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Technical Supplement to Postsecondary Employment and Earnings Outcomes for 2013 Graduates With Industry Certifications

Department of
Research and Evaluation
AUSTIN INDEPENDENT SCHOOL DISTRICT

Executive Summary

Purpose

This technical report provides details about the analyses used for *Postsecondary Employment and Earnings Outcomes for 2013 Graduates With Industry Certifications.* It covers the employment and earnings analyses, and the method used to link industry certifications to related jobs. Specifically, this report describes the limitations of the data, the assumptions made, and the decisions taken in the analyses, to facilitate interpretation of the findings.

Highlights

The employment and earnings analyses used matched comparison groups, created by propensity score matching, for graduates with certifications. Propensity score matching reduced observable demographic and academic differences between graduates with and without certifications so that any significant differences in outcomes could be attributed to having earned an industry certification.

Various types of analyses used the groups created through propensity score matching. Logistic regressions examined whether certifications were a significant determinant of students being employed between 4 and 10 months after graduation. Linear regressions examined whether certifications significantly influenced earnings. Parametric and nonparametric significance tests examined whether a significant difference existed in employment rates and median earnings between graduates based on certification status.

The determination of whether graduates had jobs related to their certification used North American Industry Classification System (NAICS) codes to categorize each place of employment into an industry sector. The analysis explored whether the career cluster of the graduates' certifications directly matched the industry sector in which they were employed. The lack of occupational data rendered this method a rough measure of a minimum percentage of graduates with certification-related jobs.

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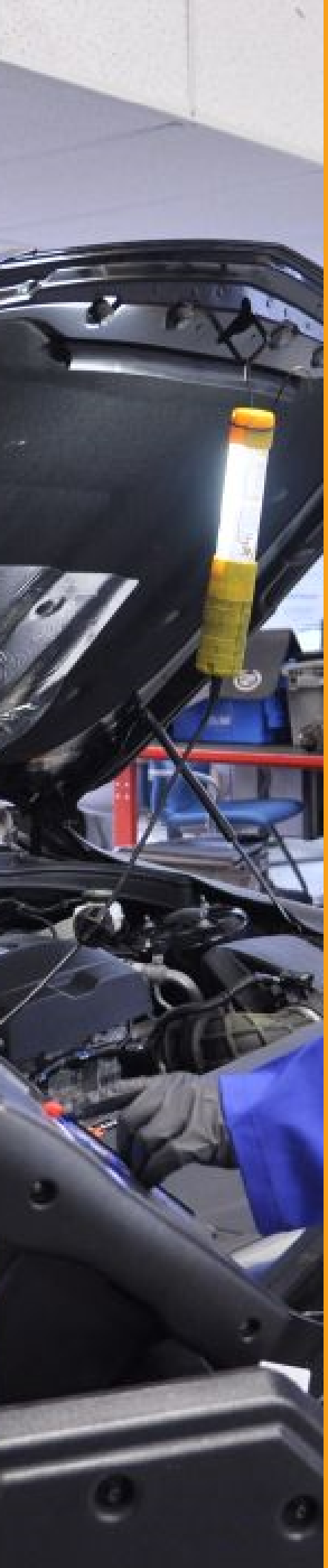

Introduction

This technical report provides details about the analyses used for *Postsecondary Employment and Earnings Outcomes for 2013 Graduates With Industry Certifications.* The Austin Independent School District (AISD) offers high school students the opportunity to earn industry certifications in some career and technical education courses. The original report investigated whether having an industry certification influenced students' employment or earnings after graduation. The report also explored whether employed graduates were working in a job related to their certification. This report covers three topics: the employment analysis, the earnings analysis, and the method used to link industry certifications to related jobs.

Employment Analysis

Propensity Score Matching for Employment Analysis

Researchers strive to create very similar treatment and comparison groups when exploring whether an intervention or treatment influenced an outcome. This similarity allows them to ascribe any significant differences found between the groups to the intervention, instead of to preexisting differences. The ideal way to create similar groups is to randomly assign subjects to treatment and comparison groups. With random assignment, any preexisting differences between the two groups would be unbiased.

However, random assignment is not often feasible in educational settings and was not possible in this case. Graduates, when in high school, chose to be in a course that offered an opportunity to earn an industry certification. Some of those graduates passed the required exam to earn a certification. Self-selection introduced a bias: a nonrandom difference between graduates.

When random assignment is not feasible, the quasi-experimental method of propensity score matching can be used to approximate similar groups and reduce selection bias by minimizing preexisting group differences.[1] Propensity scores take observed characteristics of subjects that may determine their participation in the treatment group to produce an estimate of the probability (p) that a subject would have received the treatment. The propensity scores are transformed into log-odds ($p/(1-p)$) and then are used for matching.

This study used the caliper, or radius, matching method, without replacement. This method matches treated to comparison subjects within a specified distance of the propensity score of the treated subjects. For this analysis, the specified distance was 1 standard deviation. No replacement means that only one comparison subject was matched with one treatment subject.

Before p-score matching, four characteristics differed significantly between graduates who did and did not have industry certifications: gender, race/ethnicity, English language used at home, and grade point average (GPA). Propensity score matching

1. For more details about when and how to use propensity score matching, see Bruner (2011).

reduced preexisting differences between graduates with and without industry certifications, eliminating significant differences. Additional variables used to derive the propensity scores included economic status (measured by qualification for free or reduced-priced lunch) and special education status.

Logistic Regression for Employment Analysis

A test of significance (z-test) using the treatment and matched comparison groups showed no significant difference in employment rates, based on certification status. An additional analysis used the matched groups in a logistic regression to examine whether having a certification was a significant determinant of employment. Other variables in the logistic regression model for employment included economic status, race/ethnicity, English language learner, special education status, gender, GPA, enrolled in a 2-year or a 4-year college.

Earnings Analysis

Data Limitations

The data provided by the Texas Workforce Commission (TWC) had limitations important to consider when interpreting the results of the earnings analysis. The TWC matched employment data to district records using students' social security numbers, and excluded about 20% of graduates without a social security number available to the district. The data included all of a worker's quarterly earnings in Texas from any number of jobs the individual had. Unknown is how many hours the individual worked, how many days during the quarter, and at what wage or salary rate. During one quarter, earnings of employed graduates ranged from less than $100 to more than $10,000. The earnings differences could be a result of part-time versus full-time work, higher versus lower-paid work, or being employed during the whole or only part of the quarter.

To account for possible differences in earnings attributable to the amount of time worked, the analysis grouped employed graduates by the number of quarters worked both for matching purposes and for the subsequent comparison analysis. Also, propensity score matching minimized preexisting differences (e.g., economic status) that could influence the amount of time an individual worked. The analysis assumed that other differences between graduates that might have influenced the amount of time worked were distributed randomly.

Propensity Score Matching for Earnings Analysis

The analysis of earnings based on certification status matched only employed graduates, using the same matching variables as did the employment analysis. Of the 909 graduates who worked only one quarter, 141 had certifications. Of the 783 graduates who worked two quarters, 123 had certifications. Prior to matching, the following variables were significantly different between employed graduates with and without industry certifications: gender, economic status, English language used at home, and GPA. Propensity score matching eliminated significant differences between graduates with respect to demographic and academic characteristics. Additional variables used to derive the propensity scores included race/ethnicity and special education status.

Significance Testing and Regression for Earnings Analysis

The distribution of the earnings variable was skewed to the right, so the analysis used a nonparametric method (Wilcoxon rank-sum test) to compare median earnings. The analysis found no significant difference in median earnings based on certification status for those who worked one or two quarters. A regression analysis examined whether certifications were a significant determinant of earnings. Before performing the regression, the outcome variable of earnings needed to be transformed to create a normal distribution. A square-root transformation on earnings was successful for graduates who worked two quarters. Having a certification was not found to be a significant determinant of earnings when the other variables in the model were considered. The other variables included race/ethnicity,

economic status, English language learner, gender, GPA, in special education, and enrolled in a 2-year or 4-year college.

Determination of Jobs Related to Industry Certifications

The certification outcomes report detailed the factors that made it difficult to determine whether graduates' jobs were related to the certifications they earned. These factors included the lack of occupational data; some certifications being applicable to any industry; and career clusters, used to categorize groups of certifications, including very different types of certifications.

Only certifications whose career cluster matched an industry sector were included in the count of related jobs, to get a minimum percentage. The analysis used the North American Industry Classification System (NAICS) codes to categorize each place of employment into an industry sector. If a student received a certification in the architecture and construction career cluster and was employed in the construction sector, NAICS code 23, the job was counted as related. However, if that student worked at a store or home center that sold construction materials, the job was not counted as related because home centers are in the retail industry sector, NAICS codes 44-45, not the construction sector.

The number of jobs held was consolidated by industry type. For instance, if certification holders worked at two different retail establishments, the jobs were counted once under the retail industry category. However, if certification holders worked in retail and health care, the jobs were counted once under each category. The 257 certification holders held 307 jobs. The 15 certifications earned and 11 jobs held under the career prep category were not counted because career prep is not one of the state's 16 recognized career clusters. The analysis took into consideration each job held by a certification holder to determine whether one of them was related to the certification. Table 1 summarizes the employment data for each career cluster. Table 2 lists the types of jobs certification earners held, and whether the job was counted as related or not.

Table 1.
About a third of employed graduates held jobs in an industry sector that matched the career cluster of their certification.

Career clusters of certifications of employed graduates/Industry sector of jobs held	Number of employed graduates with certifications	Number of jobs held	Number of graduates with related jobs
Agriculture, Food and Natural Resources	10	13	4
Architecture and Construction	3	3	0
Arts, A/V Technology and Communications	5	5	1
Business, Management and Administration	92	110	49
Education and Training	26	30	0
Health Science	24	32	4
Hospitality and Tourism	33	36	14
Human Services	27	35	9
Information Technology	11	14	0
Law, Public Safety, Corrections and Security	17	18	1
Science, Technology, Engineering and Math	4	5	1
Transportation, Distribution and Logistics	5	6	1
Total	257	307	84

Source. AISD Career and Technical Education program records, Texas Workforce Commission, 2013

Table 2.
Graduates with certifications held jobs in a variety of industry sectors. Sectors considered related are italicized.

NAICS code	Career clusters of certifications of employed graduates/ Industry type for jobs held	With related job	Certification earned
	Agriculture, Food and Natural Resources	**4**	
44-45	Retail (automotive parts stores, home centers, pet supply stores)		Certified Veterinary Assistant
54	*Veterinary services*	2	Floral Design Certification
61	Colleges, universities and professional schools		Occupational Health and Safety Admin.
72	Fast food restaurants		
81	Other services (*pet care, except veterinary)*	2	
	Architecture and Construction	**0**	
62	Child day care services		Carpentry Fundamentals, level one (NCCER)
44	Retail (home centers)		Occupational Health and Safety Admin.
56	Administrative and support and waste management and remediation services (professional employer assoc.)		
	Arts, A/V Technology and Communications	**1**	
54	*Photography studios, portrait*	1	Adobe Flash Certification
72	Full service and fast food restaurants		Adobe Photoshop Certification
81	Nail salons		Occupational Health and Safety Admin.
	Business, Management and Administration	**49**	
23	Construction		Microsoft Office Specialist - Power Point
42	*Wholesale trade*	2	Microsoft Office Specialist - Word
44-45	*Retail (clothing, jewelry, department stores)*	31	Occupational Health and Safety Admin.
49	Couriers		Office Proficiency Assessment and Certif.
54	*Professional, scientific, and technical services*	4	WERC READY
56	*Administrative and support and waste management and remediation services (temporary help, janitorial, land-scaping)*	11	
61	Education services		
62	Child day care		
71	Bowling center		
72	Food service (caterers, restaurants)		
81	Other services (car wash, beauty salon)		
92	*Public administration*	1	
	Education and Training	**0**	
44-45	Retail (home center, department and grocery stores)		AAFCS - Pre-Professional Certif. in Ed.
51	Information (movie theaters, wireless carriers)		CPR with Automatic External Defibrillator
54	Professional, scientific, and technical services		Office Proficiency Assessment and Certif.
56	Administrative and support and waste management and remediation services (janitorial services)		
71	Golf course and country clubs		
72	Full service and fast food restaurants		
92	Public administration		

NAICS code	Career clusters of certifications of employed graduates/ Industry type for jobs held	With related job	Certification earned
	Health Science	4	
31	Manufacturing		CPR with Automatic External Defibrillator
44-45	Retail (electronics, hobby, department stores)		Emergency Medical Technician B
53	Real estate rental and leasing		Certified Nurse Aide
54	Professional, scientific, and technical services		Occupational Health and Safety Admin
55	Management of companies and enterprises		Office Proficiency Assessment and Certif.
56	Administrative and support and waste management and remediation services (prof. employer assoc., janitorial)		Pharmacy Technician
61	Educational Services		
62	*Health care and social assistance*	4	
71	All other amusement and recreation industries		
72	Food service (caterers, restaurants)		
	Hospitality and Tourism	14	
23	Construction		Austin Hotel and Lodging Association
44-45	Retail (department and grocery stores)		CareerSafe General Safety Course
48	Other airport operations		ServSafe Manager Certification
51	Publishers		Texas Alcoholic Beverage Comm.
54	Professional, scientific, and technical services		Texas Food Handlers Certification
56	Administrative and support and waste management and remediation services (telemarketing, janitorial)		
61	Colleges, universities and professional schools		
62	Health care and social assistance		
71	*Fitness and recreational sports center*	1	
72	*Accommodation and food service*	13	
81	Civic and social organizations		
92	Public administration		
	Human Services	9	
42	Wholesale trade		Cosmetology Operator License
44-45	Retail (clothing stores, car dealers, grocery stores)		Cosmetology Shampoo Apprentice Permit
56	Administrative and support and waste management and remediation services (prof. employer assoc., janitorial)		CPR with Automatic External Defibrillator
61	*Elementary and secondary schools*	1	Occupational Health and Safety Admin.
62	*Health care and social assistance*	3	
72	Full service and fast food restaurants		
81	*Other services, beauty salons*	3	
92	*Public administration*	2	
	Information Technology	0	
53	All other consumer goods rental		Adobe Dreamweaver Certification
81	Civic and social organizations		Adobe Flash Certification
44-45	Retail (electronic, department, grocery stores)		Internet and Computing Core Certification
72	Full service and fast food restaurants		Office Proficiency Assessment and Certif.
56	Janitorial services		

NAICS code	Career clusters of certifications of employed graduates/ Industry type for jobs held	With related job	Certification earned
	Law, Public Safety, Corrections and Security	1	
23	Building finishing contractors		CPR with Automatic External Defibrillator
44-45	Retail (grocery, clothing and shoe stores)		Occupational Health and Safety Admin.
56	Administrative and support and waste management and remediation services (employment placement agencies)		Texas Comm. on Fire Protection Firefighter
61	Colleges, universities and professional schools		Texas Law, Public Safety, Corrections, Security (TLPSCS)
62	Home health care services		
62	Residential intellectual and dev. disability facilities		
72	Hotels and motels		
72	Full service and fast food restaurants		
92	*Executive and legislative offices*	1	
	Science, Technology, Engineering and Math	1	
44-45	Retail (supermarkets and grocery stores)		AutoCAD Certified User
54	Payroll services		Autodesk Inventor Certified User
56	*Administrative and support and waste management and remediation services*	1	Occupational Health and Safety Admin.
72	Full service restaurants		
92	Executive and legislative offices		
	Transportation, Distribution and Logistics	1	
44-45	Retail (new car dealership, department stores)		ASE AC Recovery and Recycling Program
54	*Engineering services*	1	ASE Maintenance and Inspection Program
62	Home health care services		Briggs and Stratton Basic Four Stroke Cycle
72	Full service restaurants		Occupational Health and Safety Admin.
			Valvoline motor oil training

Source. AISD student enrollment data systems, Career and Technical Education program data, Texas Workforce Commission, 2013

References

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AUSTIN INDEPENDENT SCHOOL DISTRICT

Carol Pazera, M.S., M.A.

Department of Research and Evaluation

1111 West 6th Street, Suite D-350 | Austin, TX 78703-5338
512.414.1724 | fax: 512.414.1707
www.austinisd.org/dre | Twitter: @AISD_DRE

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