

WHO EARNS CERTIFICATES IN KENTUCKY? 2005–2006 TO 2018–2019

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Summary

This is the second in a series of reports on the postsecondary certificate environment in Kentucky. Given its prevalence in policy debates and the high rate of short-term credential seekers in the state, Kentucky is a key context in which to study short-term credentials. The goal of this report is to inform policy decisions surrounding certificates by providing a descriptive analysis of the characteristics of students who pursue certificates. Specifically, we use administrative data from the 2005–2006 to 2018–2019 academic years to identify trends in the characteristics of students who earned sub-baccalaureate certificates at postsecondary institutions in the state of Kentucky.

In the previously released report, *Certificates Awarded in Kentucky, 2005–2006 to 2018–2019*, we documented trends in sub-baccalaureate certificates granted by postsecondary institutions in the state of Kentucky. In that report, we highlighted the dramatic increase in certificates granted in the state, especially among skilled trades and STEM fields. Here, we examine the characteristics of certificate earners using the same data. In future work, we will continue this study through analyses of labor market benefits to pursuing certificates.

Key Takeaways

1. In our most recent year of data, approximately 45% of certificates were earned by students who were 24 years old or younger (commonly referred to as “traditionally aged” students), while about 55% of certificates were earned by students who were 25 or older. Certificate earning among this younger group students has grown faster than that of older students, emphasizing the wide appeal of short-term certificates and motivating future work to understand how short-term credentials fit in the educational pathways of these students. Notably, even though this age group still represents a relatively small proportion of all certificates granted, there has been a substantial increase in the number of certificates earned by students aged 19 or younger.
2. The growth of certificate earners who identify as male has outpaced the growth of certificate earners who identify as female over the time period analyzed. Currently, approximately 62% of certificates are earned by male students. When examining certificates earned in particular fields of study, there are clear gaps by gender in many fields: men earn 86%-90% of STEM and skilled trade certificates, while women earn 81%-89% of business and health profession certificates. These gender compositions have not changed substantively over time. Because interest in different fields of study have changed over time, however, these gender field-specific gender compositions have the potential to affect the overall gender composition of certificate earners. For example, the fastest growing certificate fields are the male-dominated skilled trades and STEM fields, which has led to a relative increase in the proportion of certificates earned by male students overall.

3. In recent years, about 40% of certificates were earned by students who lived in counties that were among the top quartile of median household income in the state, and almost 70% came from top half of counties for median household income. While county-level income is not a perfect proxy for individual household income, it suggests that certificate earners are in large part coming from relatively wealthier communities. A smaller proportion of certificates (about 15%) were earned by students from counties in the lowest median income quartile. The share of certificates earned by students from counties with the lowest income has decreased almost 40% during the time period analyzed. This trend is most apparent in certificates earned in business and STEM fields. Additionally, the proportion of certificates earned by Pell students decreased from 52% in 2010 to 46% in 2018.
4. The proportion of certificates earned by white students accounts for over 80% of the total certificates granted in Kentucky between 2005–2006 and 2018–2019. This proportion was largely steady over the time period analyzed. The proportion of certificate earners who identify as Hispanic/Latinx increased by about 65%, from about 3% to almost 5% from the start to end of the period, whereas the proportion who identify as Black fell by almost 40%, from over 9% to about 6%. These trends need to be considered further in light of broader postsecondary education trends, as changes in the composition of certificate earners can reflect changes in the number of students who pursue postsecondary certificates, but also changes in the types of credentials pursued across institutions in the state.

1. Certificates by Student Characteristics

In the previously released report, *Certificates Awarded in Kentucky, 2005–2006 to 2018–2019*, we documented trends in trends in sub-baccalaureate certificates granted by postsecondary institutions in the state of Kentucky using administrative data from the 2005–2006 to 2018–2019 academic years (note that, in the graphs and text, we denote the year by the beginning year; e.g., we denote the 2005–2006 academic year as 2005 and the 2018–2019 academic year as 2018). Here, we examine certificates by students’ characteristics using the same data.

We explore demographic trends among students pursuing certificates based on certificate-level data. In other words, we count students who earned multiple certificates multiple times in our analysis, one for each certificate. Please see the data appendix for further discussion of doing a certificate-level analysis (as opposed to a student-level analysis) as well as a description of the data we use and other assumptions.

1.1. Certificates: Age at Time of Award

In Figure 1A, we display the composition of certificates by certificate earners’ age over time. We consider students’ ages here to be the age at which the certificate was conferred. Certificates are sometimes thought of as a credential sought by older individuals because, for example, such students return to school to improve their skills after working for a while. In our data, however, the fastest growth in certificate earning is happening among younger students. Certificates earned by students aged 24 or younger comprised the largest share of certificates and this group also experienced the most growth. The number of certificates earned by students aged 24 or younger grew by almost 120% and their proportion of total certificates grew from 39% to 45% from the beginning of our time period to the end. The number of certificates earned by students aged 25 to 34 nearly doubled, while certificates earned by students aged 35 to 44 and 45 or older also increased but at relatively lower rates of 43% and 60%, respectively. A notable trend is the substantial increase in the number of certificates earned by students aged 19 or younger. Even though this age group still represents a relatively small proportion of all certificates granted (5% in the most recent year), the number of certificates earned by these students swelled by about 3.5 times the level of 15 years earlier.

For comparison, the proportion of associate degrees by age group can be seen in Figure 1B. Overall, there were generally similar trends between certificate and associate degrees. For example, the number of associate degrees earned by students aged 24 or younger almost doubled, such that their proportion of overall degrees increased from 40% to 48% from the beginning of our period to the end.

Figure 1A. Certificates: Age at Time of Award

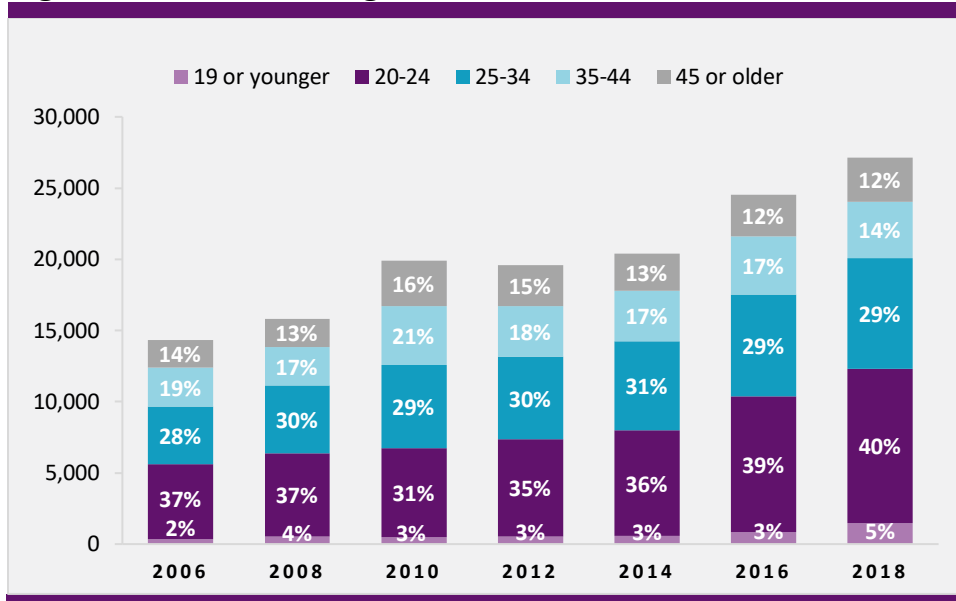
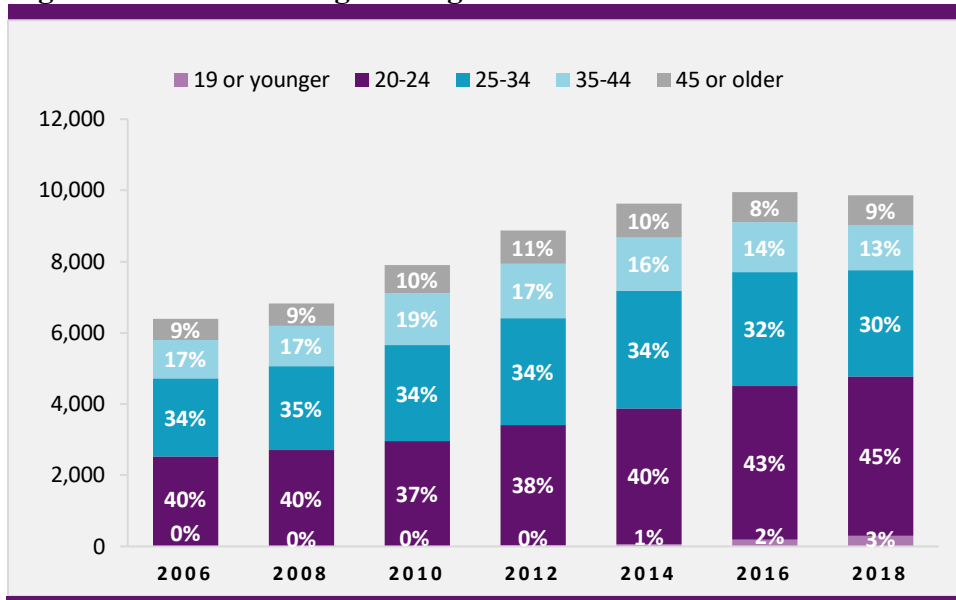


Figure 1B. Associate Degrees: Age at Time of Award

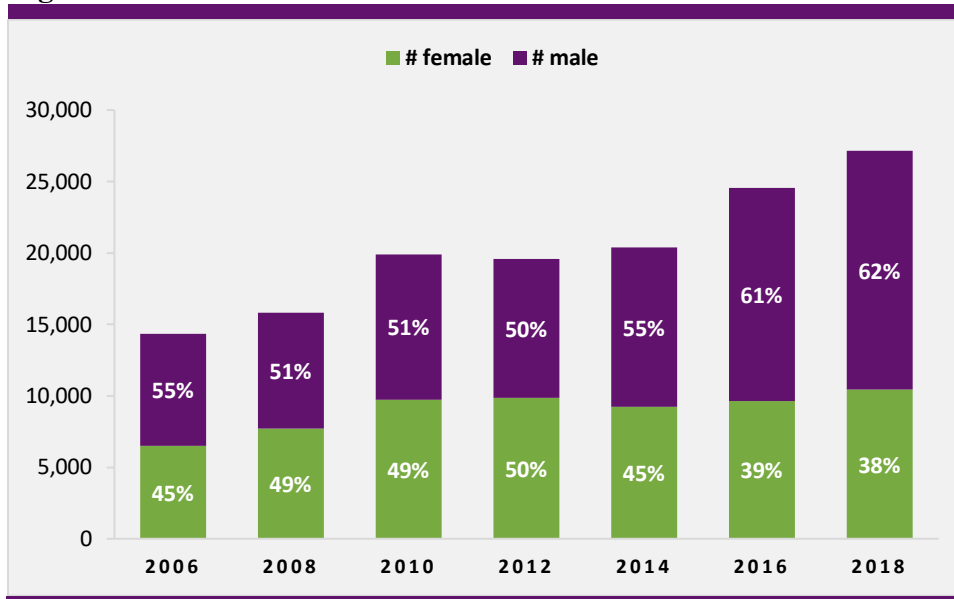


Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentage of certificates or associate degrees in each of the four age categories between 2006 and 2018. Calculations were based on the numbers of certificates or associate degrees in each of the categories in proportion to the total number of certificates by year. Each student's age group was determined according to their age at time of certificate or associate degree conferral.

1.2. Certificates: Gender

Next, we display at the gender composition of students who earned certificates in Figure 2. The number of certificates earned by students who identify as female grew by over 52% from 2006 to 2012. However, since then, the proportion of certificates earned by students who identify as female has gradually decreased to 38% due to a rapid growth rate in certificates earned by students who identify as male. As we discuss later, this partly appears to be driven by growth in male-dominated fields, such as skilled trades and STEM. While there has been a similar flattening out of the growth rate in associate degrees earned by students who identify as female in the past seven years, about two-thirds of associate degree earners in Kentucky identify as female.

Figure 2. Certificates: Gender

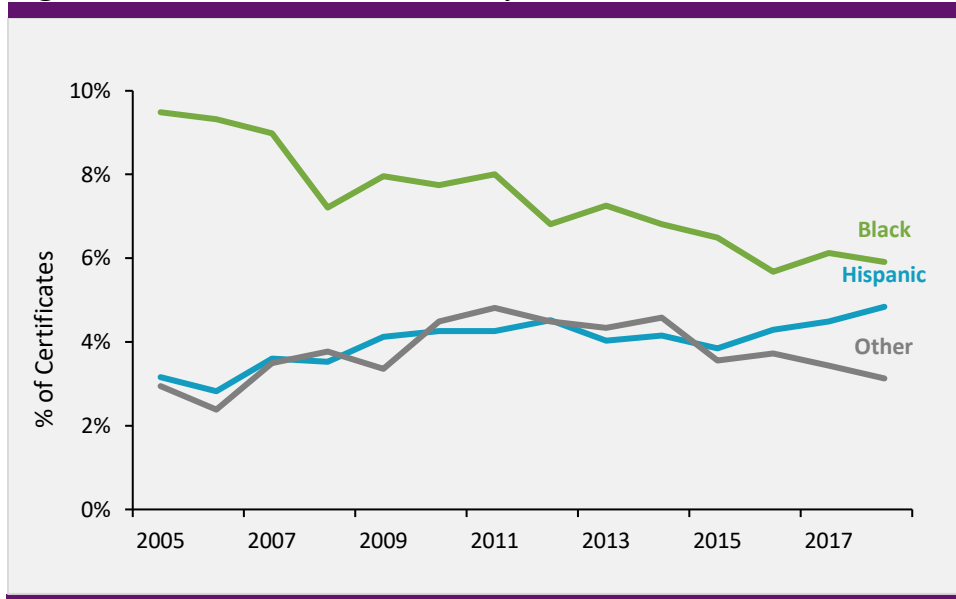


Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System.
Notes: In this figure, we show the percentage of certificates in each of the gender categories between 2006 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by year.

1.3. Certificates: Race and Ethnicity

Consider certificate attainment by student race and ethnicity in the state of Kentucky (Figure 3). We categorize students based on their identification as one of three race categories: white, Black, or other (where the “other” category included American Indian, Asian, Hawaiian, two or more races, and other/unknown) and, separately, whether they identified their ethnicity as Hispanic/Latinx. Between 2005 and 2018, about 86%--90% of certificates were awarded to students who identified as white. Black student certificate earners were the next largest group, earning about 6%--7% of certificates in recent years: this proportion is down from over 9% in 2005. The share of certificates earned by Hispanic/Latinx students increased from 3% to 5% from 2005 to 2018. The proportion of certificates awarded to students from other races slightly increased from 4% to 6% between 2005 and 2011 but has since experienced a downturn in its original levels in the most recent year.

Figure 3. Certificates: Race/Ethnicity



Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentage of certificates in each of the racial/ethnic categories between 2005 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by year.

For comparison, from 2005 to 2018, about 87%-90% of associate degrees were awarded to students who identified as white. The share of associate degrees earned by Black students has remained relatively flat over time at about 6%, while the share of associate degrees earned by Hispanic/Latinx students increased by about 65% in 2018, similar to the large growth observed among certificates.

1.4. Certificates: County Median Household Income

We do not directly observe measures of socioeconomic status in the data; therefore, we use median household income of students' county of residence from the 2015 American Community Survey as a proxy for students' socioeconomic status. For ease of interpretation, we categorize counties based on their quartile. In other words, the highest quartile consists of certificate earners living in the top 25% of the state's counties based on median household income; the second highest quartile consists of certificate earners living in the top 50%-75% of the state's counties; the second lowest quartile consisted of certificate earners living in the bottom 25%-50% of the state's counties; and lowest quartile consisted of certificate earners live in the bottom 25% of the state's counties.

We display the trends in certificate earners by county median household income quartile in Figure 4A. The proportion of certificates earned by students from lower income counties has been falling relative to the proportion of the higher income counties. The share of certificates earned by students from the lowest income quartile counties decreased from nearly 18% in 2005 to 13%--15% in recent years. The share from the second lowest income quartile counties also decreased, dipping from about 24% to 21% from 2016 to 2018. These declining shares were driven by relatively slow growth in the number of certificates earned by students in these groups (growth rates of about 56% from 2005 to 2018 for the lowest quartile and 82% for the second lowest quartile), whereas

certificates earned by students living in the second highest and highest quartiles of income grew by 135% and 147%, respectively.

Figure 4A. Certificates: County Median Household Income

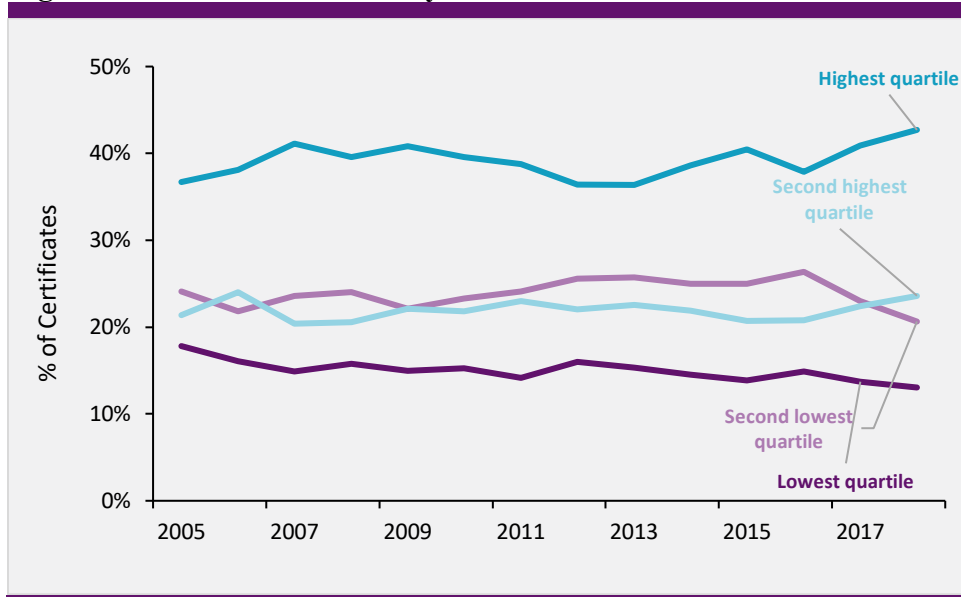
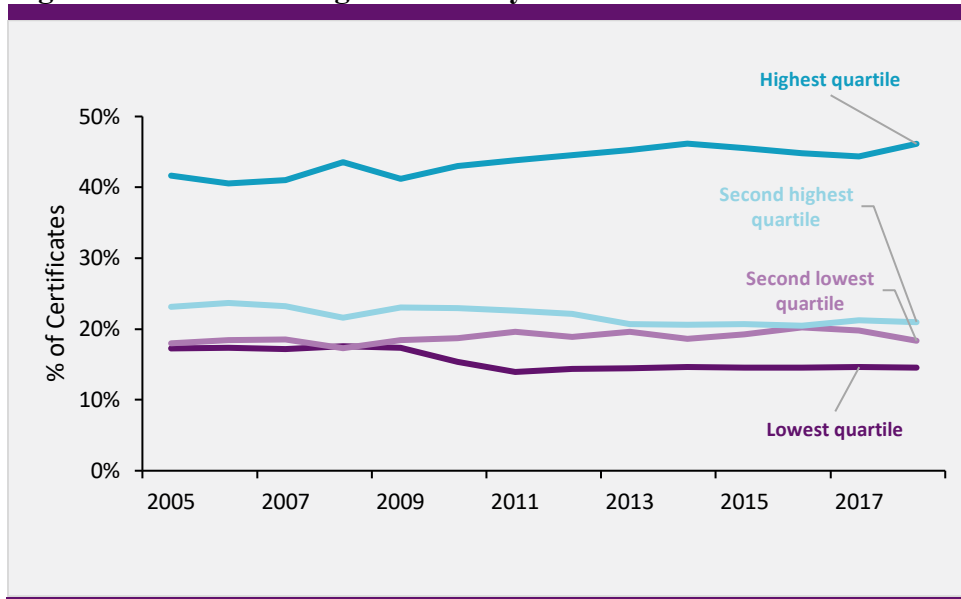


Figure 4B. Associate Degrees: County Median Household Income



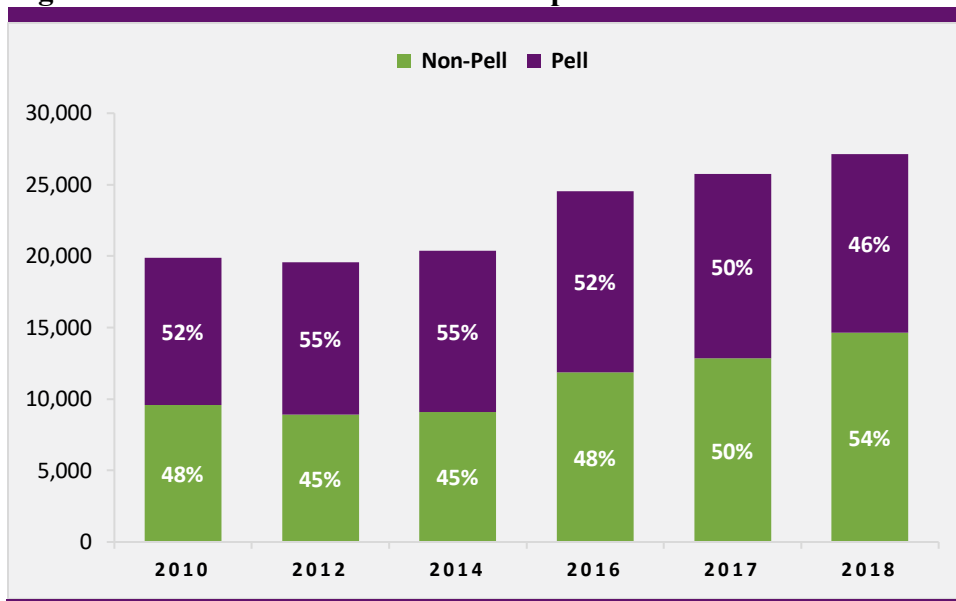
Source: Author calculations based on KPEDS Degree Data in the Kentucky Longitudinal Data System and American Community Survey median income estimates from county-level data in 2015. Notes: In this figure, we show the percentage of certificates or associate degrees in each of the four income categories between 2005 and 2018. Calculations were based on the numbers of associate degrees in each of the categories in proportion to the total number of certificates or associate degrees by year.

For comparison, we show the proportion of associate degrees earned by county median income groups in the figure 4B. While there was a similar growth rate of over 90% in certificate attainment among students from the highest quartile counties, there were somewhat smaller growth rates in other groups (47%, 77%, and 57% for the lowest, second lowest, and second highest quartiles, respectively). Therefore, among associate degrees, while the proportion of associate degrees earned by students in the highest income quartile grew by almost 4 percentage points (from 42% to 46%), the proportion of associated degrees earned by students from the lowest income quartile fell by about two percentage points (from 17% to 15%). Overall, the SES shift among associate degrees was not as dramatic as that observed among certificate earners.

1.5. Certificates: Pell Grant Recipients

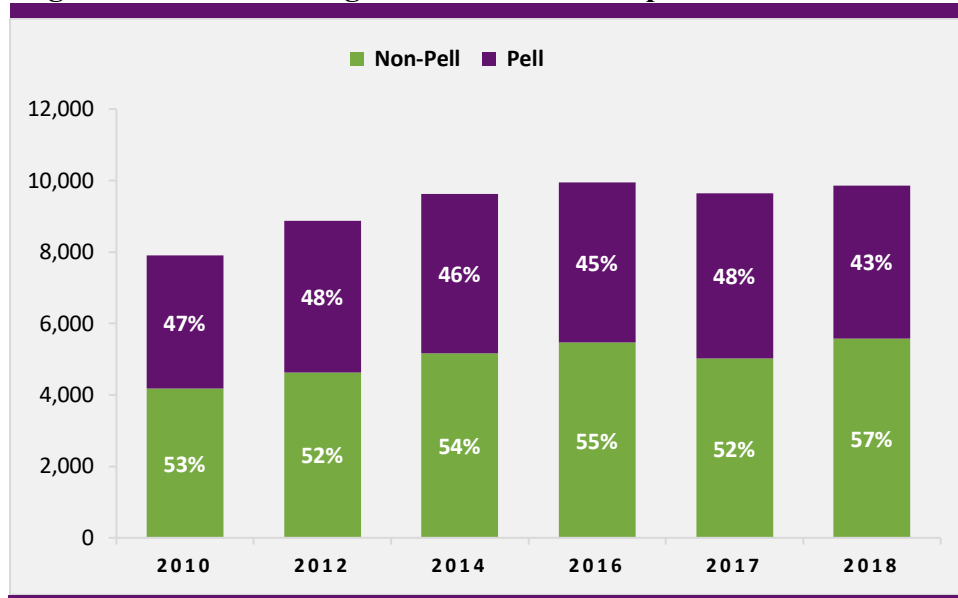
Next, we display the number and percentage of certificates earned by Pell grant recipients. Between 2010 and 2018, the number of certificates earned by both Pell and non-Pell students increased, but the growth of non-Pell students has outpaced the growth of Pell students. As a result, the proportion of certificates earned by Pell students dropped from 52% in 2010 to 46% in 2018. For comparison, we show the proportion of associate degrees earned by Pell and non-Pell students in the figure 5B. Overall, we observe a trend similar to that of certificates: the percentage of associates degrees earned by Pell recipients slightly decreased over time.

Figure 5A. Certificates: Pell Grant Recipients



Source: Author calculations based on KPEDS Degree and Financial Aid Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentage of certificates in each of the categories between 2010 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by year.

Figure 5B. Associate Degrees: Pell Grant Recipients



Source: Author calculations based on KPEDS Degree and Financial Aid Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentage of certificates in each of the categories between 2010 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by year.

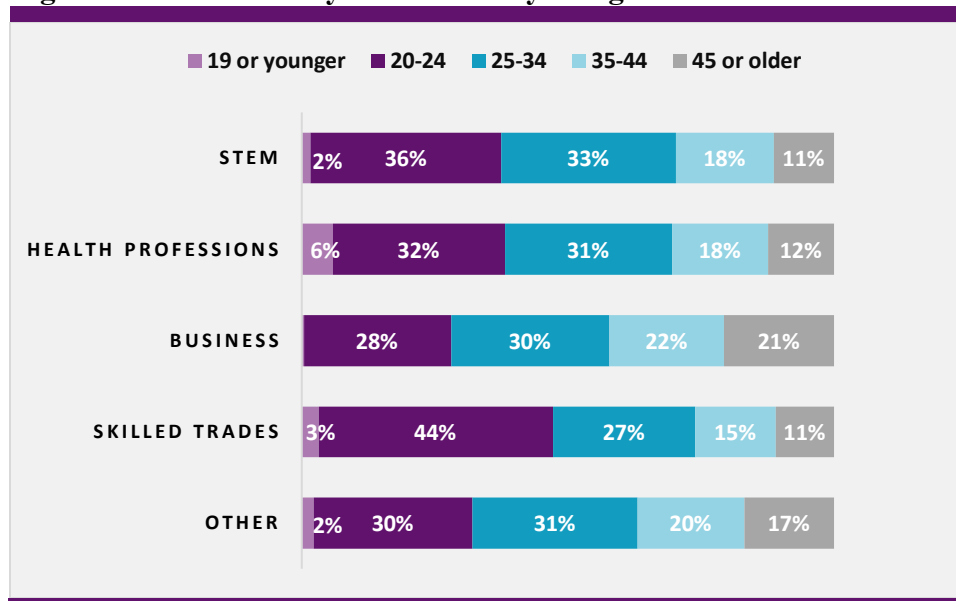
2. Certificates by Field of Study

In this section, we present trends in age, gender, race/ethnicity, and SES composition by field of study. We group the fields of study into four general categories: STEM, health professions, business, and skilled trades (including construction, mechanic and repair technologies, and precision production), with the remainder of fields falling into the “other” category. See Appendix Table 1 for our classification scheme.

2.1. Certificates by Field of Study and Age

In Figure 5, we show the share of certificates by age across various fields of study. There was some variation in the age profile of certificates across different fields of studies. For example, students aged 24 or younger earned a higher proportion of certificates in skilled trades (47%) than in STEM (38%), health professions (38%), business (28%), and other (32%). In contrast, students aged 35 or over earned the highest proportion of certificates in business (43%), while relatively smaller proportions of certificates were conferred to this age group in skilled trades (27%), STEM (29%), health professions (30%), and other (37%).

Figure 6. Certificates by Field of Study & Age

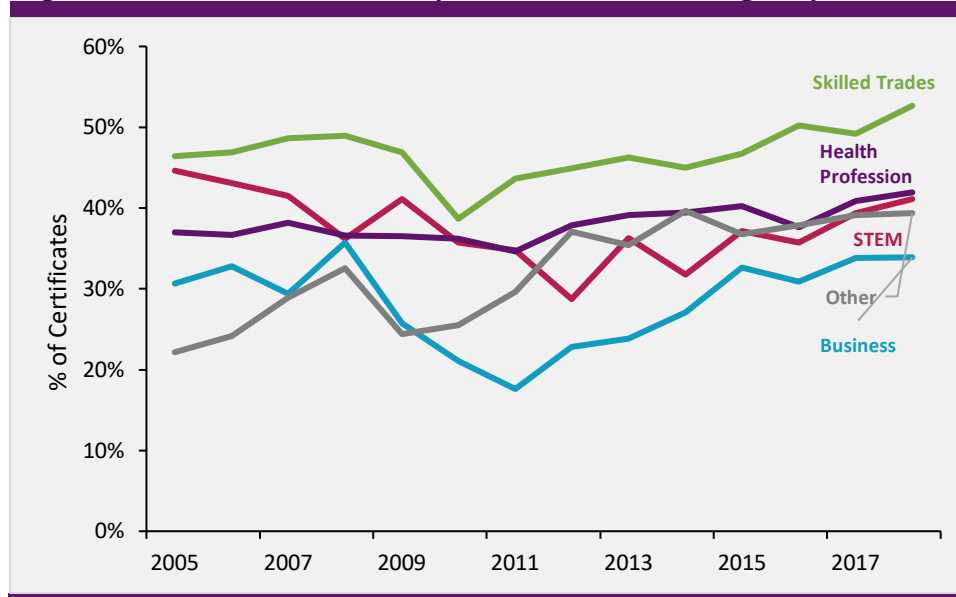


Source: Author calculations based on KPEDS Degree Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentage of certificates in each of the categories between 2005 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by field. Each student’s age group was determined according to age at time of earning certificate.

In Figure 6, we show trends in the percentage of certificates earned by students aged 24 or younger across several fields of study. There was a general dip across fields in the proportion of certificates granted to students 24 or younger during the late 2000s and the early 2010s, with the most pronounced changes observed in business. Following that period, we observed an upward trend until 2018 that, for the most part, resulted in the 2018 proportions being similar to those of 2005.

Skilled trades were an exception, with this fast-growing field also seeing an increase in relatively young students earning certificates: about 46% of certificate earners were 24 or younger in 2005, which grew to 53% by 2018.

Figure 7. Certificates Earned by Students 24 or Younger by Field of Study



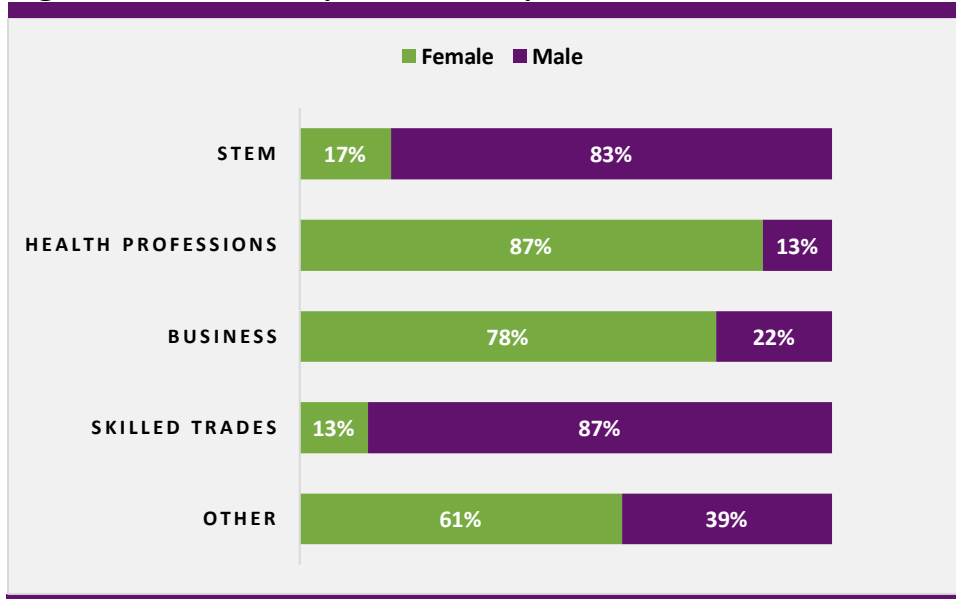
Source: Author calculations based on KPEDS Degree Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentage of certificates earned by students aged 20-24 between 2005 and 2018. Calculations were based on the numbers of certificates in proportion to the total number of certificates by year and field. Each student's age group was determined according to age at time of earning certificate.

2.2. Certificates by Field of Study: Gender

In Figure 7, we display the composition of certificates by certificate earners' gender across fields of study. Of the five identified fields, four have a share of certificates wherein one gender comprised over three-quarters of certificates awarded. Students who identified as male comprised 86% of STEM certificates and 90% of skilled trade certificates, while students who identified as female comprised 89% of health profession certificates and 81% of business certificates.

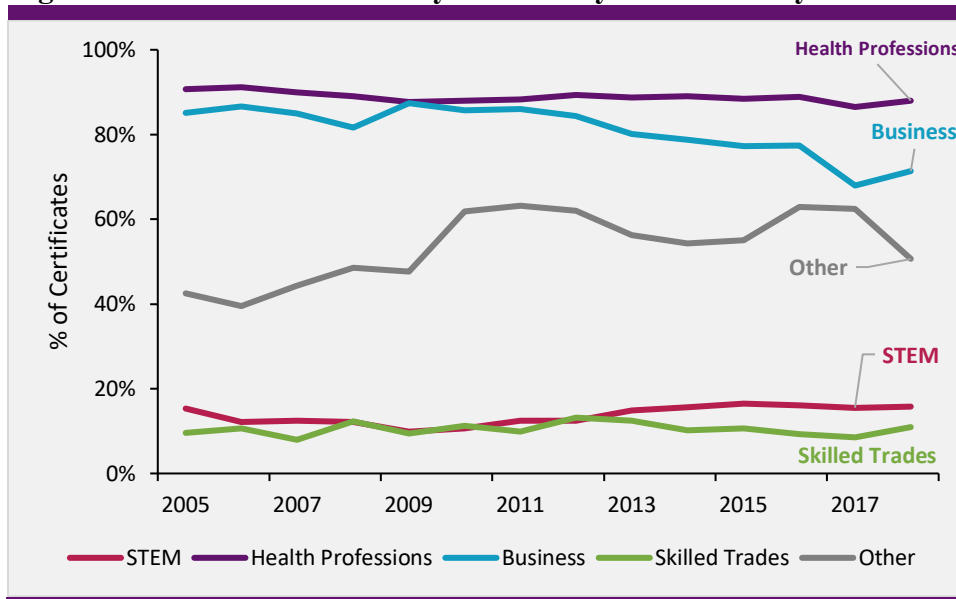
In Figure 8, we show trends in certificate attainment by gender across fields of study over time. Between 2005 and 2018, the share of certificates conferred to students who identified as female fell over time in business from about 85% to 71%. In contrast, the percentage of certificates earned by students who identified as female in "Other" fields increased over time from 42% to 51%. We observe relatively little change in the gender composition of students who earned certificates in skilled trades, STEM, and health professions during this time.

Figure 8. Certificates by Field of Study & Gender



Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentages of certificates in each of the two gender categories. Certificate calculations were based on the numbers of certificates in proportion to the total number of certificates by field.

Figure 9. Certificates Earned by Females by Field of Study



Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentages of certificates earned by female students. Certificate calculations were based on the numbers of certificates earned by female students in proportion to the total number of certificates by year and field.

2.3. Certificates by Field of Study and Race/Ethnicity

In Figure 9, we display the racial/ethnic composition of certificate earners in the fields of STEM, health professions, business, skilled trades, and other fields. Reflective of the overall racial and ethnic composition previously described, white students made up the largest racial/ethnic group, with more than 80% of the total certificates earned across all fields. Black students had relatively higher representation in “Other” and business certificates compared to their representation in the other fields. The shares of certificates earned by Hispanic/Latinx students were not measurably different across fields.

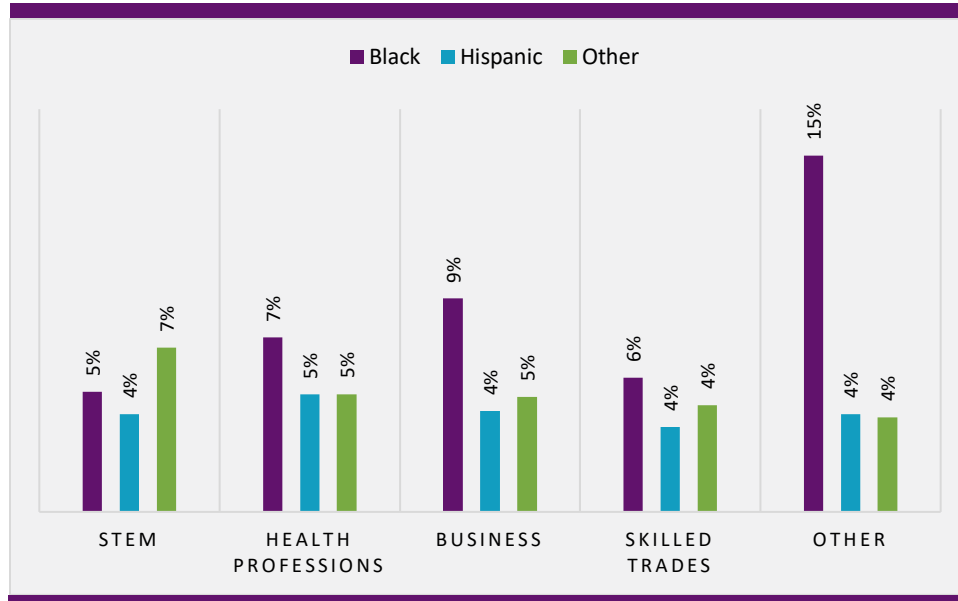
We then examined how the racial/ethnic composition of certificate earners has changed over time in STEM, health professions, business, skilled trades, and Other. In Figure 10A, we show trends in the racial/ethnic composition of certificate earners for STEM fields. The share of STEM certificates earned by Hispanic/Latinx students reflected a steady increase over time, growing from about 2% to 5%. The proportion of STEM certificates earned by Black students held relatively steady around 4%-5% and the share of certificates earned by other students peaked at 9% in 2012 and dropped to 6% in 2018.

In Figure 10B, we examine trends in certificate attainment by race/ethnicity for health professions. The proportion of certificates earned by white students remained relatively flat over time at about 86%-89% between 2005 and 2018. The share of certificates earned by Black students decreased slightly from 9% to 6% between 2005 and 2012 and has increased slowly since, almost returning to the level it was at the beginning of the period in question. The proportion of certificates earned by Hispanic/Latinx and by students of other races increased mildly.

In Figure 10C, we display trends in certificate attainment by race/ethnicity for business. There was a slight decline (88% to 82%) in the proportion of business certificates granted to white students between 2005 and 2010. Since then, it has experienced an upward trend, ending the period slightly higher than where it began at approximately 89%. In contrast, the share of certificates earned by Black students declined with some fluctuations during this period and the percentages of certificates granted to Hispanic/Latinx and other students remained around 3%-7%.

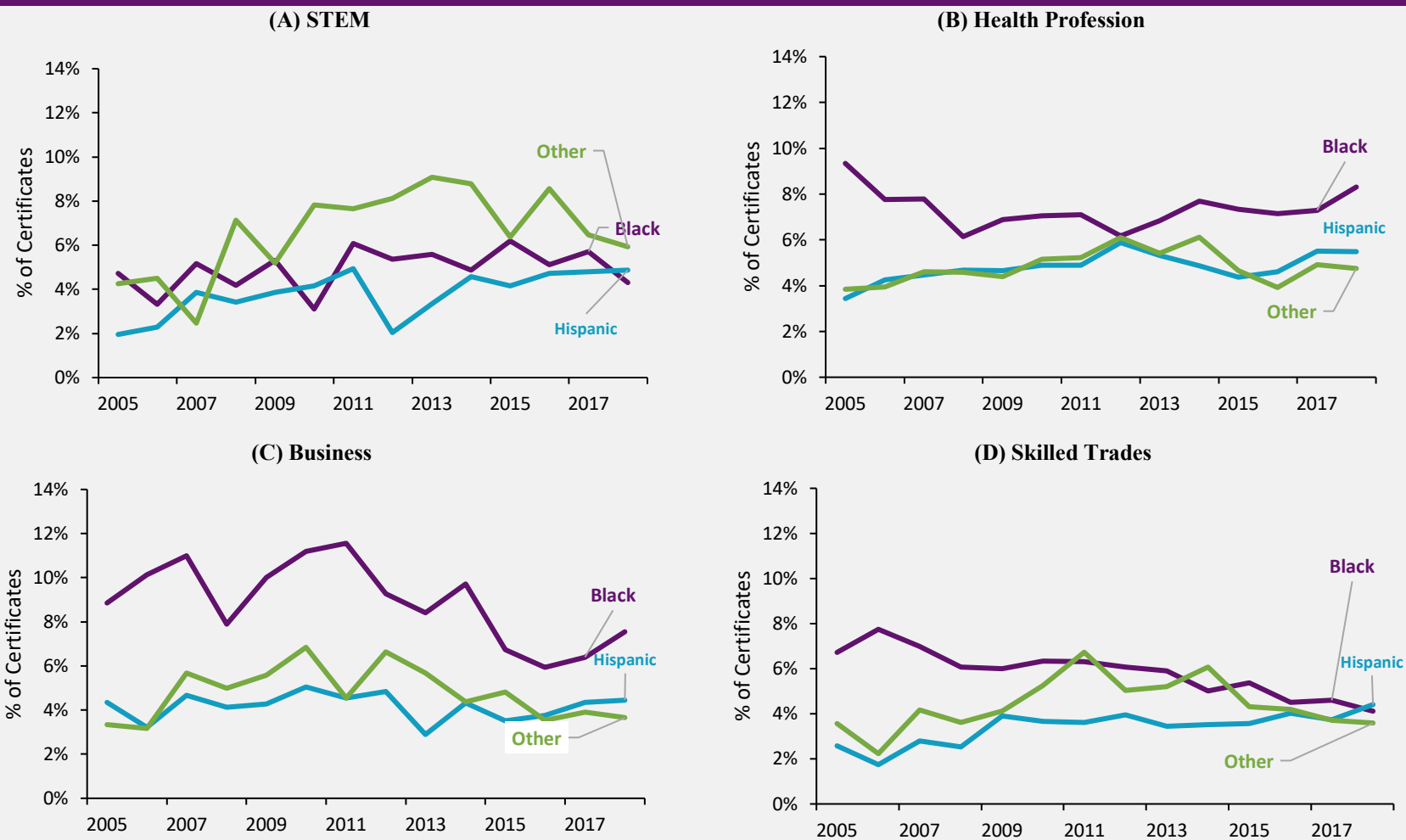
Finally, in Figure 10D, we show certificate attainment by race/ethnicity for skilled trades. The share of certificates earned by white students went down slightly by 3% (90% to 87%) from 2005 to 2011. Since then, it has grown to 92% of all certificates in 2018. During this period, Black certificate earners saw a slow decrease in their share over time from 7% in 2005 to 4% in 2018. In contrast, the proportion of Hispanic/Latinx climbed slowly during this time period. The proportion of certificates earned by other students in skilled trades peaked at 7% in 2011 and has since declined.

Figure 10. Certificates by Field of Study & Race/Ethnicity



Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System.
Notes: In this figure, we show the percentages of certificates in each of the four racial/ethnic categories. Certificate calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by field.

Figure 11. Certificates by Specific Field of Study & Race/Ethnicity

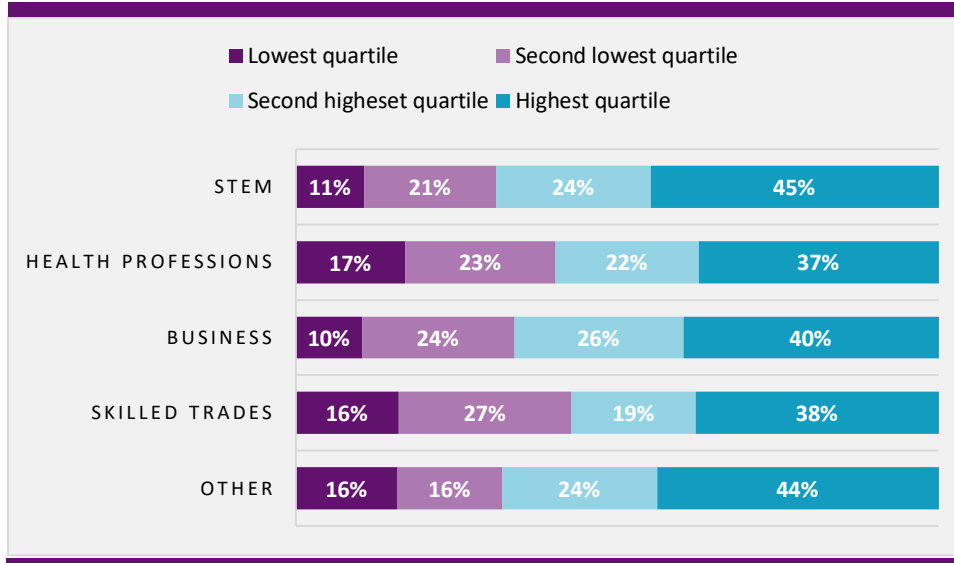


Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System. Notes: In this figure, we show the percentages of certificates in each of the four racial/ethnic categories. Certificate calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificate earners by year and field.

2.4. Certificates by Field of Study and Median Household Income

In Figure 11, we display certificate attainment by field of study and quartile of county median household income. The proportion of certificates earned by students from the highest income counties accounted for a large majority of the total certificates across fields. This highest income group has had relatively higher representation in STEM and Other fields and lower representation in health professions and skilled trades. In contrast, the percentage of certificates earned by students from the lowest income counties was higher in health professions and skilled trades and lower in STEM and business.

Figure 12. Certificates by Field of Study & Median Household Income



Source: Author calculations based on KPEDS Degree Data in the Kentucky Longitudinal Data System and the 2015 American Community Survey data. Notes: In this figure, we show the percentage of certificates in each of the categories between 2005 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by field.

In Figure 12A, we present trends in the percentage of certificates earned by students from the lowest median income quartile counties by field of study. The proportion of certificates earned by students from these quartiles counties dropped in business, health professions, skilled trades, and STEM fields, with some fluctuations between 2005 and 2018. In contrast, certificates earned in other fields fluctuated with an upward trend, ending the period slightly higher than it began at approximately 17%.

In Figure 12B, we display trends in the percentage of certificates earned by students from the highest income quartile counties. During this period, the percentage of certificates earned by students from these quartile counties climbed substantially in business and STEM. In contrast, health professions and other fields experienced a downward trend, with some fluctuations in the share of students from the highest income quartile counties. There was also a decline in skilled trades between 2005 and 2012, which preceded a moderate growth between 2012 and 2018.

Figure 13A. Certificates Earned by Students from the Lowest-income Counties by Field of Study

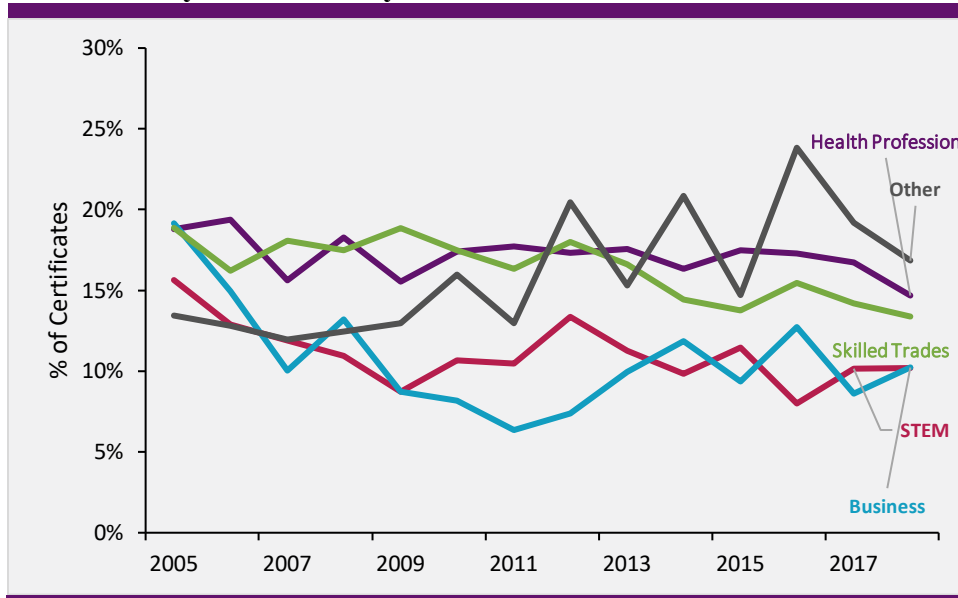
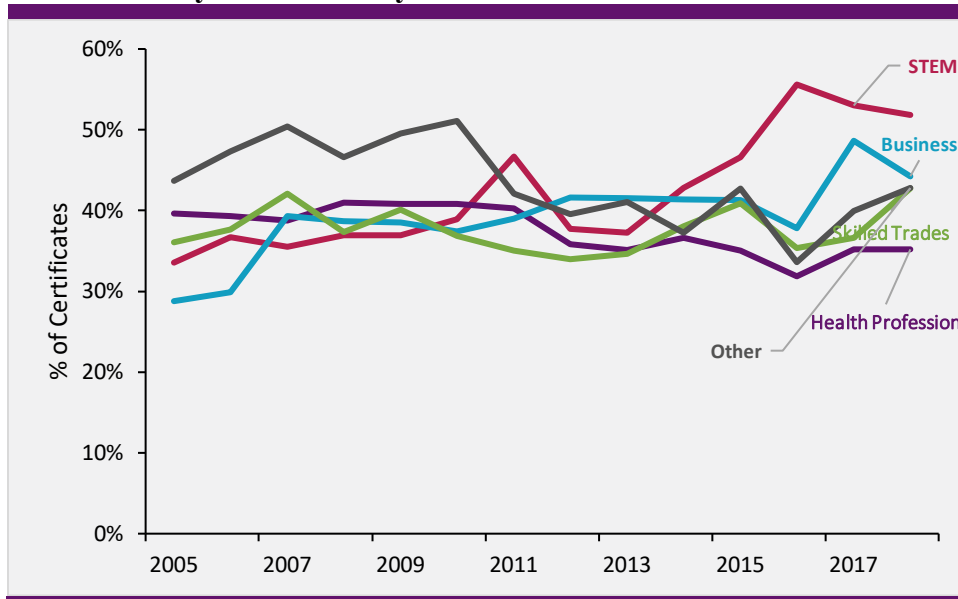


Figure 13B. Certificates Earned by Students from the Highest-income Counties by Field of Study

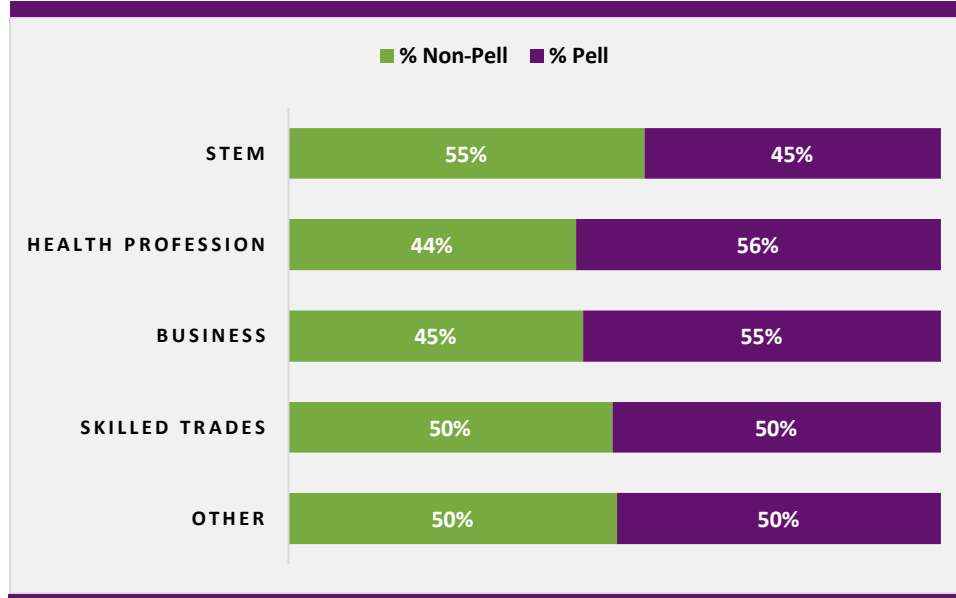


Source: Author calculations based on KPEDS Degree and MasterPerson Data in the Kentucky Longitudinal Data System.
 Notes: In this figure, we show the percentages of certificates earned by students from the lowest or highest median income quartile counties between 2005 and 2018. Certificate calculations were based on the numbers of certificate earners in each of the categories in proportion to the total number of certificate earners by field and year.

2.5. Certificates by Field of Study and Pell Grant Recipients

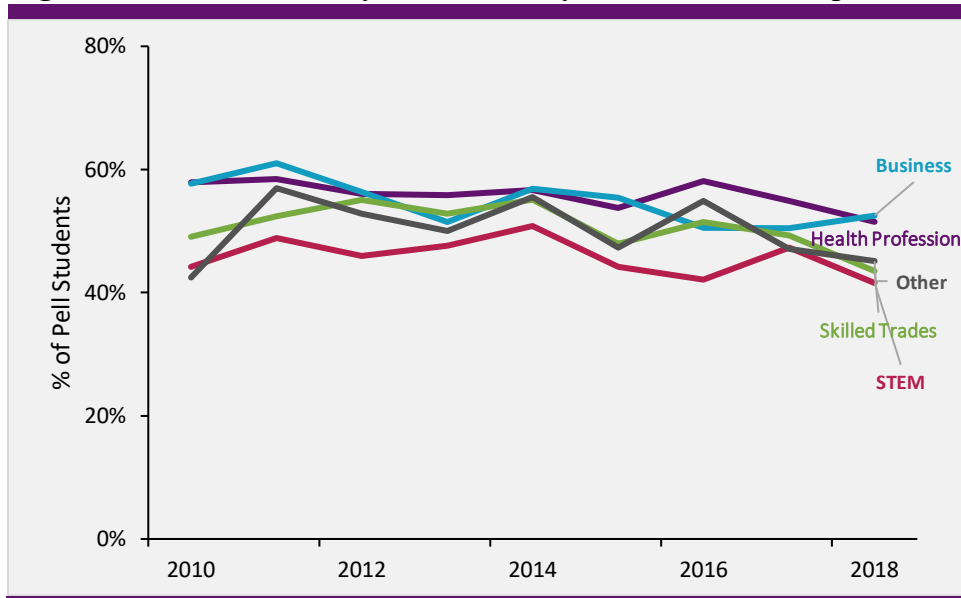
In Figure 13A, we display the proportion of certificates earned by Pell and non-Pell students across fields of study. Pell students had relatively lower representation in STEM (45%) and higher representation in health profession (56%) and business (55%). In skilled trades and “other” fields, 50% of certificates earned by Pell students. In Figure 13B, we show trends in the percentage of certificates earned by Pell recipients over time across fields of study. During the last five years, the share of certificates earned by Pell students slightly decreased over time in all the fields.

Figure 14A. Certificates by Field of Study & Pell Grant Recipients



Source: Author calculations based on KPEDS Degree and Financial Aid Data in the Kentucky Longitudinal Data System.
Notes: In this figure, we show the percentage of certificates in each of the categories between 2005 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by field.

Figure 14B. Certificates by Field of Study & Pell Grant Recipients



Source: Author calculations based on KPEDS Degree and Financial Aid Data in the Kentucky Longitudinal Data System.
Notes: In this figure, we show the percentage of certificates in each of the categories between 2005 and 2018. Calculations were based on the numbers of certificates in each of the categories in proportion to the total number of certificates by field.

5. Brief Concluding Thoughts

In this report, we used administrative data from the 2005–2006 to 2018–2019 academic years to identify and describe the characteristics of students who earned sub-baccalaureate certificates at postsecondary institutions in the state of Kentucky. In future work, we will continue this study through analyses of labor market returns on certificates.

Appendix 1: Data

To conduct this study, we used administrative Kentucky Postsecondary Education Data System (KPEDS) data provided by the Kentucky Council of Postsecondary Education to the Kentucky Center for Statistics (KYSTATS) and part of the broader Kentucky Longitudinal Data System (KLDS). The KLDS data contains individual-level records from the state agencies that oversee kindergarten through grade 12 education, postsecondary education, and the unemployment insurance system. The primary data set used in the project are KPEDS postsecondary system records that include data on postsecondary institutions attended, courses taken, credits earned, majors, and credentials completed for eight public four-year institutions, 16 community colleges with more than 70 locations, and 17 institutions affiliated with the Association of Independent Kentucky Colleges and Universities (AIKCU) between the 2005–2006 and 2018–2019 academic years.

We drew data from *KPEDS_institution*, *MasterPerson*, *KPEDS_Enrollments*, and *KPEDS_Degree*. The *KPEDS_institution* file provided information on institution name and sector. Demographics, credential attainment, and enrollment records were provided in the *MasterPerson*, *KPEDS_Enrollments*, and *KPEDS_Degree* files. Using these four data files, we constructed a student-level data file that consisted of all individuals who earned certificates through public postsecondary education programs in the Kentucky Community and Technical College System between the 2005–2006 and 2018–2019. To measure students' socioeconomic statuses, we utilized 2015 county level data from the United States Census Bureau's American Community Survey (ACS) 5-year estimates. We ranked counties from highest to lowest mean household income, then split them into quartiles.

Sample: Our analysis included all students who earned a certificate or associate degree between the 2005–2006 and 2018–2019 academic years at the KCTCS.

In this report, we did a certificate-level analysis. This means that we calculated the number and percentage of certificates earned by different groups of students and looked at how the numbers and the proportions of certificates earned by these groups of students have changed. For example, we observe that about 55% certificates earned by students who identify as male in 2006 and this proportion has increased to 62% in 2018. This certificate level analysis provides us with useful information regarding which group of students has experienced growth or decline in the certificate earning at a rate which is faster or slower compared to the other groups of students and how this trend has affected the overall composition of certificates over time. However, this certificate-level analysis does not inform us the reason why we see observed changes. For example, the percentage of certificates earned by male students could have increased because the average number of certificates earned by male students have increased in comparison to that of female students or because the actual proportion of male students have increased. This certificate-level analysis does not explain which factor drove the growth in the proportion of certificate earned by students who identify as male.

In contrast, in a student-level analysis, we count the number and percentage of students who earned certificates and how these numbers change over time. Related to the prior example, we

observe that about 39% of students who earned certificates in 2006 identify as male even though they earned 55% of certificates. A student-level analysis tells us how the characteristics of students who earned certificates and how the overall composition of certificate earners has changed over time. However, it does not tell us changes in the number or percentage of certificates earned by a certain group of students have changed over time.

Appendix 2: Field and Subfield Classification

Field Classification

Category	CIP Code	Fields
STEM	11	Computer and Information Sciences and Support Services
	14	Engineering
	15	Engineering Technologies and Engineering-Related Fields
	26	Biological and Biomedical Sciences
	41	Science Technologies/Technicians
	10.0304	Animation, Interactive Technology, Video Graphics, and Special Effects
	13.0501	Educational/Instructional Technology
	45.0702	Geographic Information Science and Cartography
	51.2205	Health/Medical Physics
Skilled trades	46	Construction Trades
	47	Mechanic and Repair Technologies/Technicians
	48	Precision Production
	12.0401	Cosmetology/Cosmetologist, General
	12.0503	Culinary Arts/Chef Training
	51.0801	Medical/Clinical Assistant
Health professions	51	Health Professions and Related Clinical Sciences
Business	52	Business, Management, Marketing, and Related Support Services

Note: This only included fields offered at community colleges. Our classification of skilled trades majors relies on a list of skilled trade occupations compiled by a Division of the New York State Department of Labor: <https://labor.ny.gov/stats/PDFs/The-Skilled-Trades-in-NYS.pdf>. We used Darolia et al.'s (2020) classification of STEM fields to identify STEM fields.