How Large Is the Local College Pipeline? Community and Technical College Credentials Relative to Hiring in Rural and Non-Rural Labor Markets

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1 Introduction

This project measures how large community and technical college credential output is relative to the local labor market, and how that ratio differs between rural and non-rural labor markets. Most research on community colleges looks at the student side: whether a credential raises earnings. I look at the market side: for the employers in a commuting zone, how much of the local flow of new hires could plausibly come from the local college's career programs?

The question matters most for rural colleges. In a rural commuting zone, a single college may be the only local source of trained nurses, welders, CDL drivers, and technicians. Existing research documents what these credentials are worth to students and how well their field mix matches projected openings at a point in time (see Section 2). Both returns and program offerings differ considerably between states, which argues for locally based analysis (Xu and Trimble 2016). Less is known about how the volume of local college credential output compares with realized hiring, and how that ratio has changed as rural private employment stagnated while non-rural employment grew.

This project builds a repeatable commuting-zone panel for 12 North Central Regional Center for Rural Development (NCRCRD) states and documents patterns in the geography and market structure of the sector, including the challenges facing rural colleges; Career Technical Education (CTE) pathways that run through community colleges; and short-term credentials (measured here as short certificates, under one academic year of study), whose

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share of awards is growing and whose federal aid eligibility changed with the Workforce Pell Grant in July 2026 (U.S. Department of Education 2026).

The Kansas pilot yields three findings. First, rural commuting zones with a college produce about 4 occupational awards per 100 new hires, three to four times the non-rural ratio; the gap persisted from 2010 to 2023 and mainly reflects college size not shrinking with the local economy. Second, short certificates make up about half of occupational awards in rural zones with a college, and statewide, awards are growing faster than the number of people receiving them. Third, the Integrated Postsecondary Education Data System (IPEDS) completion counts can diverge from the training that takes place: four of Kansas's 17 rural colleges reported few or none of their short-term completers to IPEDS before 2020, and three began reporting them at scale in 2020 or 2021, creating an apparent rise in short certificates that state program records show was already under way.

2 Related literature

The project connects four literatures, and adds a labor-market-level, over-time measure of scale.

Returns to community college credentials. Administrative earnings data show sizable returns to sub-baccalaureate credentials. In Kentucky, associate degrees and diplomas raise quarterly earnings by about $1,500 for men and $2,400 for women, with smaller returns to certificates (Jepsen, Troske and Coomes 2014). In California, completing a CTE certificate or degree raises earnings by an average of 14 to 45 percent, with the largest gains in health (Stevens, Kurlaender and Grosz 2019). In North Carolina and Virginia, long-term certificates (a year or more of full-time study) raise employment and earnings, but earnings gains among the employed are inconsistent across states for short- and long-term certificates alike and vary sharply across fields and programs (Xu and Trimble 2016).

Program supply and labor demand. An occupation's share of California community college completions grows by about half a percentage point for each percentage point increase in its share of employment, driven mainly by student demand rather than college capacity (Grosz 2022). In Michigan, recent high school graduates exposed to local mass layoffs and plant closings are less likely to enroll in community college programs tied to the affected occupations, and shift instead toward programs requiring similar skills (Acton 2021). Across 565 U.S. labor markets, the field mix of certificates and associate degrees awarded in 2019–21 is often misaligned with projected openings, and more so in rural markets, which typically

have fewer providers (Strohl, Mabel and Peltier Campbell 2024). This project complements that cross-section with a 2010–2024 panel, realized rather than projected hiring, and total volume rather than field mix.

Rural colleges. More than half of public two-year colleges are rural-serving, by an index that combines the rurality of a college's home and neighboring counties with its share of agriculture-related credentials (Koricich et al. 2022). Hillman et al. (2021) classify colleges by the rurality of their commuting zone and document enrollment declines at many rural community colleges between 2005 and 2019.

Where graduates work. Using LinkedIn data for about 2,600 institutions, Conzelmann et al. (2022) find that two-year college graduates are much less mobile than four-year graduates: fewer than 30 percent live and work outside the metro area nearest their college, and about 72 percent of public two-year graduates stay in their home state. This supports reading local awards as mostly local labor supply.

3 Data

All data are public, which makes the pipeline repeatable and extendable to other states.

The geographic scope is the twelve states of the NCRCRD: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. IPEDS and QWI cover all 12 states uniformly and form the core panel.

4 Measures and approach

The unit of analysis is the commuting zone-year, using the USDA ERS 2020 delineation (598 zones; USDA ERS 2026), which follows Fowler's (2024) method with an added requirement that each zone's counties be contiguous. Commuting zones approximate local labor markets, and every county belongs to exactly one. State-designated service areas are used as a robustness check. Further, counties may be too small a unit. In the most rural Kansas counties, QWI leaves new-hire counts for the main CTE-related sectors (health care, construction, manufacturing, transportation) unpublished in 20–30% of county-quarters.

Credential supply. Each commuting zone's supply is the total awards of all public two-year and technical colleges located in it from IPEDS. Awards are split by level: short certificates (under one academic year, or fewer than 30 semester credits), long certificates (one year or

Source	What it provides	Coverage
IPEDS Completions (C_A awards; C_B and C_C students receiving awards) and Institutional Characteristics (HD)	Awards by institution, 6-digit CIP program, and award level; unduplicated counts of people receiving awards (2012 onward); institution county	2010–2024, all public 2-year (sector 4) and public less-than-2-year (sector 7) institutions
Census LEHD Quarterly Workforce Indicators	County × NAICS sector employment, new hires, earnings; private and state/local ownership	2005–2025
USDA ERS 2020 Commuting Zones	County-to-labor-market assignment	2020 delineation
USDA ERS Rural-Urban Continuum Codes	County rurality	2023 codes
NCES CTE Statistics Postsecondary Taxonomy, Exhibit 1	Classification of 2-digit CIP fields as academic or occupational	Current taxonomy (2015–16 to present)
Kansas Board of Regents K-TIP reports	Program-level majors, graduates, employment, and wages of graduates, by award level (associate/certificate vs. short-term)	Kansas, AY2019 and AY2022–AY2024; comparable state reports to be sought for other states

more; long-term in Xu and Trimble 2016), and associate degrees. Since 2020 IPEDS also splits short certificates into under-12-week certificates (fewer than 9 credits or 300 clock hours) and 12-week-to-one-year certificates, so that split is available only for recent years. They are also split by field, occupational versus academic, using the NCES taxonomy. The count of programs reported and newly appearing programs track the breadth of offerings. State data sources draw these lines differently. Kansas's short-term category covers programs under 16 credits that lead to an industry credential, which fall within the IPEDS short-certificate range. Some are credential-only programs, which end in an industry credential or a certificate of completion rather than a college award and may not appear in IPEDS at all. The mapping between state and IPEDS award levels will be documented for each state as it is added. Where states publish program-level completer records, IPEDS short-certificate counts will be compared with them college by college, as in Finding 3, before trends are interpreted.

Labor market. Employment and new hires come from QWI and are aggregated to the commuting zone. QWI publishes private-sector and combined private plus state/local series. Public employment is derived as the difference between them. The headline uses the combined series, because public employers matter for CTE graduates. In the Kansas pilot, about 18% of health-care employment in rural commuting zones is state or local, compared to 4–7% in non-rural zones.

Core measure. The main descriptive statistic is occupational awards per 100 new hires in the same commuting zone and year. This shows how large the local college's career-credential output is relative to the flow of hiring the local economy generates. Because one student can earn multiple credentials in a time period, the measure is also computed for people, bounded below by counting only the largest award level in each program at each college. Strohl, Mabel and Peltier Campbell (2024) compare the field distribution of credentials with that of projected middle-skills openings; this measure instead compares the volume of credentials with realized hiring, so the two are complements rather than alternatives.

Comparisons. Following Hillman et al. (2021), a county is rural if its 2023 Rural-Urban Continuum Code (RUCC) is 4 or higher, a commuting zone's rurality is the share of its population living in rural counties, and a zone is rural if that share is at least 50%. A secondary split separates the most rural zones, those in which every county has an RUCC of 7–9. The analysis documents levels and trends of the core measure by group, its composition by field and award level, and how it moved alongside local employment. Where sector-level hiring is published and award counts are large enough to be stable, the field of each credential

is linked to the industries that hire for it.

5 Preliminary evidence: Kansas pilot

The Kansas pilot produces three findings: rural colleges are large relative to local hiring, primarily because college size does not shrink with the local economy; short certificates are half of rural occupational awards, and awards are outgrowing people; and IPEDS completion counts can diverge from the training that actually takes place. The pilot covers Kansas's 105 counties and 26 commuting zones. Following Hillman et al. (2021), a zone is rural if at least half of its population lives in non-metropolitan counties (RUCC 4–9): 20 zones are rural, and 14 of them host at least one of Kansas's 26 public two-year and technical colleges. Seven zones cross state lines; their rurality is measured over all of their counties, but only Kansas counties enter the outcomes for now. Figures for the full 12-state region may differ, and the cross-state zones will change once neighboring states' counties are added.

Finding 1: Rural colleges are large relative to local hiring

In rural commuting zones with a college, local colleges confer about 4 occupational awards for every 100 new hires, three to four times the non-rural ratio, and the gap persisted from 2010 to 2023.

Table 1: Occupational awards per 100 new hires (private + state/local)

	2010	2015	2019	2023	2024
Non-rural commuting zones	1.1	1.2	1.3	1.2	1.3
Rural commuting zones with a college	4.2	3.8	3.9	4.3	5.2
All rural commuting zones	3.6	3.3	3.4	3.8	4.5

Sources: IPEDS, QWI, USDA ERS; author's calculations. Every non-rural zone has a college. Using private hires alone, which omits public employers, raises the rural 2023 ratio to 5.0; excluding business and education associate degrees, which are often transfer-oriented, barely moves it (4.3 to 4.2). 2024 comes from the most recent IPEDS and QWI releases and may be revised. New hires fell 6–7% that year, which alone raises the rural ratio from 4.3 to 4.6; the remaining rise is concentrated in under-12-week certificates, about a quarter of it at Dodge City (Finding 3).

- **Counting people rather than awards leaves the gap intact.** Bounding the number of people who received occupational awards (see Finding 2), the 2023 ratio is 3.8–4.3 per 100 new hires in rural zones with a college and 1.0–1.2 in non-rural zones.

- **Six rural zones have no public two-year college.** They hold about 15% of the rural population. Including them lowers the rural ratio to 3.8 in 2023, still about three times the non-rural ratio.
- **The gap mainly reflects college size not scaling with the local economy.** Across zones with a college, occupational awards rise only about 0.4% for each 1% difference in local new hires. The median rural zone with a college has about one-seventh of the hiring of the median non-rural zone, yet its colleges confer about half as many occupational awards (358 against 791 per college in 2023). Relative to their local economies, rural colleges are therefore large.
- **The most rural zones stand out further.** In rural zones where every county has an RUCC of 7–9, the ratio is about 7 per 100 (6.9 in 2023), and private employment fell about 6% from 2010 to 2023. Across all rural zones private employment was essentially flat (+1%), against about 15% growth in non-rural zones.
- **The gap does not depend on how short certificates were reported.** Before 2020, four rural colleges under-reported short certificates to IPEDS (Finding 3), so pre-2020 rural ratios are understated. Counting only long certificates and associate degrees, which are unaffected, the rural ratio is 2.5 in 2010 and 2.2 in 2023, against 0.6 in non-rural zones in both years.

Finding 2: Short certificates are half of rural occupational awards, and awards are outgrowing people

In rural zones with a college, short certificates were about half of occupational awards in 2023 (51%), similar to the non-rural share (50%). Reported short certificates jump in 2020, but that jump mostly reflects colleges beginning to report existing programs (Finding 3); excluding the four colleges involved, the rural share was 48% in 2010 and 49% in 2023.

- **What the short certificates are.** Nurse aide certificates alone are about half of rural short-certificate awards in 2023 (1,579 of 3,203).
- **Earnings depend on the field.** Kansas's program reports (K-TIP) separate short-term programs (under 16 credits and leading to an industry credential) from a longer group of certificates of 16 or more credits and associate degrees. The line does not match IPEDS: K-TIP's longer group includes 16–29 credit certificates that IPEDS counts as short certificates. Among graduates who left school and are employed, the AY2024 median wage in health is $24,950 for K-TIP short-term programs against $60,914 for

the longer group. In transportation, where the short-term group is almost entirely CDL programs (306 of 313 employed graduates), the pattern reverses ($48,015 against $39,199), and in manufacturing the two are about equal (Kansas Board of Regents 2024–2026). These are statewide, unadjusted figures, consistent with evidence that returns to short certificates are uneven across fields and states (Xu and Trimble 2016).

- **Awards are outgrowing people.** Since 2012, IPEDS also counts the people receiving awards. Statewide, awards across all fields grew 11% from 2012 to 2023, while the number of people receiving any award grew 6%. The share of completers earning stacked awards, at two or more levels in the same year, rose from about 3% to 7%. For occupational fields, counting only the largest award level in each program at each college, a lower bound on the number of people, grew 2% while occupational awards grew 9%. Excluding the four colleges whose reporting changed (Finding 3), awards grew 4% while people fell 1%.
- **Embedded certificates drive the stacking.** At Northwest Kansas Technical College, the electrical program awarded 43 long certificates and 23 associate degrees in the same year; at Colby Community College, wind energy technology awarded 21 long and 29 short certificates. These two colleges average about 1.5 awards per person.
- **The rural gap does not depend on the shortest credentials.** Excluding under-12-week certificates, which IPEDS has reported separately only since 2020, lowers the 2023 ratios to 2.9 in rural and 0.9 in non-rural zones, still about three to one.

Finding 3: IPEDS completion counts can diverge from training

Dodge City Community College, the only college in its commuting zone, reported commercial driver's license (CDL) certificates rising from none in 2023 to 120 in 2024. The program is not new: it has run since 2013 and appears as a credit-bearing program in every catalog from 2020–21 on. The state recorded 35 and 57 declared majors in 2021–22 and 2022–23 but fewer than five graduates each year, then 120 graduates from 126 majors in 2023–24 (Kansas Board of Regents 2024–2026). An eight-week program with 57 majors is unlikely to have had fewer than five completers, so the jump most likely reflects a change in how completions were recorded, together with enrollment that roughly doubled. A second case runs the other way. Barton Community College reported 23 CDL completers to the state for 2023–24, but IPEDS shows no Barton CDL awards in any year from 2010 to 2024. The state counts students who complete a K-TIP short-term program, while IPEDS counts awards a college formally confers, so completers of a credential-only program, one that confers no college award, never

appear in IPEDS.

Applied to every college, the comparison shows the gap is not isolated. In 2018–19, Hutchinson Community College graduated 628 students from state-recognized short-term programs, including 357 nurse aides and 124 emergency medical technicians, but reported 43 short certificates to IPEDS; in 2020 it reported 579. Garden City (156 state-reported graduates, 37 IPEDS certificates), Dodge City (115, none), and Labette (135, 4) show the same gap, while at every other Kansas college IPEDS short certificates match or exceed state short-term graduates (Kansas Board of Regents 2020). Hutchinson and Garden City began reporting these programs in 2020, the year IPEDS first reported certificates under 12 weeks separately, and Dodge City in 2021. Because short certificates are exactly the credentials whose reported counts are growing, reporting practice will be tracked as the analysis extends to other states.

6 Planned work

The complete paper extends the Kansas pipeline to all 12 states in the North Central Regional Center for Rural Development region, where the commuting zones that cross state lines are complete. It adds four pieces of analysis:

1. **Sector matching.** Linking credential fields to the industries that hire for them, through CIP–SOC and occupation–industry crosswalks. This compares, for example, health-sciences credentials with health-care hiring in the same labor market.

2. **Program entry and exit.** Documenting when colleges begin and stop reporting completions in occupational programs, after harmonizing CIP 2010 and CIP 2020 codes, and how entry and exit differ between rural and non-rural markets. Previous work shows that program mixes respond to labor markets through student choices (Acton 2021; Grosz 2022), and Acton (2021) notes that without annual data on program offerings, it could not be tested whether colleges themselves adjust. Completions data give a partial view of that supply side: a program appears only after its first award and can go unobserved in years with no completers, so entry and exit will be defined over several consecutive years rather than single-year changes.

3. **Stated employer needs.** Coding the employer needs that colleges report in Perkins V Comprehensive Local Needs Assessments in the states that publish them (institution-level report cards in some states, such as Nebraska, Kansas, and South Dakota, and narrative CLNA content in Minnesota), and comparing them with the credentials the same colleges award.

4. **Short-term credentials and Workforce Pell.** Describing the stock and growth of short certificates before Workforce Pell eligibility began in July 2026. This provides a baseline for later work. Workforce Pell covers programs of 8 to under 15 weeks, or 150–599 clock hours (U.S. Department of Education 2026), a range that straddles the IPEDS split between under-12-week and 12-week-to-one-year certificates. Neither IPEDS level matches eligibility, so the baseline will be reported for both, and state program records that report credit or clock hours will be used to approximate the eligible range where available. The panel will be updated in early 2028 with the newest IPEDS and QWI releases.

Proposed further research: employer interviews. The panel measures scale, not relationships. It cannot show whether local employers hire from a particular college, or why. A follow-on phase would interview and survey employers in selected rural commuting zones. It would ask how they recruit, which colleges they work with, and how they see program offerings.

Proposed further research: college program marketing. Whether college outreach and marketing contribute to the growth of short certificates is an open question. Further research would code college marketing materials for short certificates by academic year and compare them with changes in credentials awarded.

7 Limitations

The core measure is a ratio of two flows but not a placement rate.

- **Awards are not local labor supply.** Graduates may leave the commuting zone, students may commute in, and some short-certificate earners are incumbent workers or dual-enrolled high school students. The Conzelmann et al. (2022) mobility estimates come from LinkedIn profiles, which may under-represent certificate holders, so they will bound the local share rather than measure it.
- **Awards overstate people.** IPEDS counts people receiving awards only across all fields, not by program, so the number of people receiving occupational awards is bounded rather than measured (Finding 2).
- **Program timing is not random.** Colleges add programs partly in response to local demand, so the co-movement of offerings and hiring is descriptive, not causal.

- **The field classification is by field, not degree intent.** Some associate degrees in occupational fields are designed for transfer; a sensitivity measure excludes the largest such groups.
- **IPEDS completion counts can diverge from training.** IPEDS counts of short certificates can move with institutional reporting practice (Finding 3), which matters most for the credential type driving recent growth. Large single-program jumps will be checked against state program records before they are interpreted.
- **QWI is noise-infused and excludes federal employment.** QWI adds statistical noise to protect confidentiality (Abowd et al. 2009), and public employment, derived by subtraction, is approximate. In the Kansas pilot, fewer than 0.1% of cells produce a negative derived value.

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