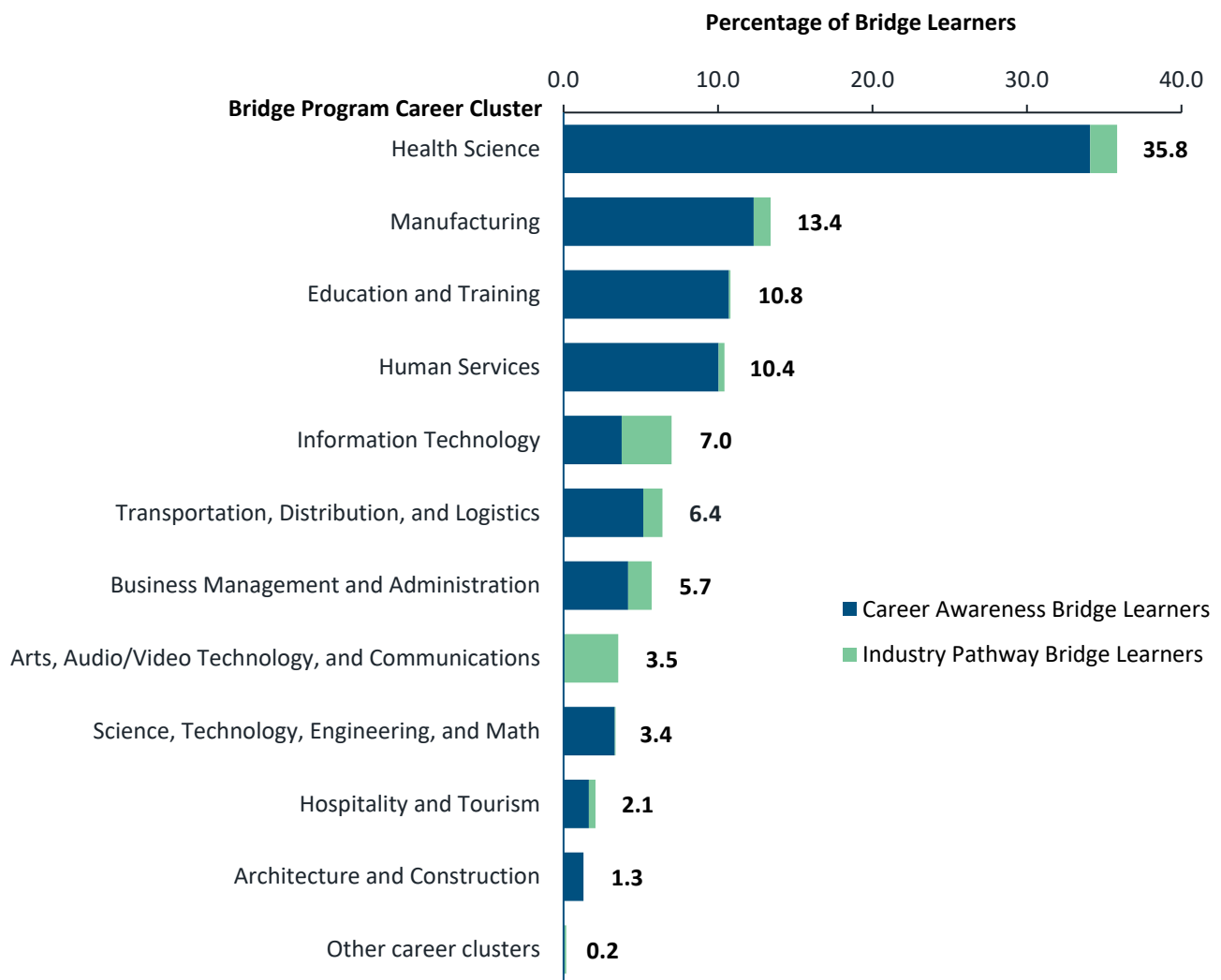
This section describes the key characteristics of the 6,295 bridge learners. As shown in Exhibit 5, about 70% of bridge learners were enrolled in ABE programming, and about 30% were enrolled in ESL programming. Additionally, 87% participated in career awareness bridge programs, while 13% participated in industry pathway bridge programs. As shown in Exhibit 6, learners enrolled in programs encompassing a wide range of career clusters. Learners were most likely to enroll in bridge programs aligned with Health Science (36% of learners), Manufacturing (13% of learners), and Education and Training (11% of learners). Among the least common career clusters were Hospitality and Tourism (2% of learners) and Architecture and Construction (1% of learners). A very small percentage of learners (0.2%) enrolled in bridge programs aligned with other career clusters, which included Law, Public Safety, Corrections and Security, as well as Agriculture, Food, and Natural Resources. While career awareness bridge learners made up the majority in most career clusters, industry pathway bridge learners accounted for all the learners in Arts, Audio/Video Technology, and Communications bridge programs, and nearly half of the learners in Information Technology bridge programs (46%; subgroup percentage not shown in Exhibit 6).

Exhibit 5. Bridge Learners' ABE and ESL Enrollment and Bridge Program Type



Note. ABE refers to Adult Basic Education. ESL refers to English as a Second Language.

Exhibit 6. Bridge Learners' Career Clusters by Bridge Program Type



Note. The “Other career clusters” category includes Law, Public Safety, Corrections, and Security, as well as Agriculture, Food, and Natural Resources.

More details on bridge learners’ characteristics are provided in Exhibit 7. Figures are reported separately for all 6,295 bridge learners and the two subgroups consisting of the 5,447 career awareness bridge learners and the 848 industry pathway bridge learners. Overall, Hispanic or Latino learners formed the largest group of bridge learners in terms of race and ethnicity, with 35% of bridge learners reporting as Hispanic or Latino, followed by white learners (28%) and Black or African American learners (26%). One-quarter of all bridge learners were 25–34 years old (25%), while 38% were 35–44 years old, 20% were 19–24 years old, and 18% were 16–18 years old.

Compared to learners in the career awareness bridge programs, learners in industry pathway bridges were relatively younger, more likely to be 16–18 years old and less likely to be 19–44 years old. Overall, a little over 40% of bridge learners were employed, and 39% had completed high school, although these percentages were slightly higher among career awareness bridge learners (43% were employed and 40% had completed high school) and lower among industry pathway bridge learners (35% were employed and 31% had completed high school). While 70% of all bridge learners were enrolled in ABE programming, as opposed to ESL, the percentage of ABE learners was much higher (86%) among those who enrolled in industry pathway bridge programs. The majority of bridge learners (84%) were located in urban counties, including nearly all learners who enrolled in industry pathway bridge programs (99%).

With respect to the type of provider that offered the bridge program, 59% of bridge learners were enrolled at a community college in Illinois, although industry pathway bridge learners (40%) were less likely than career awareness bridge learners (62%) to be at community colleges. Similar characteristics for comparison learners are reported in Exhibit A1 in Appendix A.

Exhibit 7. Characteristics of Bridge Learners

Bridge learner characteristics	Percentage of total bridge learners	Percentage of learners in career awareness bridge programs	Percentage of learners in industry pathway bridge programs
Total learners	6,295 (100.0%)	5,447 (100.0%)	848 (100.0%)
Gender			
Female	65.0%	67.4%	49.8%
Male	35.0%	32.6%	50.2%
Race/ethnicity			
Hispanic or Latino	34.8%	34.8%	34.6%
White	27.9%	28.9%	21.6%
Black or African American	26.2%	25.4%	31.8%
Asian	9.4%	9.3%	9.7%
Other	1.8%	1.7%	2.4%

Bridge learner characteristics	Percentage of total bridge learners	Percentage of learners in career awareness bridge programs	Percentage of learners in industry pathway bridge programs
Age			
16–18 years	18.0%	15.8%	31.8%
19–24 years	19.9%	20.4%	17.0%
25–34 years	25.1%	26.2%	18.2%
35–44 years	20.8%	21.4%	17.2%
45–54 years	11.7%	11.8%	11.2%
55–59 years	2.4%	2.3%	2.8%
60 years or older	2.1%	2.2%	1.8%
Employment status			
Employed	41.6%	42.6%	35.1%
Not in labor force	16.2%	14.7%	25.8%
Not employed	42.1%	42.6%	39.0%
Highest level of prior education			
Grades 1–8	6.2%	6.6%	4.0%
Grades 9–10	22.1%	22.4%	20.0%
Grades 11–12 (no high school diploma)	30.3%	28.3%	43.3%
High school diploma	14.4%	15.0%	11.0%
GED credential	4.0%	3.9%	4.4%
Some postsecondary education	6.0%	6.3%	3.9%
Postsecondary degree	14.5%	15.0%	11.3%
No schooling	0.2%	0.2%	0.0%
Unknown	2.3%	2.3%	2.1%

Bridge learner characteristics	Percentage of total bridge learners	Percentage of learners in career awareness bridge programs	Percentage of learners in industry pathway bridge programs
Public assistance			
Received public assistance	13.0%	12.9%	14.0%
Did not receive public assistance	87.0%	87.1%	86.0%
ABE or ESL enrollment			
Enrolled in ABE	70.3%	68.0%	85.6%
Enrolled in ESL	29.7%	32.0%	14.4%
Pre-test EFL			
ABE: EFL 3	30.4%	30.2%	31.5%
ABE: EFL 4	25.8%	24.8%	32.1%
ABE: EFL 5	9.5%	8.9%	13.9%
ABE: EFL 6	4.6%	4.1%	8.1%
ESL: EFL 3	1.9%	2.1%	0.6%
ESL: EFL 4	5.1%	5.5%	2.7%
ESL: EFL 5	8.6%	9.1%	5.1%
ESL: EFL 6	14.1%	15.3%	6.0%
Urbanicity			
Urban county	84.4%	82.1%	98.9%
Rural county	15.4%	17.6%	0.9%
Missing data	0.3%	0.3%	0.1%
Program year			
PY 2018–19	25.1%	24.5%	29.4%
PY 2019–20	17.9%	17.4%	20.9%
PY 2020–21	21.6%	21.7%	21.1%
PY 2021–22	35.4%	36.4%	28.7%

Bridge learner characteristics	Percentage of total bridge learners	Percentage of learners in career awareness bridge programs	Percentage of learners in industry pathway bridge programs
Provider type			
Community college	59.1%	62.1%	40.1%
Community-based organization (CBO)	15.4%	14.0%	24.1%
Local education agency	20.4%	18.5%	32.5%
Faith-based organization	0.8%	0.8%	1.3%
Correctional facility	0.8%	0.6%	2.0%
Four-year college or university	3.5%	4.0%	0.0%

Note. ABE refers to Adult Basic Education. ESL refers to English as a Second Language. EFL refers to educational functioning level. PY refers to program year. Percentages may not sum to 100 due to rounding. The “Other” race/ethnicity category includes individuals who were American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, or more than one race. The “Not employed” category includes individuals who were unemployed and those who were employed but had received notice of termination or military separation.

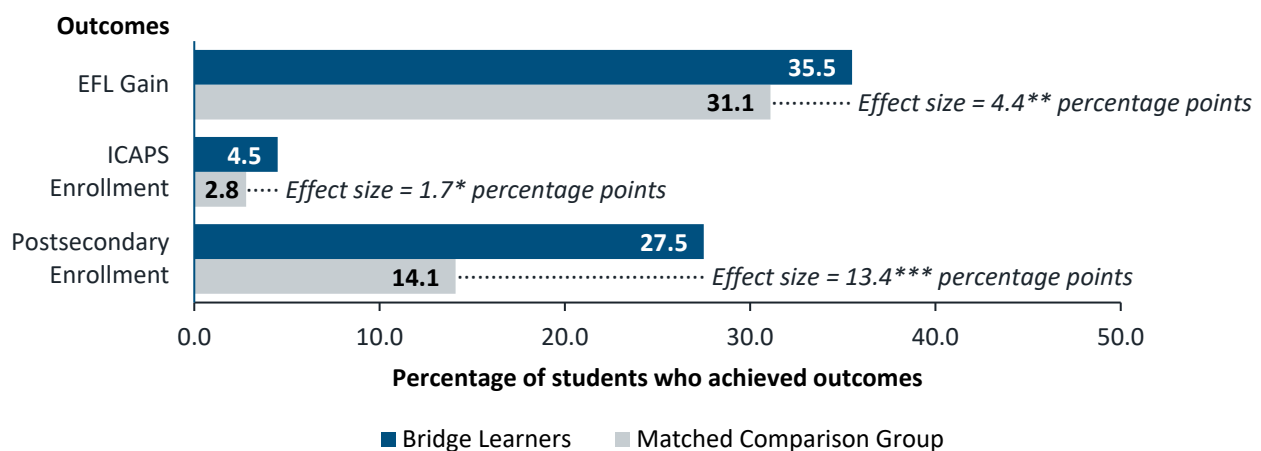
Are Bridge Programs Leading to Better Outcomes?

This section presents the impact estimates for Illinois' bridge programs, focusing on whether participation leads to improved educational outcomes compared to standard adult education. Using PSM to compare participants with observationally similar non-participants, this analysis reveals a consistent pattern of positive associations between bridge program participation and key educational outcomes. In keeping with the program theory of change, enrollment in ICAPS and enrollment in postsecondary education outcomes are considered confirmatory.¹³

Bridge Participation Outcomes

Overall, bridge program learners were 4.4 percentage points more likely to achieve an EFL gain, reflecting advancement in foundational skills critical for further education and employment. The likelihood of enrolling in ICAPS—a pathway to industry-recognized credentials—was 1.7 percentage points higher among bridge learners, and most strikingly, bridge participants were 13.4 percentage points more likely to enroll in postsecondary education than their matched counterparts. These results are shown in Exhibit 8 and reported in more detail in Exhibit B1 in Appendix B. These findings, particularly the increase in postsecondary enrollment, underscore the potential of bridge programs to support adult learners in advancing along educational and career pathways.

Exhibit 8. Impact of Bridge Participation on Learner Outcomes



Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. The absence of asterisks indicates that the finding is not statistically significant and should not be interpreted as meaningful. Rounding may result in minor discrepancies between displayed values and calculated differences.

¹³ We applied the Benjamini-Hochberg procedure to the confirmatory outcomes of enrollment in ICAPS and enrollment in postsecondary education to adjust for multiple comparisons.

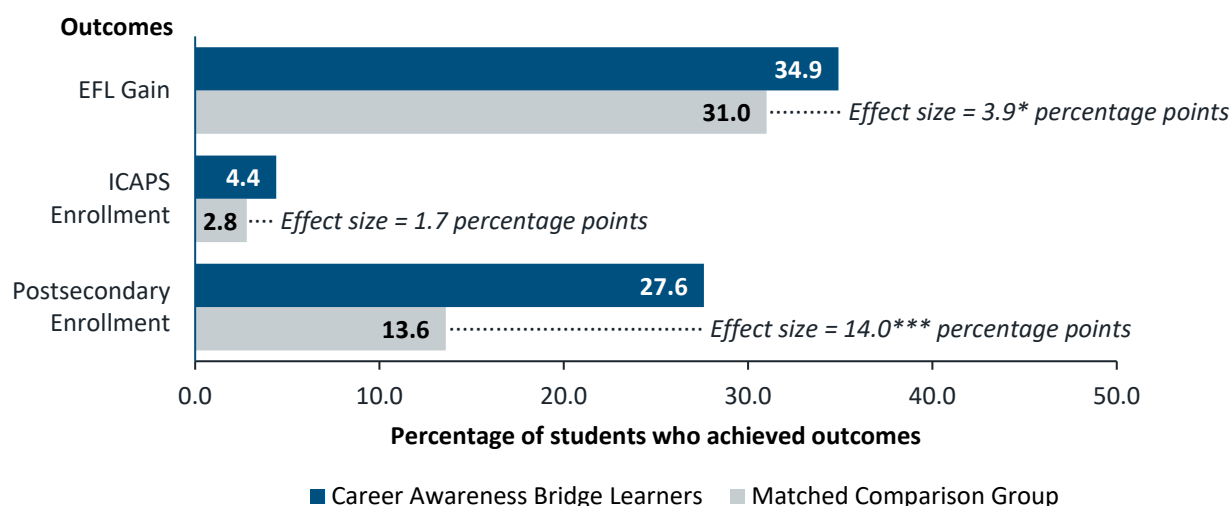
Career Awareness and Industry Pathway Bridge Programs

To better understand the program dynamics, we also estimated the effects for learners in the career awareness and industry pathway bridges separately by creating distinct matched comparison groups for each of these program types. For the vast majority of career clusters, bridge program locations were much more likely to offer career awareness bridge programs than industry pathway bridge programs. The majority, 87%, of bridge learners participated in career awareness programs (5,447 out of 6,295), and 13% (848 out of 6,295) participated in industry pathway programs.

Learners in Career Awareness Bridge Programs

We found that compared to observationally similar learners who did not participate in the bridge program, learners in career awareness bridge programs had a higher probability of making an EFL gain and enrolling in postsecondary education. Specifically, career awareness bridge learners were 3.9 percentage points more likely to make an EFL gain and 14.0 percentage points more likely to enroll in postsecondary education than the matched comparison group. The finding related to EFL gain is significant at the 10% level only. There were no significant findings related to ICAPS enrollment. These results are shown in Exhibit 9 and reported in more detail in Exhibit B2 in Appendix B.

Exhibit 9. Impact of Bridge Participation on Career Awareness Bridge Learners

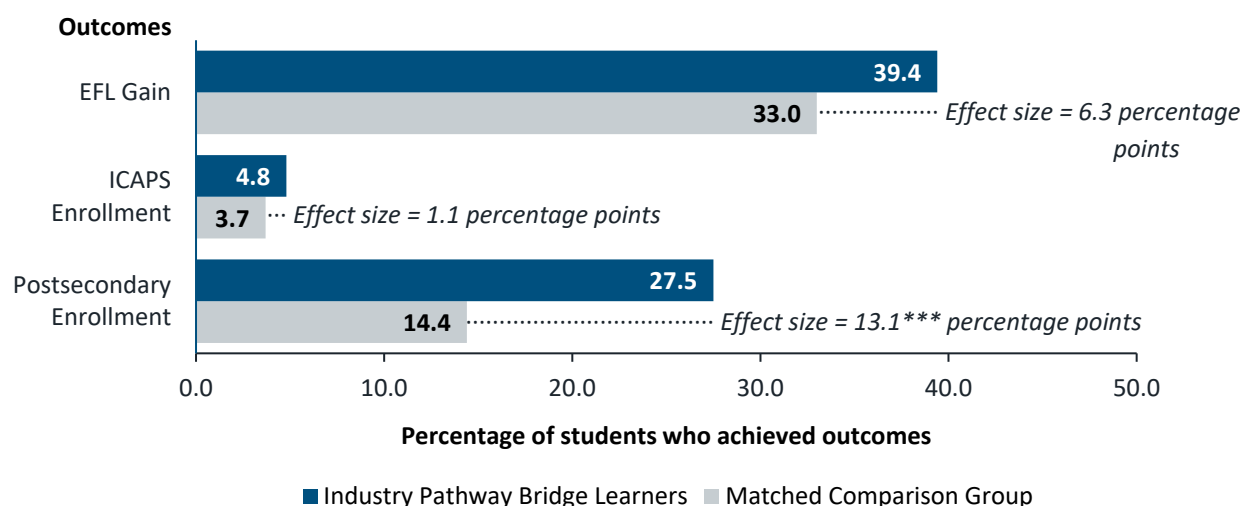


Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. The absence of asterisks indicates that the finding is not statistically significant and should not be interpreted as meaningful. Rounding may result in minor discrepancies between displayed values and calculated differences.

Learners in Industry Pathway Bridge Programs

We found that compared to observationally similar learners who did not participate in the bridge program, bridge learners in industry pathway bridge programs were 13.1 percentage points more likely to enroll in postsecondary education. No significant differences were found for EFL gain or ICAPS enrollment among industry pathway bridge learners, deviating from the overall findings for all bridge learners. These results appear in Exhibit 10 and are reported in more detail in Exhibit B3 in Appendix B.

Exhibit 10. Impact of Bridge Participation for Industry Pathway Bridge Learners



Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. The absence of asterisks indicates that the finding is not statistically significant and should not be interpreted as meaningful. Rounding may result in minor discrepancies between displayed values and calculated differences.

Subgroup Effects among ABE and ESL Bridge Learners

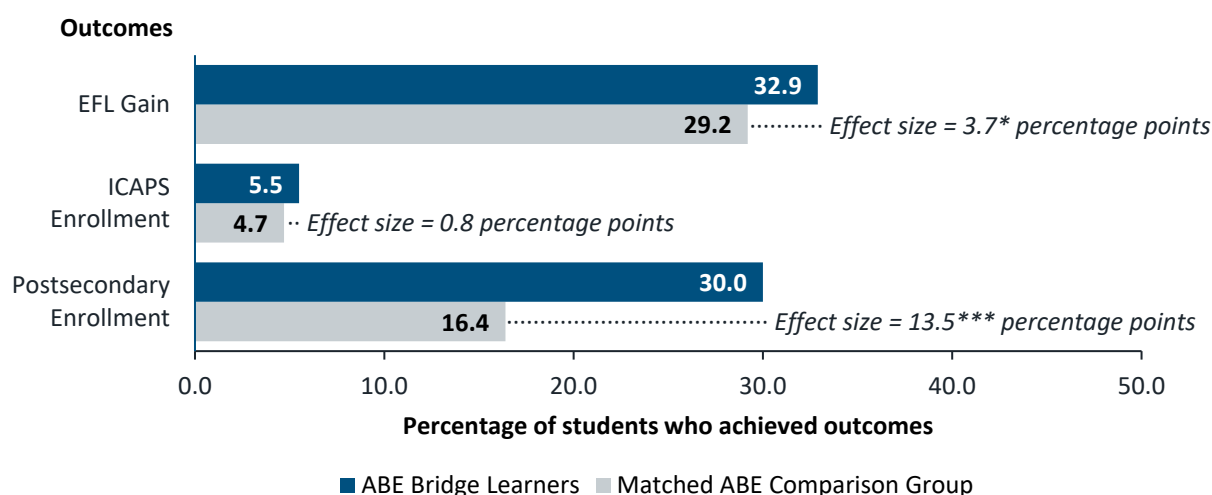
ABE and ESL learners often have distinct educational backgrounds, needs, and barriers to advancement. By examining outcomes separately for these groups, state and local leaders can better tailor program design, resource allocation, and support strategies to ensure that all learners have opportunities to succeed.

The subgroup analysis in this section compares ABE bridge learners to similar ABE learners not in bridge programming, and ESL bridge learners to similar ESL learners not in bridge programming. This approach allows us to understand how bridge program participation affects each group across key educational outcomes.

ABE Bridge Subgroup

Exhibit 11 shows the impact of being an ABE bridge learner on key educational outcomes relative to matched ABE learners who did not participate in a bridge program. Results indicate that participation in bridge programming was associated with a substantial increase in postsecondary enrollment. Specifically, ABE bridge learners were about 13.5 percentage points more likely to enroll in postsecondary education than their matched peers. There was also a marginally significant increase in the likelihood of achieving an EFL gain, suggesting a possible benefit in foundational skill development. However, ABE bridge participation did not lead to a higher likelihood of enrollment in ICAPS programs. These findings suggest that, for ABE learners, bridge programming is particularly effective in supporting transitions to postsecondary education, while impacts on other academic outcomes are less pronounced. These results are reported in more detail in Exhibit B4 in Appendix B.

Exhibit 11. Impact of Bridge Participation for ABE Learners



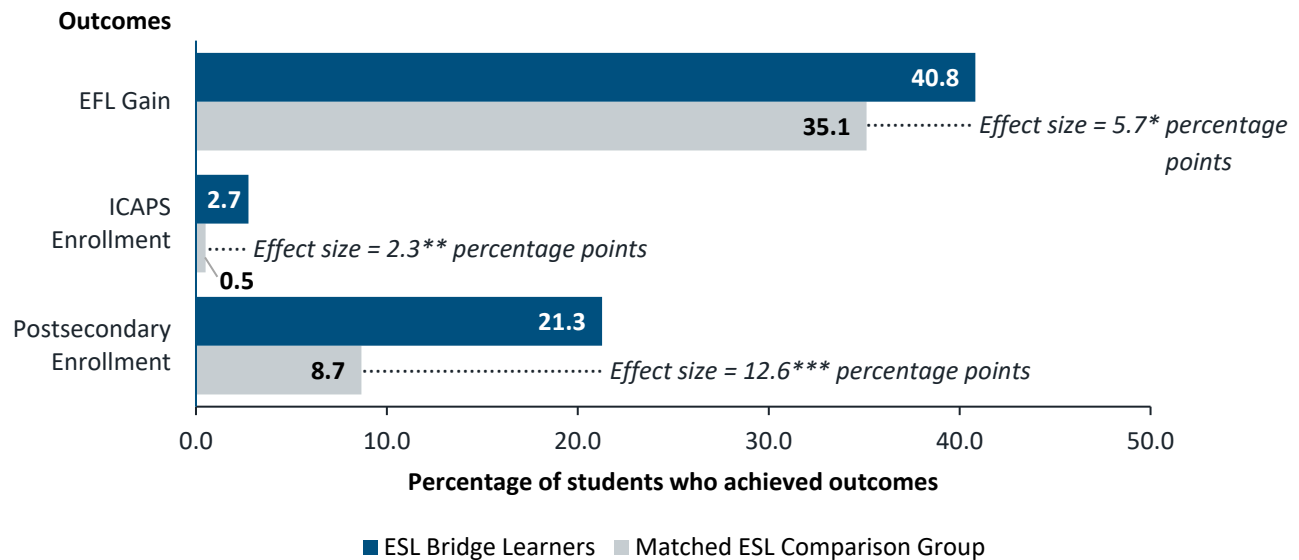
Note. ABE refers to Adult Basic Education. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. The absence of asterisks indicates that the finding is not statistically significant and should not be interpreted as meaningful. Rounding may result in minor discrepancies between displayed values and calculated differences.

ESL Bridge Subgroup

Exhibit 12 shows the impact of being an ESL bridge learner on key educational outcomes relative to matched ESL learners who did not participate in a bridge program. ESL bridge learners were more likely to achieve an EFL gain and to enroll in ICAPS programs, with both outcomes showing positive and significant effects. Most notably, ESL bridge learners were about 12.6 percentage points more likely to enroll in postsecondary education than their

matched peers, representing a strong and highly significant effect. These results indicate that bridge programming for ESL learners is associated with meaningful gains in academic progress and substantial increases in postsecondary enrollment. These results are reported in more detail in Exhibit B5 in Appendix B.

Exhibit 12. Impact of Bridge Participation for ESL Learners



Note. ESL refers to English as a Second Language. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. The absence of asterisks indicates that the finding is not statistically significant and should not be interpreted as meaningful. Rounding may result in minor discrepancies between displayed values and calculated differences.

Key Takeaways and Implications

Illinois defines bridge programs as offerings that provide literacy, numeracy, or English language instruction contextualized in one of 16 nationally recognized career clusters, paired with comprehensive support services that make higher-level instruction and jobs more accessible. The goal of bridge programs is to bridge the gap between adults' initial skill level and the level they need to enter and succeed in postsecondary education and career-path employment.

Using a PSM approach, we find that Illinois' bridge programs function as a reliable on-ramp from foundational skill-building to postsecondary education and credentials that lead to better jobs. Participation in a bridge program is associated with a higher likelihood of achieving an EFL gain (+4.4 percentage points), a higher likelihood of ICAPS entry (+1.7 percentage points), and—most notably—a substantially higher rate of postsecondary enrollment (+13.4 percentage points) compared with observationally similar peers who did not participate in a bridge program. These findings are strongest and most consistent for postsecondary enrollment, but there were also smaller gains in ICAPS entry, underscoring the role of bridges as a reliable, scalable on-ramp into community college pathways for Illinois adults with foundational skill needs.

This study also indicates that the specific goals of the program matter. First, career awareness bridges (the majority of offerings) are linked to larger likelihood of EFL gains and postsecondary entry (+3.9 and +14 percentage points, respectively), while industry pathway bridges raise postsecondary entry (+13.1 percentage points). These results indicate that career awareness bridges appear to provide a solid academic foundation that supports literacy gains and early college transition, while industry pathway bridges support movement toward postsecondary programs.

Second, ABE bridge learners show EFL gains (+3.7 percentage points) and strong postsecondary effects (+13.5 percentage points) compared to matched ABE comparison learners, while ESL bridge learners show gains in EFL (+5.7 percentage points), ICAPS entry (+2.3 percentage points), and postsecondary enrollment (+12.6 percentage points) relative to matched ESL comparison learners—a pattern that underscores the value of bridges for multilingual adults. These findings indicate that ESL learners experience especially strong transitions following bridge participation, suggesting bridges may help address longstanding access gaps for English learners in IET pathways.

These effects are plausible given Illinois' policy environment. Many community colleges permit enrollment without a high school diploma, placing learners into appropriate coursework via testing (City Colleges of Chicago, n.d.; Illinois Central College, n.d.; Oakton College, n.d.). That,

combined with the variety of credentials available at postsecondary institutions, likely contributes to stronger postsecondary entry among bridge learners. Although comprehensive postsecondary records were not available, limited data indicate that, among the 1,714 bridge learners who enrolled at community colleges, 44% pursued associate degrees, 23% pursued occupational certificates, and 33% pursued other short-term certificates.

Further, notably, 8% of bridge learners who enrolled in community colleges also enrolled in ICAPS programs (144 learners). Because we lack data on the exact date of postsecondary enrollment, we cannot determine whether these learners typically transitioned from ICAPS to postsecondary education or vice versa; however, among this group, a larger share (42%) pursued occupational certifications at postsecondary institutions, suggesting overlapping and complementary pathways between ICAPS and college programs.

Access and alignment matter too. Access constraints may have also influenced enrollment patterns, as suggested by our previous studies involving bridge programming in Illinois. Our implementation study found that some bridge learners faced challenges enrolling in ICAPS programs because local ICAPS options did not always align with the career clusters offered through their bridge programs (Khachikian et al., 2024). Our spatial analysis revealed gaps in bridge career cluster availability by region, such as a lack of bridge programs in Manufacturing in southeastern Illinois, which is predominantly rural (Deng et al., 2025). Examining how bridge programs are geographically positioned relative to ICAPS offerings in aligned career clusters could uncover barriers to ICAPS enrollment and inform improvements to local career pathway pipelines. Further, most industry pathway bridges and enrollments are concentrated in urban counties (Deng et al., 2025). These geographic and program alignment gaps can dampen ICAPS entry even when postsecondary entry remains strong. Examining where bridges are offered relative to available ICAPS programs in the same clusters can help identify and address barriers to smooth transitions.

Taken together, these findings suggest that bridge programs are associated with improved academic achievement and increased transitions to postsecondary education. The evidence supports the value of bridge programming as a strategy for helping adults build foundational skills and access further training and credentials, ultimately contributing to workforce development and economic mobility. For state and local leaders, these findings suggest implications for expanding bridge capacity, improving connections between bridge and ICAPS programs, and using data to identify gaps so that more adults have pathways to credentials of value and family-sustaining employment.

Appendix A: Comparison Learners

Exhibit A1. Comparison Group Learner Characteristics

Learner characteristics	Number of bridge learners	Percentage of bridge learners	Number of comparison learners	Percentage of comparison learners
Total learners	6,295	100.0%	97,973	100.0%
Gender				
Female	4,091	65.0%	61,367	62.6%
Male	2,204	35.0%	36,606	37.4%
Race/ ethnicity				
Hispanic or Latino	2,188	34.8%	50,622	51.7%
White	1,755	27.9%	23,199	23.7%
Black or African American	1,651	26.2%	12,354	12.6%
Asian	589	9.4%	10,712	10.9%
Other	112	1.8%	1,086	1.1%
Age				
16–18 years	1,132	18.0%	10,480	10.7%
19–24 years	1,254	19.9%	16,444	16.8%
25–34 years	1,579	25.1%	26,601	27.2%
35–44 years	1,311	20.8%	22,705	23.2%
45–54 years	737	11.7%	13,551	13.8%
55–59 years	148	2.4%	3,597	3.7%
60 years or older	134	2.1%	4,595	4.7%

Learner characteristics	Number of bridge learners	Percentage of bridge learners	Number of comparison learners	Percentage of comparison learners
Employment status				
Employed	2,621	41.6%	47,100	48.1%
Not in labor force	1,021	16.2%	16,317	16.7%
Not employed	2,653	42.1%	34,556	35.3%
Highest level of prior education				
Grades 1–8	393	6.2%	10,776	11.0%
Grades 9–10	1,389	22.1%	19,259	19.7%
Grades 11–12 (no high school diploma)	1,906	30.3%	23,057	23.5%
High school diploma	909	14.4%	14,703	15.0%
GED credential	252	4.0%	1,913	2.0%
Some postsecondary	377	6.0%	6,946	7.1%
Postsecondary degree	913	14.5%	13,420	13.7%
No schooling	13	0.2%	943	1.0%
Unknown	143	2.3%	6,956	7.1%
Public assistance				
Received public assistance	819	13.0%	7,738	7.9%
Did not receive public assistance	5,476	87.0%	90,235	92.1%
ABE or ESL enrollment				
Enrolled in ABE	4,428	70.3%	36,356	37.1%
Enrolled in ESL	1,867	29.7%	61,617	62.9%

Learner characteristics	Number of bridge learners	Percentage of bridge learners	Number of comparison learners	Percentage of comparison learners
Pre-test EFL				
ABE: EFL 3	1,912	30.4%	15,953	16.3%
ABE: EFL 4	1,624	25.8%	12,724	13.0%
ABE: EFL 5	601	9.5%	4,757	4.9%
ABE: EFL 6	291	4.6%	2,922	3.0%
ESL: EFL 3	117	1.9%	13,190	13.5%
ESL: EFL 4	322	5.1%	18,079	18.5%
ESL: EFL 5	541	8.6%	15,751	16.1%
ESL: EFL 6	887	14.1%	14,597	14.9%
Urbanicity				
Urban county	5,311	84.4%	89,412	91.3%
Rural county	968	15.4%	8,254	8.4%
Missing data	16	0.3%	307	0.3%
Program Year				
PY 2018–19	1,583	25.1%	42,733	43.6%
PY 2019–20	1,124	17.9%	24,159	24.7%
PY 2020–21	1,360	21.6%	12,499	12.8%
PY 2021–22	2,228	35.4%	18,582	19.0%
Provider type				
Community college	3,723	59.1%	76,781	78.4%
Community-based organization	969	15.4%	10,295	10.5%

Learner characteristics	Number of bridge learners	Percentage of bridge learners	Number of comparison learners	Percentage of comparison learners
Local education agency	1,284	20.4%	8,299	8.5%
Faith-based organization	52	0.8%	731	0.7%
Correctional facility	49	0.8%	1,071	1.1%
Four-year college or university	218	3.5%	796	0.8%

Note. ABE refers to Adult Basic Education. ESL refers to English as a Second Language. EFL refers to educational functioning level. PY refers to program year. Percentages may not sum to 100 due to rounding. The “Other” race/ethnicity category includes individuals who were American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, or more than one race. The “Not employed” category includes individuals who were unemployed and those who were employed but had received notice of termination or military separation.

Appendix B: Detailed Impact Findings

Exhibit B1. Average Marginal Effect of Being a Bridge Learner on Key Educational Outcomes

Outcome (regression methodology)	Effect on the treated estimate, unadjusted (<i>standard error</i>)	Effect on the treated estimate, regression-adjusted (<i>standard error</i>)	P-value	Regression sample size
EFL gain (logistic regression)	5.2*** (0.67)	4.4** (2.2)	0.046	33,891
Enrollment in ICAPS (logistic regression)	2.4*** (0.35)	1.7* (1.0)	0.088	20,486
Enrollment in postsecondary education (logistic regression)	13.0*** (0.61)	13.4*** (3.5)	0.000	33,891

Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. We estimated the statistical significance levels on the unadjusted estimates with a Welch t-test. The standard errors for the adjusted estimates are cluster-robust standard errors that cluster both on the matched pair unit (R Matchit “subclass” variable) and the provider ID. Adjusted estimates also incorporate the matching weights. EFL gain is an exploratory outcome. We applied the Benjamini-Hochberg procedure to the confirmatory outcomes of enrollment in ICAPS and enrollment in postsecondary education. After rounding, the Benjamini-Hochberg-adjusted p-values were the same as the raw p-values for these outcomes: 0.088 for ICAPS enrollment and 0.000 for postsecondary enrollment. Covariates included for regression adjustment are program year of enrollment, race and ethnicity, EFL at pre-test, educational attainment, urbanicity status, provider’s percentage of Adult Basic Education learners, provider’s percentage of teachers with less than one year of experience, and provider type. We trimmed the handful of units outside of the common support in the final matched samples used for regression estimation.

Exhibit B2. Average Marginal Effect of Being a Career Awareness Bridge Learner on Key Educational Outcomes

Outcome (regression methodology)	Effect on the treated estimate, unadjusted (<i>standard error</i>)	Effect on the treated estimate, regression-adjusted (<i>standard error</i>)	P-value	Regression sample size
EFL gain (logistic regression)	4.8*** (0.7)	3.9* (2.1)	0.061	29,860
Enrollment in ICAPS (logistic regression)	2.5*** (0.4)	1.7 (1.1)	0.130	18,082
Enrollment in postsecondary education (logistic regression)	13.5*** (0.7)	14.0*** (3.9)	0.000	29,860

Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. We estimated the statistical significance levels on the unadjusted estimates with a Welch t-test. The standard errors for the adjusted estimates are cluster-robust standard errors that cluster both on the matched pair unit (R Matchit “subclass” variable) and the provider ID. Adjusted estimates also incorporate the matching weights. EFL gain is an exploratory outcome. After rounding, the Benjamini-Hochberg-adjusted p-values were similar to the raw p-values for these outcomes: 0.130 for ICAPS enrollment and 0.001 for postsecondary enrollment. Covariates included in the regression are program year of enrollment, EFL at pre-test, educational attainment, age, provider’s percentage of Adult Basic Education learners, provider percentage of teachers with a TESOL certificate, and provider type. We trimmed the handful of units outside of the common support in the final matched samples used for regression estimation.

Exhibit B3. Average Marginal Effect of Being an Industry Pathway Bridge Learner on Key Educational Outcomes

Outcome (regression methodology)	Effect on the treated estimate, unadjusted (standard error)	Effect on the treated estimate, regression-adjusted (standard error)	P-value	Regression sample size
EFL gain (logistic regression)	5.9*** (1.9)	6.3 (4.4)	0.149	3,282
Enrollment in ICAPS (logistic regression)	1.4 (1.0)	1.1 (3.0)	0.710	2,129
Enrollment in postsecondary education (logistic regression)	12.9*** (1.7)	13.1*** (2.6)	0.000	3,282

Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. We estimated the statistical significance levels on the unadjusted estimates with a Welch t-test. The standard errors for the adjusted estimates are cluster-robust standard errors that cluster both on the matched pair unit (R Matchit “subclass” variable) and the provider ID. Adjusted estimates also incorporate the matching weights. EFL gain is an exploratory outcome. We applied the Benjamini-Hochberg procedure to the confirmatory outcomes of enrollment in ICAPS and enrollment in postsecondary education. After rounding, the Benjamini-Hochberg-adjusted p-values were the same as the raw p-values for these outcomes: 0.710 for ICAPS enrollment and 0.000 for postsecondary enrollment. We trimmed the handful of units outside of the common support in the final matched samples used for regression estimation. Covariates included in the regression are program year of enrollment, race and ethnicity, EFL at pre-test, educational attainment, employment status, age, urbanicity, provider’s percentage of Adult Basic Education learners, provider’s percentage of teachers with less than one year of experience, provider type.

Exhibit B4. Average Marginal Effect of Being an ABE Bridge Learner on Key Educational Outcomes (Relative to ABE Non-Bridge Learners)

Outcome (regression methodology)	Effect on the treated estimate, unadjusted (standard error)	Effect on the treated estimate (standard error)	P-value	Regression sample size
EFL gain (logistic regression)	4.1*** (0.8)	3.7* (1.9)	0.058	16,899
Enrollment in ICAPS (logistic regression)	1.8*** (0.5)	0.8 (1.5)	0.596	9,877
Enrollment in postsecondary education (logistic regression)	13.3*** (0.8)	13.5*** (3.2)	0.000	16,899

Note. ABE refers to Adult Basic Education. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. We estimated the statistical significance levels on the unadjusted estimates with a Welch t-test. The standard errors for the adjusted estimates are cluster-robust standard errors that cluster both on the matched pair unit (R Matchit “subclass” variable) and the provider ID. Adjusted estimates also incorporate the matching weights. Fixed effects in the regression were as follows: program year of enrollment, race and ethnicity, EFL at pre-test, educational attainment, urbanicity, provider type, provider’s percentage ABE learners, and provider’s percentage of teachers with less than one year of experience.

Exhibit B5. Average Marginal Effect of Being an ESL Bridge Learner on Key Educational Outcomes (Relative to ESL Non-Bridge Learners)

Outcome (regression methodology)	Effect on the treated estimate, unadjusted (standard error)	Effect on the treated estimate (standard error)	P-value	Regression sample size
EFL gain (logistic regression)	5.0*** (1.3)	5.7* (3.0)	0.059	6,845
Enrollment in ICAPS (logistic regression)	2.2*** (0.5)	2.3** (0.9)	0.014	5,045
Enrollment in postsecondary education (logistic regression)	12.4*** (1.0)	12.6*** (3.4)	0.000	6,845

Note. ESL refers to English as a Second Language. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. Statistical significance levels are indicated as *** = 1%, ** = 5%, and * = 10%. We estimated the statistical significance levels on the unadjusted estimates with a Welch t-test. The standard errors for the adjusted estimates are cluster-robust standard errors that cluster both on the matched pair unit (R Matchit “subclass” variable) and the provider ID. Adjusted estimates also incorporate the matching weights. Fixed effects in the regression were as follows: program year of enrollment, race and ethnicity, EFL at pre-test, educational attainment, urbanicity, provider type, provider’s percentage of Adult Basic Education learners, and provider’s percentage of teachers with less than one year of experience.

Appendix C: Technical Documentation

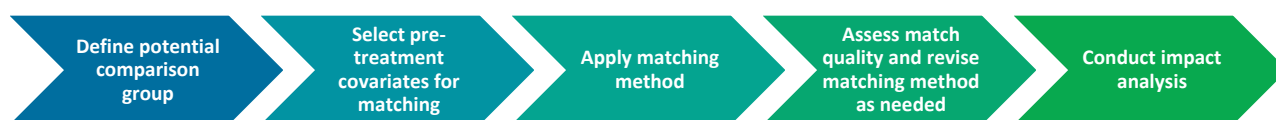
Analytic Approach

We use PSM, a robust matching method pioneered by Rosenbaum and Rubin (1983), to examine the bridge program’s effectiveness on EFL gains, entry into IET, and postsecondary education. PSM attempts to identify the counterfactual for each treated unit in the comparison group. In other words, it allows us to find learner(s) in the comparison group that are observationally similar to those in the treatment group. A counterfactual simulates the treated unit’s outcome if they had not received treatment. With PSM, we estimate the Average Treatment Effect on the Treated (ATT) because the matched comparison units represent the counterfactual for the treated ones (Austin, 2011). In other words, our estimates are applicable to those who enroll in the bridge program, referred to as the “treated units,” but do not generalize to the whole population.

The key limitation of any matching approach is that comparison matches are created based on observable characteristics available in the dataset. Presence of “unobservable” factors, not accounted for in the analysis but correlated to both program participation and the outcome of interest, can lead to omitted variable bias resulting in over- or underestimation of program estimates (Zhao et al., 2021). While always a concern, the larger the set of relevant matching covariates, the greater the chance that this omitted variable bias is minimized.

Exhibit C1 highlights the process used to estimate bridge program effects with our matching method, which includes the following steps: (1) define the potential comparison group; (2) select matching covariates; (3) apply the matching method; (4) assess match quality and revise the model, as needed; and (5) conduct the impact analysis. We elaborate on each in this document.

Exhibit C1. Process for Estimating Bridge Program Effects



Defining the Potential Comparison Group

The comparison group for this study is drawn from adult education learners who scored at EFL 3–6 at entry and did **not** enroll in a bridge program during PY 2018–19 through PY 2022–23. We filtered the sample for each of our four outcomes based on the outcome’s definition and inclusion criteria, as reported in Exhibit 4. Based on these definitions, we created two matched analytic samples: (1) an analytic sample for EFL gain and enrollment in postsecondary education outcomes, and (2) an analytic sample for enrollment in ICAPS outcomes. Fewer than 1% of values were missing across the variables used in our analysis. The analytic sample for the EFL gain and enrollment in postsecondary education outcomes includes the full treatment and comparison groups, while the analytic sample for the ICAPS outcome is smaller (52% of the full treatment and potential comparison samples). Our dataset contains 80 educational providers, and the same providers served both the treated and comparison group learners.

Selecting Pre-Treatment Covariates for Propensity Score Estimation

PSM requires the inclusion of baseline covariates that affect both the likelihood of enrolling in the bridge program and the outcomes of interest, because omitting such variables can lead to biased impact estimates due to unmeasured confounding (Stuart, 2010; Austin, 2011; Zhao et al., 2021).

Baseline characteristics are measured before the treatment period and do not change due to the treatment. The baseline learner and provider covariates we used for matching are listed below in Exhibit C2. Provider characteristics at baseline help us match learners in the treatment group to nonparticipants in a similar adult education context. Beyond just the raw variable forms, researchers often include quadratic and interaction terms to improve the balance of the matched sample and potentially reduce bias if they believe that there exists either (1) more complicated relationships between covariates and treatment status (Zhao et al., 2021) and/or (2) insufficiency of linear variable forms for capturing the relationship between the variable and inclusion in the treatment group (Garrido et al., 2014). We included interaction terms primarily for the former reason, selecting those that we thought could be conceptually important; for example, we believed a learner’s employment status might influence their probability of inclusion in the treatment differently if they were in a younger age group versus an older age group. However, with smaller datasets, researchers often need to use propensity score models with fewer covariates to achieve balance (Stuart, 2010; Garrido et al., 2014). We included interaction terms in our larger analytic samples but only achieved balanced matched samples for some of our smaller analytic samples once we dropped the interaction terms (Industry Pathway Treatment, exploratory subgroup samples).

Exhibit C2. Matching Covariates by Propensity Score Model

Variable	Bridge Learner Treatment		Career Awareness Treatment	Industry Pathway Treatment	Exploratory subgroups
	Analytic sample: EFL gain & enrollment in postsecondary education outcomes	Analytic sample: ICAPS enrollment outcome	All analytic samples	All analytic samples	All analytic samples
Learner characteristics					
Gender	x	x	x	x	x
Race and ethnicity	x	x	x	x	x
Employment status	x	x	x	x	x
Urbanicity	x	x	x	x	x
Public assistance	x	x	x	x	x
EFL at pre-test	x	x	x	x	x
ABE and ESL enrollment	x	x	x	x	x
Program year	x	x	x	x	x
Prior education level	x	x	x	x	x
Age	x	x*	x	x	x
Age squared		x*			

Variable	Bridge Learner Treatment		Career Awareness Treatment	Industry Pathway Treatment	Exploratory subgroups
	Analytic sample: EFL gain & enrollment in postsecondary education outcomes	Analytic sample: ICAPS enrollment outcome	All analytic samples	All analytic samples	All analytic samples
Age * Employment status (interaction)	x		x		
Age * EFL at pre-test (interaction)	x		x		
Gender * EFL at pre-test (interaction)	x	x	x		
Employment * EFL at pre-test (interaction)	x	x	x		
Urbanicity * EFL at pre-test (interaction)	x	x	x		
Provider characteristics					
Provider type	x	x	x	x	x
Provider's share of ABE learners	x	x*	x	x	x
Provider's share of teachers with less than one year of experience	x	x*	x	x	x

Variable	Bridge Learner Treatment		Career Awareness Treatment	Industry Pathway Treatment	Exploratory subgroups
	Analytic sample: EFL gain & enrollment in postsecondary education outcomes	Analytic sample: ICAPS enrollment outcome	All analytic samples	All analytic samples	All analytic samples
Provider's share of teachers with a TESOL certification	x	x*	x	x	x

Note: X indicates variables included in the analytic samples. EFL refers to educational functioning level. ABE refers to Adult Basic Education. ESL refers to English as a Second Language. TESOL refers to teaching English to speakers of other languages. An asterisk (*) marks variables that are in the numeric/continuous form. All other variables are categorical. Categorical variables are specified as follows: gender (male or female); race and ethnicity (Asian, Black, Hispanic or Latino, White, combined category of American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, or more than one race); age (16–18, 19–24, 25–34, 35–44, 45–54, 55–59, 60+); employment status (employed, not in the labor force, not employed); prior education level (grades 1–8, grades 9–10, grades 11–12 without a diploma, high school diploma, GED credential, some postsecondary, postsecondary degree, unknown, or none); public assistance status (yes or no); enrollment in ABE or ESL programming (ABE learner, ESL learner); pre-test EFL (Level 3, Level 4, Level 5, Level 6); urbanicity based on the learner's ZIP code¹⁴ (urban, rural, missing), PY of enrollment, referring to the year in which bridge learners started their bridge program¹⁵ and comparison learners started their first adult education course between July 1, 2018, and June 30, 2022 (2018–19, 2019–20, 2020–21, 2021–22), provider type (community college, community-based organization, local education agency, faith-based organization, four-year college or university, correctional facility), provider's share of ABE learners served (0%–26.5%, 26.6%–31.2%, 31.3%–51.7%, 51.7%–100%, missing), provider's share of teachers with less than one year of experience (0%–1.14%, 1.14%–37.5%, missing), provider's share of teachers with a TESOL certification (0%–4.69%, 4.70%–15.5%, 15.6%–100%, missing). The “Not employed” category includes individuals who were unemployed and those who were employed but had received notice of termination or military separation.

¹⁴ Urban and rural classifications were determined for each county in Illinois based on [U.S. Department of Agriculture](#) rural-urban continuum codes, following data operationalization implemented by the [Illinois Department of Public Health](#). Among the 102 counties in the state, 19 were identified as urban, and the remaining 83 were identified as rural. We mapped county boundaries using the county shapefile from the [Illinois Department of Transportation](#) using ArcGIS Pro. This allowed us to accurately visualize and analyze the geographic distribution of counties across the state. To determine whether a student was from an urban or rural county, we mapped the population-weighted centroid of each student's ZIP code and assessed whether it fell within the spatial boundaries of a county classified as urban or rural.

¹⁵ For bridge learners who enrolled in more than one bridge program between PY 2018–19 and PY 2021–22, only their first bridge program was considered in this study. Similarly, for comparison learners who enrolled in more than one adult education course during this time period, only their first course was considered in this study.

Applying the Matching Method

We used logistic regression to estimate propensity scores, which represent the probability of being “treated”—in this case, participating in the bridge program—based on baseline characteristics listed in Exhibit C2. We used the estimated model to generate a predicted probability of treatment for every observation. This predicted probability is the propensity score. The resulting propensity score is a value between 0 and 1, where values near 0 indicate a low likelihood of participating in the bridge program and values near 1 indicate a high likelihood. After estimating these scores, we matched comparison units to each treated unit based on the similarity of their propensity scores.

A key advantage of PSM is that it reduces the multidimensional set of covariates for both treated and comparison units to a single dimension—the propensity score—making matching more feasible and efficient (Zhao et al., 2021). This approach allows us to pair each treated unit with the most similar comparison units based on this single score. However, PSM discards treated units for which no suitable match exists in the comparison group, which can reduce sample size and increase the variance of the estimated treatment effect (Zhao et al., 2021). Given the large size of our comparison group, we anticipated—and confirmed—that we could achieve good-quality matches while retaining nearly all treated units.

When implementing PSM, researchers make several important decisions, which determine how similar a comparison unit must be to a treated unit to be deemed a match, discussed below. Exhibit C3 summarizes how these matching parameters varied across our propensity score models.

- 1. Maximum number of matches (ratio).** The ratio sets the maximum number of comparison units matched to each treatment unit. There is no universally agreed-upon “best” ratio; larger ratios can reduce variance but may increase bias because more distant matches are less similar (Stuart, 2010). Researchers often use ratios of one, two, or three comparison group matches to each treated unit (Zhao et al., 2021). For our Bridge Learner Treatment and Career Awareness Treatment models, the large comparison pool allowed us to achieve balance with up to five matches per treated unit. For smaller datasets—Industry Pathway Treatment and subgroup models—we used a ratio of three.
- 2. Use of a caliper.** In addition to the ratio, we applied a caliper to ensure matches were sufficiently similar. A caliper specifies the maximum allowable difference between a treated unit’s propensity score and that of its matched comparison units. If the gap exceeds the caliper, the match is rejected. While literature often recommends a caliper of 0.2 of the standard deviation (SD) of the propensity score (Austin, 2011; Stuart, 2010), we used tighter

thresholds. We tried a caliper of 0.025 of the SD for all models but widened it as needed to achieve balance and maintain at least 95% of the treated sample:

- a. **0.025 of the SD** for Bridge Learner and Career Awareness models
- b. **0.05 of the SD** for Industry Pathway models
- c. **0.10 of the SD** for subgroup models

A caliper can be thought of as a “tightness rule” for matching. Tighter calipers reduce bias by ensuring closer matches. Because our comparison pool was large, we retained nearly all treated units despite these stricter limits. Combining ratio and caliper approaches helps minimize bias while maintaining flexibility (Austin, 2011; Ming & Rosenbaum, 2004).

3. **Exact matching requirements.** We required exact matches on gender and ABE/ESL enrollment, as these variables were conceptually and empirically predictive of treatment assignment and outcomes. This means that every comparison unit that is matched to a given treatment unit must have the same values on gender and ABE/ESL enrollment.
4. **Matching with or without replacement.** Matching with replacement allows the same comparison unit to be used multiple times, which can reduce bias when the comparison pool is small (Stuart, 2010). This is because multiple treated units can share the same most similar comparison unit instead of having to resort to the next most similar comparison unit that is still available. However, this approach introduces dependence among matches and requires additional adjustments. There is also the risk of overreliance on a small subset of comparison units that are matched multiple times (Stuart, 2010). Since our comparison group was large relative to the size of the treatment group, we matched without replacement, ensuring each comparison unit was used only once.

Exhibit C3. Matching Parameters by Propensity Score Model

Variable	Bridge Learner Treatment	Career Awareness Treatment	Industry Pathway Treatment	Exploratory subgroups
Caliper (in terms of standard deviation units of the propensity score)	0.025	0.025	0.05	0.1
Ratio	5	5	3	3
Exact matching on:	ABE/ESL enrollment, gender	ABE/ESL enrollment, gender	ABE/ESL enrollment, gender	ABE/ESL enrollment, gender
Match without replacement	Yes	Yes	Yes	Yes

Note: ABE refers to Adult Basic Education. ESL refers to English as a Second Language. We used the R Matchit package to implement the matching.

Assessing Match Quality and Revising the Matching Method

After assigning propensity scores and applying the matching parameters described above, we conducted a series of checks to evaluate the quality of the match. Assessing match quality is critical because the validity of PSM depends on achieving covariate balance between treated and comparison groups. When covariates are balanced, the matched groups resemble each other on observed characteristics, reducing confounding and making treatment effect estimates more credible (Stuart, 2010; Austin, 2011).

In addition to numeric diagnostics (described below), we used graphical checks to confirm common support—the overlap in propensity score distributions between treated and comparison units (Austin, 2011). For the overall bridge learner group, Career Awareness Treatment, and Industry Pathway Treatment propensity score models, Exhibits C4–C6 display:

- **Circle plots** showing propensity score overlap between treated and comparison units, including unmatched cases on the right
- **Density plots** of propensity scores for matched treatment and comparison groups on the left

These plots demonstrate strong common support, with substantial overlap in propensity score distributions after matching. In fact, there were only a handful (fewer than five) matched treated or matched comparison units outside the common support for any of the propensity score models. The circle charts, showing the distribution of propensity scores for matched and unmatched units, show that many of unmatched treated units have propensity scores higher than the average matched treated unit, and therefore it was difficult to find a corresponding comparison unit. The circle charts also show that there are a small number of unmatched treated units with propensity scores that lie within the common support bounds. As we used the more restrictive requirement to match without replacement, these treated units within the common support are unmatched because there was no available comparison unit within that treated unit's propensity score caliper bounds. The grey regions in the density plots highlight this overlap, confirming that treated and comparison units are similar on observed covariates.

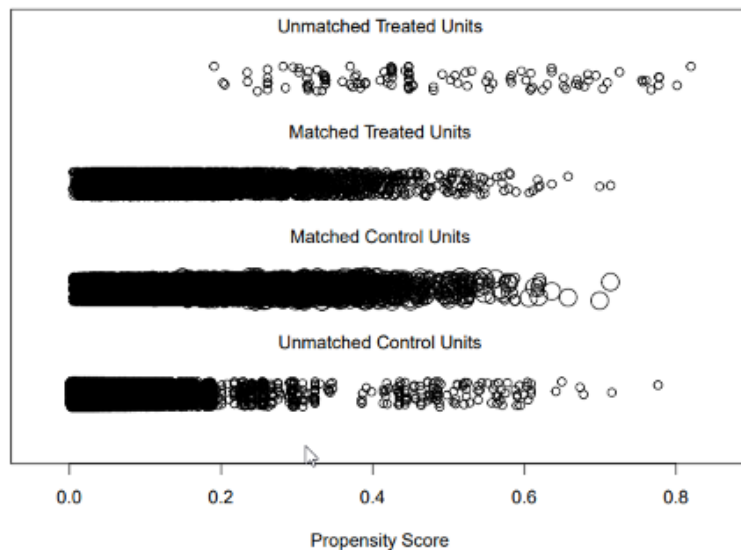
Exhibit C4. All Bridge Learner Treatment Propensity Score Model

TOP: Distribution of Propensity Scores for the Matched and Unmatched Units.

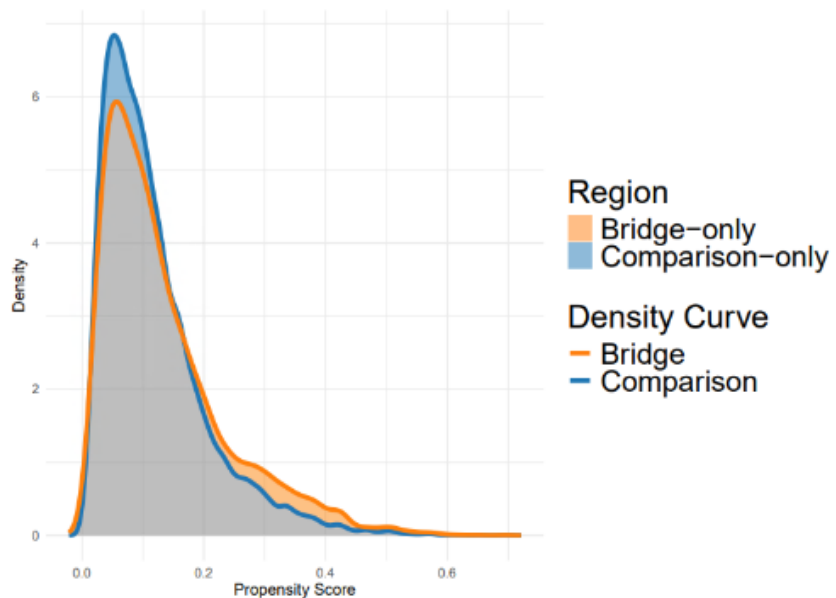
BOTTOM: Density Plot of Matched Treatment and Matched Comparison Groups.

Analytic Sample: Enrollment in Postsecondary Education and EFL Gain Outcomes

Distribution of Propensity Scores

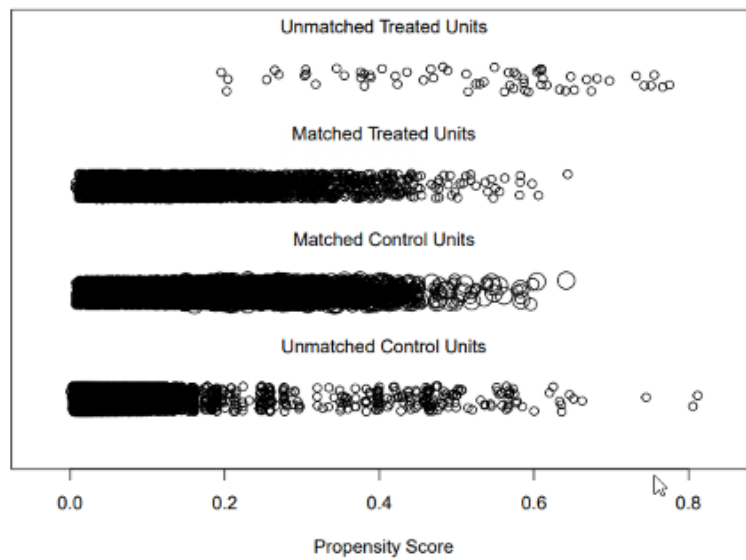


Density Plot of Bridge Treatment and Matched Comparison Group

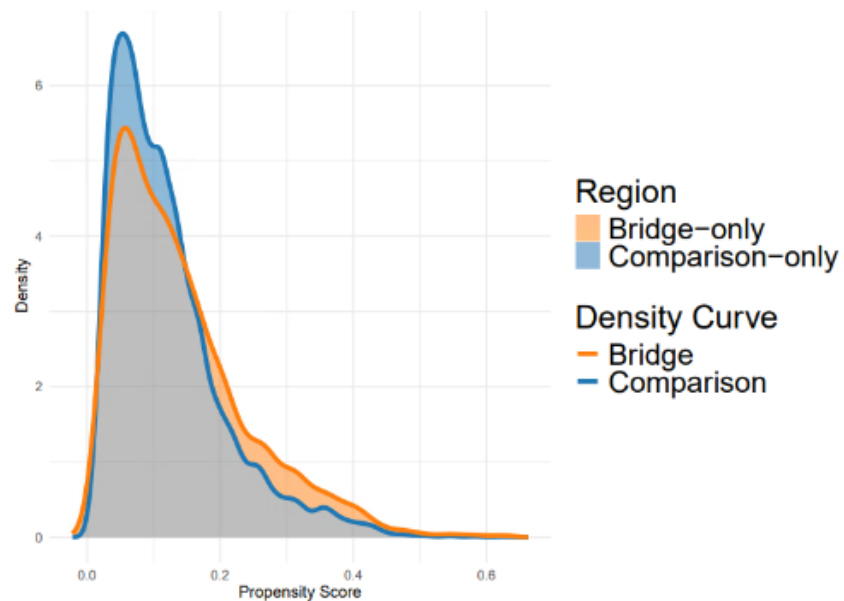


Analytic Sample: Enrollment in ICAPS Outcome

Distribution of Propensity Scores



Density Plot of Bridge Treatment and Matched Comparison Group



Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System.

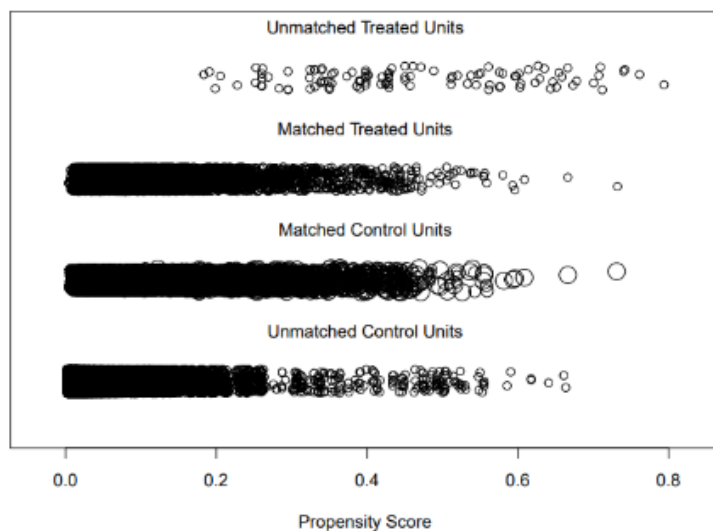
Exhibit C5. Bridge Learner Career Awareness Propensity Score Model

TOP: Distribution of Propensity Scores for the Matched and Unmatched Units.

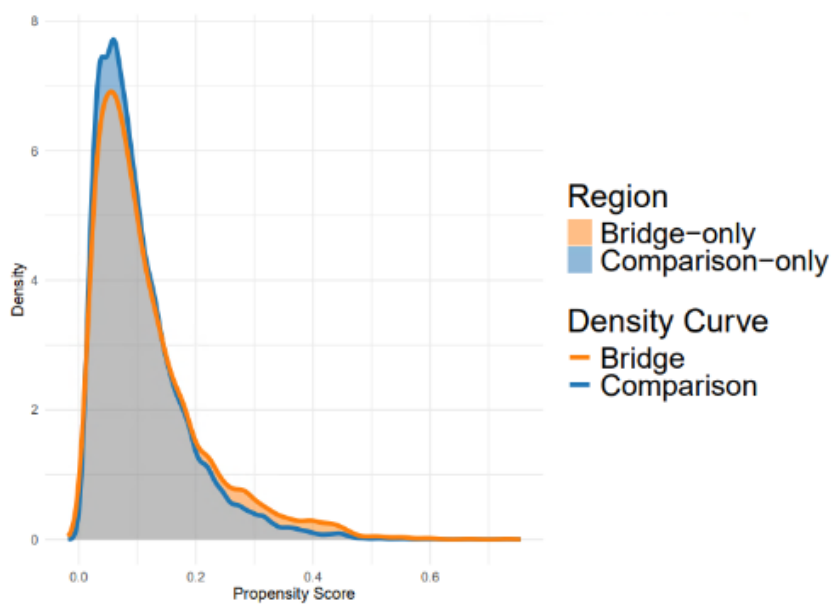
BOTTOM: Density Plot of Matched Treatment and Matched Comparison Groups.

Analytic Sample: Enrollment in Postsecondary Education and EFL Gain Outcomes

Distribution of Propensity Scores

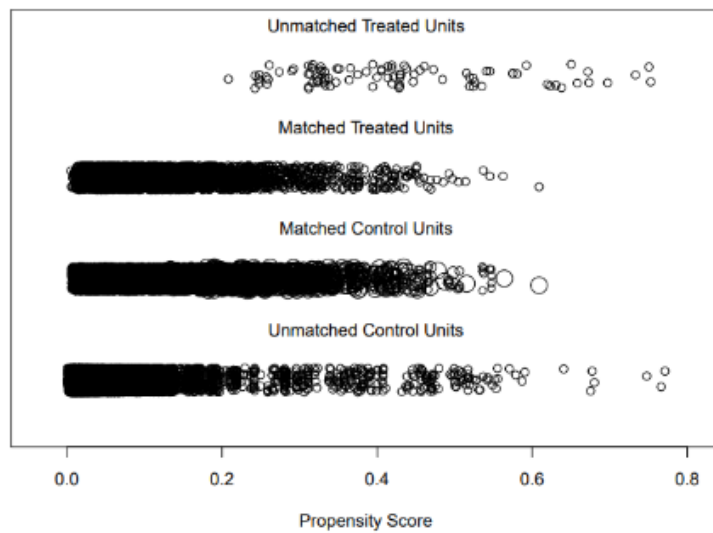


Density Plot of Bridge Treatment Career Awareness and Matched Comparison Group

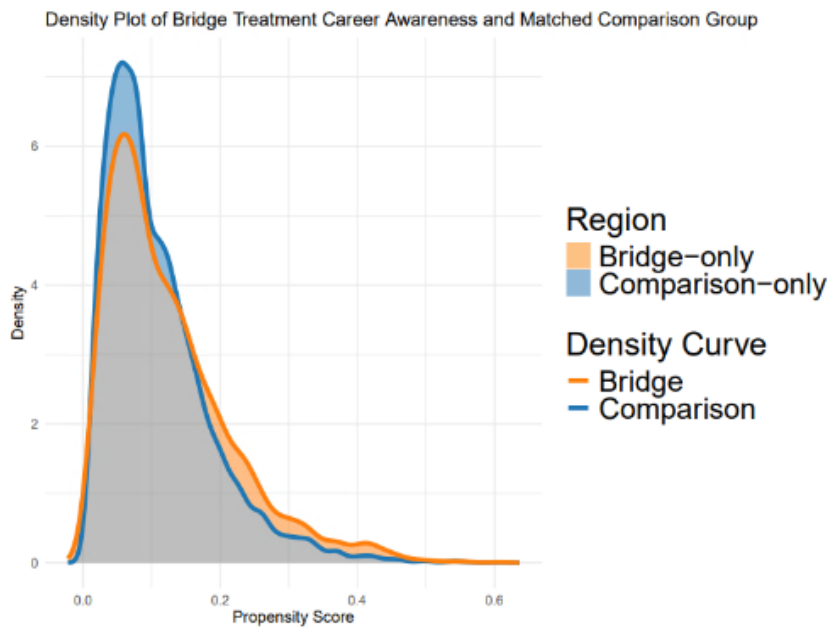


Analytic Sample: Enrollment in ICAPS Outcome

Distribution of Propensity Scores



Density Plot of Bridge Treatment Career Awareness and Matched Comparison Group



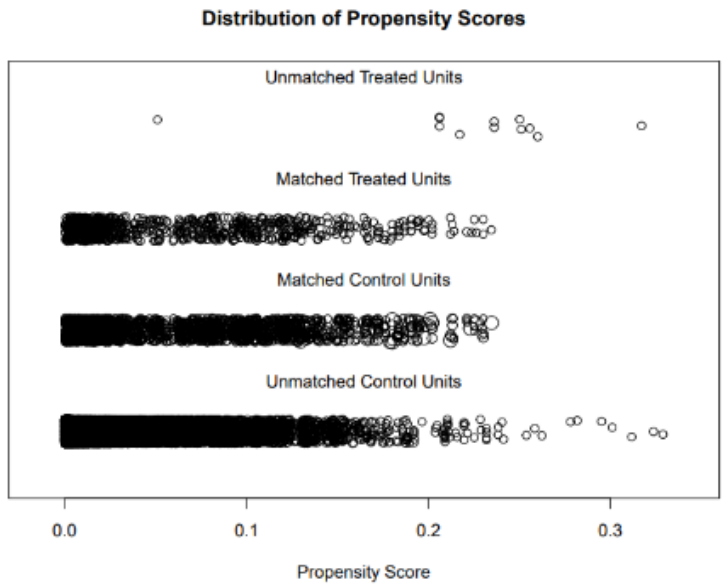
Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System.

Exhibit C6. Bridge Learner Industry Pathway Propensity Score Model

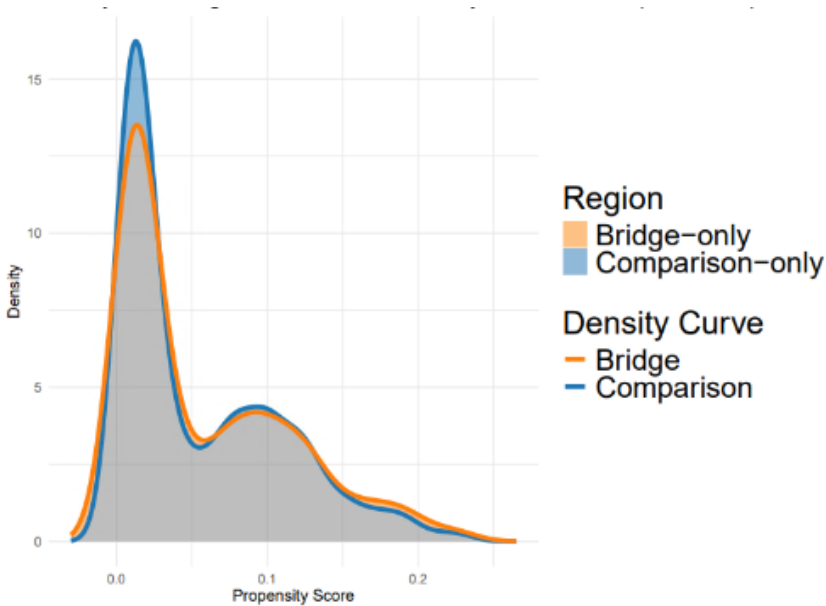
TOP: Distribution of Propensity Scores for the Matched and Unmatched Units.
BOTTOM: Density Plot of Matched Treatment and Matched Comparison Groups.

Analytic Sample: Enrollment in Postsecondary Education and EFL Gain Outcomes

Distribution of Propensity Scores

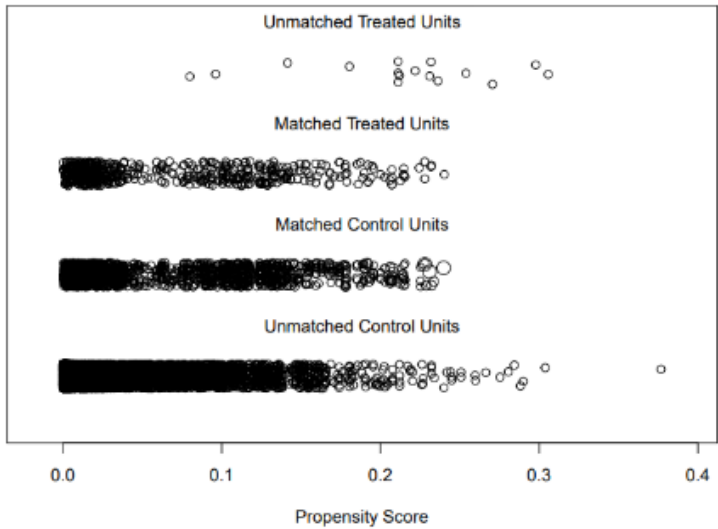


Density Plot of Bridge Treatment Industrial Pathway and Matched Comparison Group

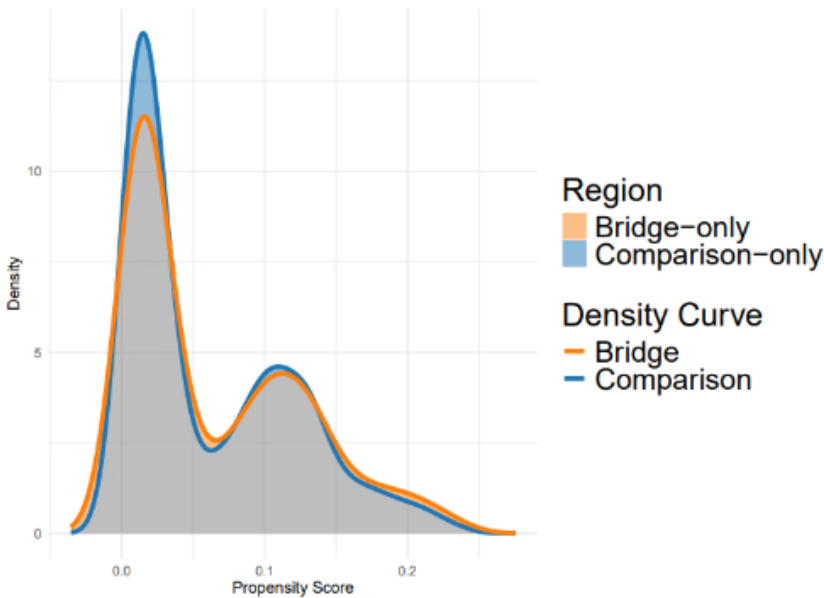


Analytic Sample: Enrollment in ICAPS Outcome

Distribution of Propensity Scores



Density Plot of Bridge Treatment Industrial Pathway and Matched Comparison Group



Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System.

Exhibits C7–C10 show more information on matching diagnostics for all Bridge Learner Treatment, the Career Awareness, Industry Pathway, and exploratory subgroup models. These show the percentage of matched treated units, number of matched treated and comparison units, number of comparison units matched to each treatment unit, the number of units outside the common support, and the common support bounds. Importantly, we could find high-quality comparison group matches for nearly the full treatment group, as follows:

- Over 98% of treated units for the Bridge Learner Treatment models
- Over 97% of treated units for the Career Awareness and Industry Pathway models
- Over 96% of treated units for the exploratory subgroup models

Exhibit C7. Propensity Score Model Results: All Bridge Learners

Analytic sample	% of treated units matched	# of comparison units matched per treated unit	Matched sample size		# of matched units outside common support		Common support
			Treatment	Control	Treatment	Control	
EFL gain & enrollment in postsecondary outcomes	98.3%	Mean: 4.5 Min.: 1 Max.: 5	6,191	27,700	0	0	0.004–0.695
ICAPS enrollment outcome	98.4%	Mean: 4.3 Min.: 1 Max.: 5	3,900	16,587	1	0	0.007–0.634

Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. The common support represents the overlap in the range of the propensity scores across the comparison and treatment groups. Common support was imposed using the minima-maxima rule: observations were kept only if their propensity scores fell within the overlapping range of the treatment and control groups' score distributions (Caliendo & Kopeinig, 2008).

Exhibit C8. Propensity Score Model Results: Career Awareness Bridge Learners

Analytic sample	% of treated units matched	# of matched comparison units matched per treated unit	Matched sample size		# of matched units outside common support		Common support
			Treatment	Control	Treatment	Control	
EFL gain & enrollment in postsecondary outcomes	98.0%	Mean: 4.6 Min.: 1 Max.: 5	5,337	24,527	1	3	0.004–0.731
ICAPS enrollment outcome	97.3%	Mean: 4.4 Min.: 1 Max.: 5	3,351	14,733	2	0	0.005–0.609

Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. The common support represents the overlap in the range of the propensity scores across the comparison and treatment groups. Common support was imposed using the minima-maxima rule: observations were kept only if their propensity scores fell within the overlapping range of the treatment and control groups' score distributions (Caliendo & Kopeinig, 2008).

Exhibit C9. Propensity Score Model Results: Industry Pathway Bridge Learners

Analytic sample	% of treated units matched	# of comparison units matched per treated unit	Matched sample size		# of matched units outside common support		Common support
			Treatment	Control	Treatment	Control	
EFL gain & enrollment in postsecondary outcomes	98.6%	Mean: 2.9 Min.: 1 Max.: 3	836	2,449	0	3	0–0.234
ICAPS enrollment outcome	97.1%	Mean: 2.9 Min: 1 Max: 3	544	1,587	2	0	0–0.24

Note. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. The common support represents the overlap in the range of the propensity scores across the comparison and treatment groups. Common support was imposed using the minima-maxima rule: observations were kept only if their propensity scores fell within the overlapping range of the treatment and control groups' score distributions (Caliendo & Kopeinig, 2008).

Exhibit C10. Propensity Score Results: Exploratory Subgroup Analysis for ESL Enrollees and ABE Enrollees

Analytic sample	Subgroup	% of treated units matched	# of comparison units matched per treated unit	Matched sample size		# of matched units outside common support		Common support
				Treatment	Control	Treatment	Control	
EFL gain & enrollment in postsecondary outcomes	ESL enrollees	97.2%	Mean: 2.8 Min.: 1 Max.: 3	1,815	5,035	0	5	0.001–0.831
	ABE enrollees	99.3%	Mean: 2.8 Min.: 1 Max.: 3	4,399	12,504	0	4	0.016–0.626
ICAPS enrollment outcome	ESL enrollees	96.6%	Mean: 2.7 Min.: 1 Max.: 3	1,383	3,665	1	2	0.001–0.848
	ABE enrollees	99.3%	Mean: 2.9 Min.: 1 Max.: 3	2,556	7,322	1	0	0.017–0.611

Note. ESL refers to English as a Second Language. ABE refers to Adult Basic Education. EFL refers to educational functioning level. ICAPS refers to Integrated Career and Academic Preparation System. The common support represents the overlap in the range of the propensity scores across the comparison and treatment groups. Common support was imposed using the minima-maxima rule: observations were kept only if their propensity scores fell within the overlapping range of the treatment and control groups' score distributions (Caliendo & Kopeinig, 2008).

Researchers typically use two standard checks to assess covariate balance for each covariate in the matched samples (Zhao et al., 2021):

1. measuring the standardized mean differences (SMDs) across all covariates; and
2. calculating the variance ratio (VR) for continuous covariates

We present the table of SMDs for each matching covariate in Exhibit C11 for the Bridge Learner Treatment propensity score models. Across all models—all Bridge Learner group, Career Awareness, Industry Pathway, and subgroups—we achieved SMD values below the commonly accepted threshold of 0.1, and often much lower (Austin, 2011). We also achieved the desired VR of roughly 1.0 for all continuous covariates, which indicates a nearly ideal balance. Values below 0.5 and greater than 2.0 are considered unacceptable (Zhao et al., 2021). Exhibit C12 displays the variance ratios for continuous matching variables for the Bridge Learner group propensity score model.

Exhibit C11. Standard Mean Difference: Bridge Learner Treatment Group

Variable	Analytic sample: EFL gain & enrollment in postsecondary outcomes SMD (good balance is < 0.1)	Analytic sample: ICAPS enrollment outcome SMD (good balance is < 0.1)
Distance	0.001	0.001
Gender: female	0.000	0.000
Race/ethnicity: Asian	-0.017	-0.030
Race/ethnicity: Black	0.004	0.025
Race/ethnicity: other ¹⁷	0.003	-0.022
Race/ethnicity: Hispanic or Latino	0.018	0.036
Race/ethnicity: White	-0.012	-0.036
Employment status: Employed	0.007	0.011
Employment status: Not in the labor force	0.002	0.003
Employment status: Unemployed	-0.008	-0.013
Urbanicity: Rural	-0.011	-0.016
Urbanicity: Missing	-0.003	0.005

¹⁷ The “Other” race and ethnicity category includes American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, or more than one race.

Variable	Analytic sample: EFL gain & enrollment in postsecondary outcomes SMD (good balance is < 0.1)	Analytic sample: ICAPS enrollment outcome SMD (good balance is < 0.1)
Urbanicity: Urban	0.012	0.015
Public assistance: Yes	0.010	0.008
EFL at pre-test: EFL 3	-0.004	0.011
EFL at pre-test: EFL 4	0.031	0.024
EFL at pre-test: EFL 5	0.008	0.026
EFL at pre-test: EFL 6	-0.040	-0.069
ESL learner	0.000	0.000
Prior education level: GED credential	-0.011	-0.009
Prior education level: Grades 1–8	0.025	0.014
Prior education level: Grades 11–12 (no diploma)	0.016	0.023
Prior education level: Grades 9–10	-0.001	0.006
Prior education level: High school diploma	-0.018	-0.017
Prior education level: Postsecondary degree	-0.025	-0.039
Prior education level: Some postsecondary	0.001	-0.004
Prior education level: Unknown or none	0.027	0.034
Age		-0.001
PY 2018–19	-0.010	-0.003
PY 2019–20	-0.009	0.002
PY 2020–21	-0.005	0.007
PY 2021–22	0.020	-0.004
Provider type: Community-based organization	0.001	0.010
Provider type: Community college	-0.026	-0.032
Provider type: Correctional facility	-0.021	-0.029
Provider type: Faith-based organization	-0.033	-0.062
Provider type: Four-year college or university	0.047	0.063

Variable	Analytic sample: EFL gain & enrollment in postsecondary outcomes SMD (good balance is < 0.1)	Analytic sample: ICAPS enrollment outcome SMD (good balance is < 0.1)
Provider type: Local education agency	0.022	0.020
Provider's percentage of teachers with less than one year of experience		-0.030
Provider's percentage of ABE learners		0.070
Provider's percentage teachers with TESOL certification		-0.089
Male * EFL 3 (interaction)	-0.003	
Female * EFL 3 (interaction)	-0.003	
Male * EFL 4 (interaction)	0.010	
Female * EFL 4 (interaction)	0.028	
Male * EFL 5 (interaction)	0.001	
Female * EFL 5 (interaction)	0.009	
Male * EFL 6 (interaction)	-0.011	
Female * EFL 6 (interaction)	-0.038	
Employed * EFL 3 (interaction)	-0.009	
Not in labor force * EFL 3 (interaction)	0.005	
Unemployed * EFL 3 (interaction)	0.000	
Employed * EFL 4 (interaction)	0.023	
Not in labor force * EFL 4 (interaction)	0.019	
Unemployed * EFL 4 (interaction)	0.007	
Employed * EFL 5 (interaction)	0.010	
Not in labor force * EFL 5 (interaction)	0.004	
Unemployed * EFL 5 (interaction)	0.000	
Employed * EFL 6 (interaction)	-0.014	
Not in labor force * EFL 6 (interaction)	-0.028	
Unemployed * EFL 6 (interaction)	-0.025	

Variable	Analytic sample: EFL gain & enrollment in postsecondary outcomes SMD (good balance is < 0.1)	Analytic sample: ICAPS enrollment outcome SMD (good balance is < 0.1)
Rural * EFL 3 (interaction)	-0.026	
Missing * EFL 3 (interaction)	-0.005	
Urban * EFL 3 (interaction)	0.008	
Rural * EFL 4 (interaction)	0.006	
Missing * EFL 4 (interaction)	-0.003	
Urban * EFL 4 (interaction)	0.030	
Rural * EFL 5 (interaction)	0.006	
Missing * EFL 5 (interaction)	0.008	
Urban * EFL 5 (interaction)	0.005	
Rural * EFL 6 (interaction)	-0.008	
Missing * EFL 6 (interaction)	0.000	
Urban * EFL 6 (interaction)	-0.038	
Age squared (numeric)		0.004
Age 16–18	0.011	
Age 19–24	-0.004	
Age 25–34	0.005	
Age 35–44	0.000	
Age 45–54	-0.018	
Age 55–59	-0.006	
Age 60 or older	0.014	
Provider's percentage of ABE learners (26.6%–31.2%)	0.001	
Provider's percentage of ABE learners (31.3%–51.7%)	-0.004	
Provider's percentage of ABE learners (51.7%–100%)	0.029	
Provider's percentage of ABE learners (0%–26.5%)	-0.035	
Provider's percentage of ABE learners (missing)	-0.002	

Variable	Analytic sample: EFL gain & enrollment in postsecondary outcomes SMD (good balance is < 0.1)	Analytic sample: ICAPS enrollment outcome SMD (good balance is < 0.1)
Provider's percentage of teachers with less than one year (1.14%–37.5%)	-0.005	
Provider's percentage of teachers with less than one year (0%–1.14%)	0.006	
Provider's percentage of teachers with less than one year (missing)	-0.002	
Provider's percentage of teachers with TESOL certification (15.5%–100%)	-0.022	
Provider's percentage of teachers with TESOL certification (4.69%–15.5%)	0.012	
Provider's percentage of teachers with TESOL certification (0%–4.69%)	0.010	
Provider's percentage of teachers with TESOL certification (missing)	-0.002	
Age 16–18 * employed (interaction)	0.017	
Age 19–24 * employed (interaction)	-0.007	
Age 25–34 * employed (interaction)	0.002	
Age 35–44 * employed (interaction)	0.003	
Age 45–54 * employed (interaction)	-0.003	
Age 55–59 * employed (interaction)	0.004	
Age 60 or older * employed (interaction)	0.000	
Age 16–18 * not in labor force (interaction)	0.000	
Age 19–24 * not in labor force (interaction)	0.016	
Age 25–34 * not in labor force (interaction)	-0.004	
Age 35–44 * not in labor force (interaction)	0.003	
Age 45–54 * not in labor force (interaction)	-0.019	
Age 55–59 * not in labor force (interaction)	0.002	
Age 60 or older * not in labor force (interaction)	0.010	

Variable	Analytic sample: EFL gain & enrollment in postsecondary outcomes SMD (good balance is < 0.1)	Analytic sample: ICAPS enrollment outcome SMD (good balance is < 0.1)
Age 16–18 * unemployed (interaction)	-0.001	
Age 19–24 * unemployed (interaction)	-0.006	
Age 25–34 * unemployed (interaction)	0.007	
Age 35–44 * unemployed (interaction)	-0.005	
Age 45–54 * unemployed (interaction)	-0.013	
Age 55–59 * unemployed (interaction)	-0.014	
Age 60 or older * unemployed (interaction)	0.013	
Age 16–18 * EFL 3 (interaction)	-0.007	
Age 19–24 * EFL 3 (interaction)	-0.004	
Age 25–34 * EFL 3 (interaction)	0.003	
Age 35–44 * EFL 3 (interaction)	-0.008	
Age 45–54 * EFL 3 (interaction)	0.005	
Age 55–59 * EFL 3 (interaction)	0.004	
Age 60 or older * EFL 3 (interaction)	0.011	
Age 16–18 * EFL 4 (interaction)	0.017	
Age 19–24 * EFL 4 (interaction)	-0.001	
Age 25–34 * EFL 4 (interaction)	0.002	
Age 35–44 * EFL 4 (interaction)	0.024	
Age 45–54 * EFL 4 (interaction)	0.011	
Age 55–59 * EFL 4 (interaction)	0.013	
Age 60 or older * EFL 4 (interaction)	0.023	
Age 16–18 * EFL 5 (interaction)	0.007	
Age 19–24 * EFL 5 (interaction)	0.001	
Age 25–34 * EFL 5 (interaction)	0.004	
Age 35–44 * EFL 5 (interaction)	0.005	

Variable	Analytic sample: EFL gain & enrollment in postsecondary outcomes SMD (good balance is < 0.1)	Analytic sample: ICAPS enrollment outcome SMD (good balance is < 0.1)
Age 45–54 * EFL 5 (interaction)	-0.001	
Age 55–59 * EFL 5 (interaction)	-0.001	
Age 60 or older * EFL 5 (interaction)	0.002	
Age 16–18 * EFL 6 (interaction)	0.002	
Age 19–24 * EFL 6 (interaction)	-0.003	
Age 25–34 * EFL 6 (interaction)	0.001	
Age 35–44 * EFL 6 (interaction)	-0.020	
Age 45–54 * EFL 6 (interaction)	-0.048	
Age 55–59 * EFL 6 (interaction)	-0.023	
Age 60 or older * EFL 6 (interaction)	-0.006	

Note. EFL refers to educational functioning level. SMD refers to standard mean difference. ICAPS refers to Integrated Career and Academic Preparation System. ESL refers to English as a Second Language. PY refers to program year. ABE refers to Adult Basic Education. TESOL refers to teaching English to speakers of other languages.

Exhibit C12. Variance Ratio for Continuous Matching Variables: Full Bridge Learner Treatment Group

Variable	Analytic sample: ICAPS enrollment outcome Variance ratio (ideal = 1)
Age	1.002
Age squared	1.007
Provider's percentage of teachers with less than one year of experience	1.069
Provider's percentage of ABE enrollment	0.961
Provider's percentage of teachers with TESOL certification	0.662

Note. ICAPS refers to Integrated Career and Academic Preparation System. ABE refers to Adult Basic Education. TESOL refers to teaching English to speakers of other languages. The Career Awareness and Industry Pathway propensity score models did not have any matching covariates that were continuous variables.

Impact Analysis

After constructing a suitable matched comparison group, we examined outcome differences between the treatment and the comparison groups through regression adjustment to estimate the program impact. Technically, although we did not need to estimate the impact of the program using a regression (because one can directly compare average outcomes between the treatment and matched comparison groups and use the difference as an estimate of the program's impact), specifying regression models allowed us to implement the doubly robust technique described below that reduces bias and increases precision. This section summarizes our regression modeling specifications, including incorporating matching weights, correcting for heteroskedasticity, and adjusting for multiple comparisons.

Our regression models estimated the **ATT** and report all estimates as **Average Marginal Effects (AMEs)**. AMEs represent the difference between the average predicted outcome under treatment and the average predicted outcome under control for treated units, holding other variables constant. We modeled EFL gain, enrollment in ICAPS, and enrollment in postsecondary education with a logistic regression. Following best practices for post-matching estimation, our models incorporated the following elements:

- **Matching weights.** Each treatment unit could be matched to multiple comparison units (up to 3 or 5 depending on the propensity score model). We constructed weights for each comparison unit based on the matched group size. If a treated unit was matched to 5 comparison units, each comparison unit was weighted by 1/5. This ensured we did not overrepresent comparison units with higher matching ratios and maintained covariate balance in the matched analytic samples (Austin, 2011).
- **Doubly robust regression.** Although our matching achieved good balance (all standardized mean differences < 0.1), we included covariates with the largest residual imbalances in the outcome model. This doubly robust approach minimizes any remaining bias from observable factors and improves precision (Austin, 2011). Exhibit C13 details which covariates were included for each propensity score model.

Exhibit C13. Regression Specification by Propensity Score Model

Propensity score model	Treatment variable	Covariates in doubly robust regression
Bridge Learner Treatment	Bridge learner status (vs. non-bridge learners)	Program year of enrollment, race and ethnicity, EFL at pre-test, prior education level, urbanicity, provider's percentage of ABE learners, provider type, provider's percentage of teachers with less than one year of experience
Career Awareness Bridge Learner Treatment	Bridge learner in the career awareness path (vs. non-bridge learners)	Program year of enrollment, EFL at pre-test, age, provider's percentage of ABE learners, provider type, provider's percentage of teachers with a TESOL certification
Industry Pathway Bridge Learner Treatment	Bridge learner in the industry path (vs. non-bridge learners)	Program year of enrollment, race and ethnicity, employment status, EFL at pre-test, prior education level, urbanicity, provider's percentage of ABE learners, provider type, provider's percentage of teachers with less than one year of experience

Note. EFL refers to educational functioning level. ABE refers to Adult Basic Education. TESOL refers to teaching English to speakers of other languages.

- **Cluster-robust standard errors.** We used cluster-robust standard errors to account for dependence within matched sets and provider-level clustering (Austin, 2009; Austin & Small, 2014; Gayat et al., 2012; Wan, 2019). Specifically, we clustered on both the matching subclass and provider ID. The subclass is a unique identifier for each of the matched treatment/comparison groups. This conservative approach addresses heteroskedasticity and correlation among observations because providers often serve both treatment and comparison learners.
- **Multiple comparisons adjustment.** We applied the Benjamini-Hochberg procedure to minimize the false discovery rate, i.e., the likelihood of estimating a statistically significant effect by chance when researchers conduct multiple confirmatory tests in the same domain. We applied Benjamini-Hochberg adjustments to the confirmatory outcomes of enrollment in ICAPS and enrollment in postsecondary education, which are in the same theoretical domain. Benjamini-Hochberg adjustments are not necessary for exploratory analyses, such as our moderation/interaction effect estimates (Schochet, 2008).

References

- Austin, P. C. (2009). Type I error rates, coverage of confidence intervals, and variance estimation in propensity-score matched analyses. *The International Journal of Biostatistics*, 5(1), 13. <https://doi.org/10.2202/1557-4679.1146>
- Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research*, 46(3), 399–424. <https://doi.org/10.1080/00273171.2011.568786>
- Austin, P. C., & Small, D. S. (2014). The use of bootstrapping when using propensity-score matching without replacement: A simulation study. *Statistics in Medicine*, 33(24), 4306–4319. <https://doi.org/10.1002/sim.6276>
- Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22(1), 31–72. <https://doi.org/10.1111/j.1467-6419.2007.00527.x>
- Carnevale, A. P., Smith, N., Van Der Werf, M., & Quinn, M. C. (2023). *After everything: Projections of jobs, education, and training requirements through 2031*. Georgetown University Center on Education and the Workforce. <https://cew.georgetown.edu/cew-reports/projections2031>
- City Colleges of Chicago (n.d.). *Admissions requirements*. <https://www.ccc.edu/departments/Admissions-Requirements>
- Deng, E., Nanda, N., Ruiz, R., & Talwar, A. (2025). *Mapping opportunity* [Research brief]. American Institutes for Research. <https://www.air.org/sites/default/files/2025-10/ICCB-Mapping-Opportunity-Spatial-Analysis-Brief-508-October-2025.pdf>
- Garrido, M. M., Kelley, A. S., Paris, J., Roza, K., Meier, D. E., Morrison, R. S., & Aldridge, M. D. (2014). Methods for constructing and assessing propensity scores. *Health Services Research*, 49(5), 1701–1720. <https://doi.org/10.1111/1475-6773.12182>
- Gayat, E., Resche-Rigon, M., Mary, J.-Y., & Porcher, R. (2012). Propensity score applied to survival data analysis through proportional hazards models: A Monte Carlo study. *Pharmaceutical Statistics*, 11(3), 222–229. <https://doi.org/10.1002/pst.537>
- Heckman, J. J., & Smith, J. A. (1999). The pre-programme earnings dip and the determinants of participation in a social programme: Implications for simple programme evaluation strategies. *The Economic Journal*, 109(457), 313–348. <https://doi.org/10.1111/1468-0297.00451>

- Illinois Central College (n.d.). *Admissions requirements*.
<https://catalog.icc.edu/cataloginfo/admissions/requirements>
- Illinois Community College Board. (2013). *Creating a successful bridge program: A “how to” guide*.
https://www2.iccb.org/iccb/wp-content/pdfs/shiftinggears/ICCB_2012BridgeGuide_web_REV_FEB13.pdf
- Illinois Community College Board. (2024, October). *ICAPS manual*. <https://www.icapsillinois.com/wp-content/uploads/2024/10/ICAPS-Manual-2025.pdf>
- Khachikian, O., Nanda, N., Oates, S., Sisay, R., Friend, D., & Talwar, A. (2024). *Bridges to opportunity? An implementation analysis of ICCB bridge programs for adult learners*. American Institutes for Research. <https://www.air.org/sites/default/files/2024-08/Implementation-Analysis-ICCB-Bridge-Program-Adult-Learners-August-2024.pdf>
- Lumina Foundation. (2024). *A stronger nation: Credentials of value*.
<https://strongernation.luminafoundation.org/credentials-of-value>
- McLeod, E. N., Campbell K. P., Mabel, Z., & Strohl, J. (2025). *Bridging the middle-skills gap: Connecting a diverse workforce to economic opportunity through certificates and associate’s degrees*. Georgetown University Center on Education and the Workforce.
https://cew.georgetown.edu/wp-content/uploads/cew-bridging_the_middle-skills_gap-fr.pdf
- Ming, K., & Rosenbaum, P. R. (2004). Substantial gains in bias reduction from matching with a variable number of controls. *Biometrics*, 56(1), 118–124. <https://doi.org/10.1111/j.0006-341X.2000.00118.x>
- National Reporting System. (2025). *Illinois reporting for 2023*. <https://nrs.ed.gov/rt/il/2023>
- Nicholson-Tosh, K., & Bragg, D. (2013). *Illinois career clusters, pathways, and programs of study guide*. University of Illinois at Urbana-Champaign, Office of Community College Research and Leadership. <https://occrll.illinois.edu/docs/librariesprovider2/prc/career-cluster-guide.pdf>
- Oakton College (n.d.). *Admission*. <https://catalog.oakton.edu/academic-student-policies/admission>
- Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41–55. <https://doi.org/10.1093/biomet/70.1.41>

- Schochet, P. Z. (2008, May). *Technical methods report: Guidelines for multiple testing in impact evaluations* (NCEE 2008-4018). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.
<https://ies.ed.gov/ncee/2025/01/20084018-pdf>
- Stuart, E. A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical Science*, 25(1), 1–21. <https://doi.org/10.1214/09-STS313>
- U.S. Census Bureau. (2023). Table 1: Educational attainment of the population 18 years and over, by age, sex, race, and Hispanic origin, 2022.
<https://www.census.gov/data/tables/2022/demo/educational-attainment/cps-detailedtables.html>
- Wan, F. (2019). Matched or unmatched analyses with propensity-score–matched data? *Statistics in Medicine*, 38(2), 289–300. <https://doi.org/10.1002/sim.7976>
- Zhao, Q.-Y., Luo, J.-C., Su, Y., Zhang, Y.-J., Tu, G.-W., & Luo, Z. (2021). Propensity score matching with R: Conventional methods and new features. *Annals of Translational Medicine*, 9(9), 812.
<https://doi.org/10.21037/atm-20-3998>

