IES Institute of Education Sciences

APPENDIXES
March 2021

Regional Educational Laboratory Midwest
At American Institutes for Research

Understanding the Teacher Pipeline for Indiana's K–12 Public Schools

Appendix A. Methods

Appendix B. Supporting analyses

See https://go.usa.gov/xsY4z for the full report.

Appendix A. Methods

This appendix includes detailed information about the data used for this study as well as the methods used in the analyses.

Data sources

The study team used a combination of administrative data collected by the Indiana Commission for Higher Education and the Indiana Department of Education and publicly available data to address the study's research questions (table A1). The study team obtained the administrative data through a data-sharing agreement with Indiana's Management Performance Hub, the agency that manages Indiana's statewide longitudinal system and is charged with handling data requests and merging data from different agencies.

The Management Performance Hub relied on a unique student identifier to link all files. The Management Performance Hub scrambled all student identifiers to protect the identity of students. In addition, data on the characteristics of Indiana's colleges and universities were downloaded from the Integrated Postsecondary Education Data System, maintained by the National Center for Education Statistics (U.S. Department of Education, n.d. b), and data on the characteristics of Indiana's education programs were downloaded from the federal Title II website (U.S. Department of Education, n.d. a).

Table A1. Data used in the analysis

Data element	Years of data used in analysis	Source	Research questions addressed
Postsecondary enrollment and degree records for all students enrolled in Indiana public colleges and universities: • Report year • Enrollment status (yes or no) • Degree conferral status (yes or no) • Institution (name, level) • Program information (program name, program degree level, Classification of Instructional Programs [CIP] name and code, CIP category) • Overall financial aid receipt (yes or no) • Pell Grant status (yes or no) • 21st Century Scholarship status (yes or no)	2010/11–2017/18	Indiana Commission for Higher Education	1–7

Data element	Years of data used in analysis	Source	Research questions addressed
• Remediation status (remedial courses in English language arts, math, or both) • Credits attempted and credits earned • Grade point average • Degree institution (name, level) • Degree information (degree program name, level, CIP code and title, CIP category)			
High school student demographic, performance, and graduation data • Year of graduation • Gender • Race/ethnicity • Eligibility for the national school lunch program • English learner status • Special education status • Number of Advanced Placement exams passed • Honors diploma indicator • High school and district identification	2009/10–2017/18	Indiana Department of Education	1–7
Educator licensure information • Credential type (for example, professional, standard, substitute permit) • Licensure action (addition, conversion, original, professionalize, renewal) • Licensure type (for example, administrative, instructional, school service) • Endorsement area • Date issued • Date of expiration • Recommending institution	All educator licenses active between 2013/14 and 2017/18	Indiana Department of Education	3–6
Licensed staff employment information • Report year • Hiring district identification • School of employment • Full-time equivalent percentage • Position (subject) hired	2012/13–2018/19	Indiana Department of Education	4–6
Teacher evaluation information • Report year • Teacher evaluation summative ratings (1–4) • Reasons for not being evaluated	2012/13–2017/18	Indiana Department of Education	5,6
Information on Indiana's education programs • Percentage of racial/ethnic minority students enrolled • Number of clock hours required for student teaching	2011–18	U.S. Department of Education Title II website (U.S. Department of Education, n.d. b)	6

Data element	Years of data used in analysis	Source	Research questions addressed
Characteristics of first-year institution • Undergraduate enrollment • Racial/ethnic minority students as a percentage of undergraduate enrollment • Percentage of first-time, full-time undergraduates awarded federal, state, local, or institutional grant aid • Average amount of federal, state, local, or institutional grant aid awarded to first-time, full-time undergraduates • Percentage of first-time, full-time undergraduates awarded Pell Grants • Average amount of Pell Grant aid awarded to first-time, full-time undergraduates	2010/11–2012/13	Integrated Postsecondary Education Data System (U.S. Department of Education, n.d. a)	7
Characteristics of first-year institution • Selectivity measured by Barron's competitiveness ratings	2013	*Barron's Profiles of American Colleges* (Barron's Educational Series, 2013)	7

Source: Authors' compilation based on data noted in the table.

Data for research questions 1 and 2. For research question 1 on characteristics of undergraduate education students and research question 2 on completion of a bachelor's degree in education, the study team used data from two sources:

- *Postsecondary enrollment and degree records*. The data show annual enrollment records for all students in Indiana public colleges and universities between 2010/11 and 2017/18 and include information on institution name and level, program of enrollment, financial aid receipt, and degree information. Data were used to identify students in each cohort who pursued a bachelor's degree in education and to construct the analytic samples for the research questions.
- *High school student demographic, performance, and graduation data*. These data include students' demographic characteristics (gender and race/ethnicity), student background characteristics (whether the student received special education services, was eligible for the national school lunch program, or was an English learner student in high school), and information on students' high school academic preparation (number of Advanced Placement [AP] exams taken and passed and diploma type), including the high school from which they graduated. The data were available for students who graduated after 2009/10. Approximately one-fourth of the students in the postsecondary enrollment records could not be linked to high school graduation records, so these students are missing data on demographic and background characteristics and high school academic preparation. Students with missing data might have graduated from a private high school, from a high school outside Indiana, or before 2009/10.

Data for research question 3. For research question 3 on certification, the study team obtained teacher licensure data on all educator licenses active between 2013/14 and 2017/18 to identify completers who earned licenses after graduation and the types of licenses they earned.

Data for research questions 4–6. For research questions 4–6 on the early career outcomes of completers with a license, the study team used administrative data provided by the Indiana Department of Education for all teachers who taught in Indiana public schools during the 2012/13–2018/19 school years. The data included teacher employment information, teacher evaluation ratings, and the districts and schools in which teachers were

employed. Teacher evaluation data included summative ratings for each teacher. Teachers in Indiana receive one of four summative ratings at the end of the school year: highly effective, effective, improvement necessary, and ineffective. Additional data on the characteristics of the education programs from which students obtained their education degree were downloaded from the federal Title II website (U.S. Department of Education, n.d. a). The Title II data include information on all education programs—private, public, traditional, and alternative—in Indiana. This study used data for Indiana public and traditional education programs on the percentage of racial/ethnic minority students enrolled and the number of hours of student teaching required.

Data for research question 7. For research question 7 on factors associated with degree completion, the study team built on the data sources used for research questions 1 and 2, along with additional information on the characteristics of the first college or university in which a student enrolled from the Integrated Postsecondary Education Data System (U.S. Department of Education, n.d. b). Colleges and universities were classified by their selectivity, as rated in *Barron's Profiles of American Colleges* (Barron's Educational Series, 2013).

Data cleaning and preparation

Postsecondary enrollment and degree records. The student-level postsecondary enrollment and degree records include program category and level, financial aid, enrollment in remedial English language arts or math courses, credits attempted and earned, grade point average, and degrees conferred for students enrolled in Indiana public colleges and universities. To prepare the data for analysis, the study team completed the following tasks for students between 2010/11 and 2017/18:

- Dropped any records containing high school enrollment data, such as dual-credit courses. This included 647,208 records (18 percent of total records) from 377,687 unique students (29 percent of total unique students).
- Dropped any records containing graduate-level enrollment data (doctoral, master's, or other graduate). This included 361,759 records (10 percent of total records) from 147,645 unique students (11 percent of total unique students).
- Kept records only from students who ever enrolled in a four-year education program or completed a four-year education degree.

Duplicate records could occur when students enrolled in multiple institutions, enrolled in multiple programs within the same or different institutions, or completed multiple degrees in the same year. So that there was only a single record for each student each year, the study team resolved duplicates in the following order:

- By year, institution, and degree level, kept records for an education degree when a student completed multiple degrees of the same level, and randomly picked one degree record if students had no education degrees.
- By year and institution, kept records for the highest degree level.
- By year, generated total values for credits earned in a year from all institutions; maximum values of indicators for variables of interest, such as financial aid receipt or remediation; and mean value for cumulative grade point average from all institutions.
- By year, removed duplicates so that each student had one row for each year. The study team prioritized keeping rows from education programs or, if there were none, keeping rows from the "higher" program. For example, if there were two rows in the same year from different institutions, neither in education but one in an associate's program and one in a bachelor's program, the team kept the record from the bachelor's program.

- Generated cohort year variables, defined as the first year that a student was a first-time, degree-seeking undergraduate, and dropped any records that occurred before the cohort year (for example, records showing an entry type of "other nondegree seeking").

High school student demographic, performance, and graduation data. The data received by the study team contained student-level high school graduation and exit (dropout) records for students who graduated from Indiana public high schools after 2009/10 and enrolled in an Indiana public college or university between 2010/11 and 2017/18. To prepare the data for analysis, the study team:

- Dropped records for school years 2018/19 and after.
- Kept records from only the most recent year if a student had records in multiple years. Most students who had multiple records per year had attended more than one school in that year. However, some students had different values on some variables. To address this, the study team first generated new variables that captured the "maximum" or most "favorable" value of each variable. For example, a student might have two records with different values for the socioeconomic status variable (*s_frl*), one showing that the student was eligible for the national school lunch program (*s_frl* = 1) and the other showing that the student was not eligible (*s_frl* = 0). The study team would then create a new variable (*s_frl*_max) that would take a value of 1 (the maximum value) for both records. Similarly, for variables on performance (for example, whether the student received an honors diploma), the newly created variable would take the most favorable value recorded for the student. These newly created variables were used in the analysis in place of the original variables.
- Removed the remaining 938 duplicate records (0.2 percent of total records) by randomly picking one record for each student.

Educator licensure data. The data received by the study team contained individual-level certification records, including credential type (for example, Professional Educator License and Substitute Permit) and preparation (for example, instructional or administrative), for all active licenses between 2013/14 and 2017/18. Duplicates existed when teachers were active in multiple years. To prepare the data for analysis, the study team used the following steps:

- Dropped all records for teachers who earned a license before July 1, 2011.
- Generated new variables to code credential types (standard, substitute, and other) and preparation categories (instructional, administrative, school services, and other).
- Kept only records in which the licensure action was original and dropped records marking actions such as renewal, addition, conversion, or professionalize.
- Created four licensure datasets by preparation category with one row per teacher-year. Because teachers could receive multiple licenses in a year, the study team generated indicators by credential type and preparation category and generated the maximum value of those indicators for each teacher within a year. For example, in the dataset for instructional licenses, a teacher might have received an instructional emergency permit before receiving a standard instructional license in the same year. The study team generated separate variables indicating whether a teacher earned a standard, substitute, or other instructional license (*instruct_type_standard, instruct_type_sub,* and *instruct_type_other*), taking on a value of 1 if yes and 0 if no. In the earlier example, the teacher would have a value of 1 for *instruct_type_standard* in the row in which the teacher earned the standard instructional license (and 0 for the other two variables) and a value of 1 for *instruct_type_other* in the row in which the teacher received the emergency permit (and 0 for the other two variables). The study team then generated maximum values for these variables by teacher and year to put these data on the same row, so the example teacher would ultimately have a single row for the year with *instruct_type_standard* = 1, *instruct_type_other* = 1, and *instruct_type_sub* = 0, showing that

the teacher earned a standard instructional license and another instructional license in the same year but did not receive a substitute permit.

- Once relevant certification information by teacher-year was preserved, the study team kept only the first record for each teacher in a year.

Employment data for licensed educators. The employment data provided to the study team included data for licensed educators employed in each Indiana school for each period of a school year between 2012/13 and 2018/19. Most educators (95 percent) had two records each year, one for each period. Three educators had data for a third period which most likely were data errors. The study team first split the file into separate files by year and used the following steps to prepare the annual file for analysis:

- Dropped the three records for period 3 and dropped 132 records (0.01 percent of total records) with missing data on the percentage of time employed.
- For teachers who were employed in multiple districts within the same period and year, calculated the total percentage of time employed and attached that data to the file.
- Added a flag indicating that the teacher was employed in multiple districts within a period.
- For teachers employed in multiple districts within the same period and year, kept the record with the highest percentage of employment.
- Reshaped the data into wide format so that each teacher had only one row.
- Generated new variables denoting the number of periods a teacher was employed in each year.
- Merged annual files to create a longitudinal file that tracked teachers for 2012/13–2018/19.

Teacher evaluation data. The teacher evaluation data provided to the study team included the evaluation results from each evaluation a teacher received between 2012/13 and 2017/18. About three-fourths of the teachers had two evaluation records each year. The rest had results for only one evaluation each year. The study team first split the file into separate files by year and then completed the following steps to prepare each file for analysis:

- Dropped 35,114 records (9 percent of total records) with missing evaluation results. Those teachers were shown as not being evaluated in that year.
- Generated variables denoting the number of evaluations each teacher received each year from each district and calculated the average evaluation result.
- For teachers employed in multiple districts within the same year, kept the record with the highest (average) evaluation result.
- Reshaped the data into wide format so that each teacher had only one row.
- Merged annual files to create a longitudinal file that tracked teachers for 2012/13–2017/18.

Data on the characteristics of colleges and universities. The data downloaded from the Integrated Postsecondary Education Data System were in wide format, with one row for each institution and a column for each characteristic in each year (2011–13). The study team reshaped the data into long format, with three rows for each institution (one row for each year). The data were then merged with a spreadsheet compiled by the study team that contained information on the 2013 Barron's admissions competitiveness rating for Indiana public colleges and universities.

Data on education program characteristics. According to the Title II website, the Title II report for each year includes the data that states reported to the U.S. Department of Education in October of each year. For many data elements, such as enrollment, states reported data for the previous academic year. The 2018 report therefore

contained data for the 2016/17 academic year on those elements. For other data elements, such as admission requirements, states reported on the most current information available. The study team used data from the 2011–18 reports and structured the file into a long format (each education program had one row for each year).

File merge. After cleaning files from each source, the study team merged different individual files to construct analysis files to address each research question.

- For the analysis file for research questions 1 and 2, the study team merged the postsecondary enrollment and degree file for each cohort with the high school data by student unique identifier. The resulting files are referred to as files A1–A8, one for each cohort.
- For the analysis file for research question 3, the study team merged files A1–A3 (the 2011–13 cohort files) with the cleaned certification files by student unique identifier, resulting in files B1–B3.
- For the analysis file for research questions 4–6, the study team first reduced files B1–B3 to include the degree records only for students who received a bachelor's degree in each cohort. The study team then merged the reduced files with the Title II data by education program name and report year and with the longitudinal teacher employment and evaluation data by unique identifier, resulting in files C1–C3.
- For the analysis file for research question 7, the study team first combined files A1–A3 into one file and then merged the file with data on the characteristics of colleges and universities, resulting in file D.

Analysis method for research question 1

For research question 1 the study team created a variable indicating the first year that first-time, degree-seeking undergraduates in files A1–A8 enrolled in an education program (*ed_yearmin*), a variable indicating whether a student was ever enrolled in a four-year program (*fouryear_ever*), and a variable indicating the number of years after college enrollment when a student first enrolled in an education program (*entry_year*). The study team then kept only the first row for each student. The study team ran frequency statistics on the *entry_year* variable to obtain counts and frequencies of students based on the timing of their entry into an education program. To summarize each student's demographic characteristics and levels of academic preparation, the study team ran frequency statistics on student characteristics, including gender, race/ethnicity, eligibility for the national school lunch program, English learner status, special education status, and academic preparation, including the number of AP exams passed and whether the student earned an honors diploma.

Analysis method for research questions 2 and 3

For research questions 2 and 3 the study team first created college degree completion outcome and instructional license outcome variables for each student in files B1–B3. The study team then created a variable taking on the maximum values of these outcome variables by student and kept only the first record for each student so that each student had only one row. Finally, the study team created a variable indicating whether a completer earned a standard administrative, instructional, or school services certification. The study team then ran frequency statistics on the college degree completion outcome and instructional license outcome variables to obtain the counts and percentages of undergraduate education students who completed programs and program completers who earned an initial license. To examine the characteristics of students based on their college degree completion and instructional license outcomes, the study team conducted cross-tabulations of those outcome variables with the demographic and academic preparation variables described for research question 1.

Analysis method for research questions 3–6

For research question 3 the study team first created variables indicating whether each completer in files C1–C3 was employed for at least one period in an Indiana public school in each year. The study team then created a variable indicating whether each completer was ever employed in an Indiana public school during 2012/13–

2018/19 (*ever_ce*) and identified the first year that each completer was employed. Based on this information, the study team created additional variables that denoted whether each completer was employed in subsequent years (for example, *ce_y*2, *ce_y*3) and the evaluation rating in each year of teaching (for example, *er_y*1, *er_y*2). The study team ran frequency statistics on those variables to obtain the counts and percentages of completers with a license who were ever employed and remained for a second, third, and fourth year of teaching as well as the distribution of evaluation ratings for teachers in their first, second, and third years of teaching.

To examine whether the employment, retention, and evaluation outcomes for completers with an instructional license varied by the percentage of racial/ethnic minority students enrolled and the average hours required for student teaching at the education program where a student graduated, the study team first classified education programs into three groups (low, medium, high) based on cut values that corresponded to the 25th and 75th percentile values of each variable averaged across the last five years of Title II data (2014–18). The three groups are therefore those in the lowest 25 percent, the middle 50 percent, and the highest 25 percent of each variable. The cut values were 4.4 percent and 15.7 percent for the percentage of racial/ethnic minority students enrolled and 490 and 640 for the hours required for student teaching. The study team then conducted cross-tabulations of each outcome (for example, ever employed, remained for a second year of teaching, evaluation ratings) with each of the newly created categorical variables to obtain the counts and percentages of completers in each category that attained those outcomes.

Because the analyses for research questions 1–6 included all undergraduate education students in the target cohorts (that is, all students in the population of interest), the study team did not use statistical tests when the analysis involved comparisons of outcomes or characteristics between different subgroups. Group differences that were 5 percentage points or greater were considered meaningful and are presented in the main report.

Analysis method for research question 7

For research question 7 the study team used discrete-time survival analysis to analyze factors associated with completion of a bachelor's degree in education.

Survival analysis. Survival analysis (also known as hazard models or event history analysis) is widely used in economics, biology, health, and other fields to analyze factors associated with the occurrence and timing of events, such as exiting poverty, finding a job, recovering from a disease, or dying. In this study survival models were used to examine whether and when students completed the education program and how the time to complete the program and the probability of doing so were related to various individual and institutional factors.

The use of survival analysis to investigate the timing of completion enables two limitations to be addressed that are typically associated with longitudinal studies of graduation outcomes: time-varying variables and censored cases (Singer & Willett, 1993, 2003).

Studies of college student retention and graduation using longitudinal descriptive analysis have had difficulty accommodating variables that change across time, such as grade point average, financial aid amount, and number of credits. Some researchers have taken an average across all time points and imputed that average as the measure for time-varying variables. This approach is problematic because it masks the effects of fluctuations in grades, financial aid, and credit histories across time. Allowing for the inclusion of time-varying predictors as well as time-invariant predictors is a particularly valuable benefit of applying survival analysis techniques. This study included four variables as time-varying variables: whether the student received any financial aid, received a 21st Century Scholarship, received a Pell Grant, or was enrolled in remedial English language arts or math courses each year.

Subjects who do not experience the event of interest (for example, graduation) by the end of the study period but remain in the sample are described as censored. Because it is impossible to compute time to event for censored subjects, some researchers have either excluded censored subjects or imputed the study duration as the time to

event for those subjects. These approaches result in biased parameter estimates. Survival analysis accounts for students whose outcomes could not be tracked up to the end of the study period and students whose outcomes were unknown beyond that (censored students). In this study censored students included students in the target cohorts who did not complete the program by 2017/18 and students who dropped out before completion.

Outcomes. The study examined two completion outcomes for research question 7: a bachelor's degree in any field and a bachelor's degree in education. Each outcome is a dichotomous variable that takes a value of 1 when the student completed the degree in a particular year and 0 if the student did not complete the degree in that year. Time was measured in discrete intervals—academic years (hence discrete-time survival analysis). Each year some students completed the program, and some did not. According to Singer and Willett (1993), the fundamental quantity representing the risk of event occurrence in each time period was the hazard. The hazard (h_t) is a conditional probability of the event occurring in the time interval *t,* provided the event has not occurred before *t:*

$$h_t = P(T = t|T \geq t).$$

In this study, hazard probabilities were computed by dividing the number of students who completed the degree at the end of a particular year by the number of students enrolled at the beginning of that year. Because the hazard represents the conditional probability that a student will complete the degree during the current year given that he or she did not complete the degree in a prior year, the hazard function captures the "risk" of completing the degree across time.

Sample. The initial sample in file D included 47,600 records for 11,080 students in the 2010/11, 2011/12, and 2012/13 cohorts who ever enrolled in a four-year education program or received a bachelor's degree or higher in education. The study team used multiple steps to exclude some records from the analysis for research question 7 (table A2):

- Removed five records for one student who completed a postbaccalaureate degree (the undergraduate program enrollment record was linked with a postbaccalaureate degree record).
- Removed 741 records that were for years after a student completed a bachelor's degree. Survival analysis would automatically remove those records from the analysis.
- Removed 22 records for students who had missing data on postsecondary program enrollment (for example, program enrolled, financial aid receipt, or grade point average).
- Removed 10 records (two unique students) because of missing data on the characteristics of the first-year college or university. Both students were first enrolled at Purdue University-Polytechnic Statewide and later transferred to another institution. Data on Purdue University-Polytechnic Statewide were not available from the Integrated Postsecondary Education Record System.
- Removed 118 records for 23 students who completed a degree in education but had no enrollment records in an education program.
- Removed 15 students from the 2010/11 cohort who were identified as first-time students in 2010/11 but also as completing their bachelor's degree in 2010/11. These students were removed from the analysis because completing a bachelor's degree in the first year of college is highly unlikely. The study team could not verify that those students truly started in the 2010/11 school year because postsecondary enrollment data from prior years were not provided.
- Finally, because all students had an outcome of zero in their first year (that is, time [year 1] perfectly predicts the outcome) once the 15 students in the previous step were removed, the 11,039 first-year records were not used in the regression models.

- The final analysis sample for the outcome of completing a bachelor's degree in any field included 35,638 records for 11,039 unique students. For the analysis of the outcome of completing a bachelor's degree in education, the study team further removed 9,226 records for 2,477 students who completed a bachelor's degree in a field other than education, with 26,412 records for 8,562 students remaining in the sample.

Table A2. Constructing the analysis sample for research question 7

Sample and records included	Number of records	Number of students
Initial sample	47,600	11,080
Number of records and students excluded		
Students who received a postbaccalaureate degree only	5	1
Records for years after a student completed a bachelor's degree	741	0
Records with missing program information	22	0
Records with missing data on characteristics of first-year institution	10	2
Records for students who never enrolled in an education program but received a bachelor's degree in education	118	23
Records for students who received a bachelor's degree in their first year (all in the 2010/11 cohort)	15	15
First-year records omitted from regressions	11,039	0
Final analysis sample for analysis of completing a bachelor's degree	***35,638***	***11,039***
Records for students who completed a bachelor's degree in a field other than education	9,226	2,477
Final analysis sample for analysis of completing a bachelor's degree in education	***26,412***	***8,562***

Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education.

Model specification. The study team used regression models to examine the relationship between each outcome and various individual and institutional characteristics. The complementary log-log ("cloglog") link transformed the hazard probability into a continuous scale. The hazard of the student graduating from college is a cloglog function of two sets of predictors. The following equation denotes the general form of the models:

$$\ln(-\ln(1-h(t_{ij})) = \sum \beta_k Time + \sum \beta_m (Student\ Characteristics) + \sum \beta_n (Institutional\ Characteristics)$$

where $h(t_{ij})$ is the conditional probability that student *i* will complete the degree during year *j* given that the student did not graduate in any previous year, β_k represents the coefficients for a set of dummy variables that represent each time interval (academic year), β_m represents the associations between each student characteristic and the outcome, and β_n represents the associations between the outcome and characteristics of the first college or university in which a student enrolled (for example, undergraduate enrollment size and college selectivity).

Student characteristics included demographic characteristics (gender and race/ethnicity), background characteristics (whether the student received special education services, was eligible for the national school lunch program, or was an English learner student in high school), and high school academic preparation (number of AP exams passed and whether the student received an honors diploma), and college experience variables (for example, time of entry into an education program and financial aid receipt).

College experience variables included both time-independent variables (for example, time of entry into an education program) and time-varying variables (for example, financial aid receipt, grade point average, and credits earned in each year). In addition, to examine the relationship between students' first-year experience and the outcome, a set of variables representing a student's first-year experience (for example, grade point average and financial aid receipt in the first year) were included in the model as time-independent variables (that is, a student's

first-year experiences were attached to all records for that student). For a list of all student and institution characteristics included in the final regression models, see table B8 in appendix B.

The study team started with a null model that included no predictors other than the time indicators. The team then added the following sets of variables to the model: cohort, time of entry into an education program, student's demographic and background characteristics and high school academic preparation, student's first-year college experience, time-varying college experiences, the characteristics of the first college in which the student was enrolled, and fixed effects for the first-year college or university.

The study team used likelihood-ratio tests combined with the Akaike information criterion and Bayesian information criterion to assess the fit of different models and decide on which variables to include or exclude from the final model. The study team initially used a two-level model, with students nested within their first-year college or university. However, institution-level variance was reduced to nearly zero after institution-level characteristics were added to the model. The study team therefore presented results from the single-level models for each outcome.

Missing data on covariates. Of the 35,638 observations in the analysis sample, 8,663 (2,599 unique students, or 24 percent) had missing data on all high school variables, including student demographic and background characteristics and high school academic preparation; 1,529 observations (379 unique students, or 4 percent) had missing data on first-year grade point average. The study team used multiple imputation to create and analyze 10 multiply imputed datasets. The team used the suite of multiple imputation (mi) commands in STATA to impute the data and also to explore any missingness patterns. Incomplete variables were imputed under fully conditional specification, with the imputation models including the same variables as were in the final analytic models. The parameters were estimated in each imputed dataset separately and combined using Rubin's rules. For comparison, the analysis was also performed on the subset of complete cases and yielded similar results.

Interpretation of regression results. Regression coefficients (β) indicate the linear relationship between each predictor and the transformed outcome. The standard interpretation of a coefficient in a regression analysis is that a 1 unit change in the independent variable results in the respective regression coefficient change in the expected value of the outcome while all the other predictors are held constant. When the outcome is transformed using a cloglog link function, such interpretation becomes less intuitive and could be difficult to understand. However, exponentiated coefficients [$\exp(\beta)$] from a regression using a cloglog link function can be interpreted as hazard ratios. Hazard ratios greater than 1 indicate a positive statistical relationship, and ratios less than 1 indicate a negative relationship. For a categorical predictor (for example, gender, with male as the reference group), a hazard ratio of 1.15 indicates that the probability of completing the program for female students is 15 percent higher than that for male students. For a continuous predictor (for example, grade point average), the hazard ratio is a multiplier that shows how the probability of completing the program changes for a 1 unit increase in the value of the predicator. For example, a hazard ratio of 1.08 for grade point average corresponds to being 8 percent more likely to complete the program with a 1 unit increase in grade point average (for example, grade point average increases from 2.0 to 3.0). If the hazard ratio is 0.94, then the probability of completing the program is 6 percent lower with a 1 unit increase in grade point average.

Regression coefficients that were statistically significant at the .05 level were considered meaningful, and those results are presented in the main report. Even though the initial sample included all undergraduate education students in the 2010/11–12/13 cohorts, the study team believes that statistical tests (and *p*-values) can still be used as a guide for deciding whether an observed relationship was meaningful and potentially important for practice, for several reasons:

- The analysis excluded some individuals and records from the regression analysis (see table A2).
- The analysis used longitudinal cohort data, but not all students had data for all years; students in the analysis sample had one to eight years of data.
- The study used multiple imputation to handle missing data. The regression estimates were pooled across multiply imputed datasets. A Wald test was used to obtain a *p*-value for significance of the pooled estimates.

For ease in interpreting the regression results, the study team first calculated the average adjusted hazard probability of program completion in each year for different levels of a predictor of interest (for example, probability of completion for female students versus male students). Based on the average adjusted probabilities, the study team then calculated the median lifetime for student subgroups indicated by a statistically significant categorical predictor (for example, estimated median time to program completion for female students versus male students) and for different values of a statistically significant continuous predictor (for example, estimated median time for students with a first-year grade point average of 2.5 versus students with a grade point average of 3.5). Median lifetime is the estimated time at which half of the sample completed the program and half did not.

Median lifetime was calculated using linear interpolation between years. Let $\hat{h}$ represent the estimated hazard probability of completing the program at time *j*, and let

$$\hat{s_j} = \prod_{t=1}^{j} (1 - \hat{h_t})$$

be the estimated probability of not having completed (not having survived) beyond time *j*. Then the estimated median time to program completion is given by

$$Estimated\ Median\ = m + \left[\frac{\hat{s}(t_m) - 0.5}{\hat{s}(t_m) - \hat{s}(t_{m+1})}\right]((m+1) - m)$$

where *m* represents the last time interval in which the survival function is greater than 0.5, $\hat{s}(t_m)$ equals the survival function in that particular time interval, and $\hat{s}(t_{m+1})$ equals the survival function for the next time interval (Miller, 1981; Singer & Willett, 2003).

The complete regression results are in table B8 in appendix B. The estimated median time to completion for subgroups is in table B9 in appendix B.

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Appendix B. Supporting analyses

This appendix contains additional results for research questions 1–6 and detailed results for research question 7.

Table B1 presents the demographic and background characteristics as well as high school academic preparation of undergraduate education students by cohort for the 2010/11–2017/18 cohorts.

Tables B2 and B3 summarize the demographic characteristics, high school academic preparation, and college experiences for five groups of students in the 2010/11–2012/13 cohorts: students who pursued a bachelor's degree in any field (including education), students who pursued a bachelor's degree in education (entrants), students who completed a bachelor's degree in education (completers), completers who earned an initial instructional license, and completers with a license who entered teaching in an Indiana public school.

Table B4 provides the evaluation results for all teachers with evaluation data in Indiana public schools between 2013/14 and 2017/18 (the last five years with data available). This information provides context for understanding the evaluation results presented in the main report for completers who taught in Indiana public schools.

Table B5 provides the percentage of completers with a license who entered teaching in Indiana schools and their retention rates in subsequent years by the characteristics of the education program they attended.

Table B6 provides the evaluation results of completers with a license in each of the first three years of teaching in Indiana public schools by the characteristics of the education programs they attended.

Table B7 presents the number of students who completed a bachelor's degree in any field and the number who completed a bachelor's degree in education in each year after initial enrollment, along with the hazard probability of completing the degree in each year. This is often referred to as a life table in survival analysis.

Table B8 provides detailed regression results from the analyses for research question 7. For each outcome, results from three models are presented: the null model with time dummy variables but no other predictors, the model without student demographic and background characteristics and high school academic preparation, and the full model with all predictors of interest.

Table B9 presents the estimated median time to completion for a bachelor's degree or a bachelor's degree in education for different subgroups of a categorical predictor or at representative values of a continuous predictor.

Table B1. Characteristics of students who pursued a bachelor's degree in education, 2010/11–2017/18 cohorts

Characteristic	2010/11 cohort	2011/12 cohort	2012/13 cohort	2013/14 cohort	2014/15 cohort	2015/16 cohort	2016/17 cohort	2017/18 cohort
Time of student entry into education program								
Year 1								
Number entering	3,136	2,344	1,984	1,996	2,064	2,009	1,964	1,975
Percent entering	71.3	67.0	62.2	65.1	66.3	71.4	79.2	100.0
Year 2								
Number entering	577	599	680	616	639	563	517	na
Percent entering	13.1	17.1	21.3	20.1	20.5	20.0	20.8	na
Year 3								
Number entering	344	330	294	305	306	240	na	na
Percent entering	7.8	9.4	9.2	9.9	9.8	8.5	na	na
Year 4 or later								
Number entering	339	223	230	149	106	na	na	na
Percent entering	7.7	6.4	7.2	4.9	3.4	na	na	na

Characteristic	2010/11 cohort	2011/12 cohort	2012/13 cohort	2013/14 cohort	2014/15 cohort	2015/16 cohort	2016/17 cohort	2017/18 cohort
Demographic and background characteristic and high school academic preparation (percent of students)								
Female students	71.5	73.3	74.0	78.4	77.2	79.4	78.8	78.9
Black students	5.1	6.2	5.5	5.0	4.8	4.2	5.0	5.3
Hispanic students	2.6	4.0	3.0	4.8	4.3	4.5	4.7	5.5
White students	89.6	85.9	88.0	87.1	86.8	86.9	86.7	84.8
Students of other races/ethnicities	2.7	3.9	3.6	3.1	4.1	4.4	3.6	4.4
Students eligible for the national school lunch program	16.7	20.5	20.4	24.1	24.7	22.1	24.7	24.1
Students in special education	3.6	3.5	3.2	4.0	3.9	4.1	3.7	4.0
English learner students	0.2	0.3	0.3	0.5	0.4	0.3	0.0	0.2
Students who passed at least one Advanced Placement exam	12.2	15.9	19.7	20.4	20.9	21.1	16.4	23.5
Students with an honors diploma	44.9	47.7	52.0	56.6	55.9	58.3	59.4	57.7
Total number of students in cohort	**4,396**	**3,496**	**3,188**	**3,066**	**3,115**	**2,812**	**2,481**	**1,975**
Students with demographic and high school data								
Number	2,930	2,745	2,508	2,487	2,539	2,356	2,049	1,640
Percent of cohort	66.7	78.5	78.7	81.1	81.5	83.8	82.6	83.0

na is not applicable because it is outside the study period.
Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education.

Table B2. Demographic and background characteristics and high school academic preparation of students in the 2010/11–2012/13 cohorts, by postsecondary outcome

Characteristic	Students who pursued a bachelor's degree in any field	Students who pursued a bachelor's degree in education (entrants)	Students who completed a bachelor's degree in education (completers)	Completers who earned an initial instructional license	Completers with a license who entered teaching in Indiana
Female students	54.1	72.8	78.9	78.2	76.2
Black students	8.1	5.6	3.5	1.7	1.7
Hispanic students	4.4	3.2	2.2	2.1	2.0
White students	82.3	87.9	91.8	93.9	94.1
Students of other races/ethnicities	5.1	3.3	2.5	2.3	2.2
Students eligible for the national school lunch program	21.8	19.1	13.9	11.5	10.9
Students in special education	3.2	3.4	1.8	1.9	0.1
English learner students	0.7	0.3	0.1	0.1	1.7
Students who passed at least one Advanced Placement exam	21.7	15.7	22.8	25.2	24.2
Students with an honors diploma	49.1	48.0	64.4	64.7	64.6
Total number of students	117,944	11,080	4,533	2,503	1,719
Students with demographic and high school data					
Number	72,863	8,183	3,337	1,847	1,395
Percent of total	61.8	73.8	73.6	73.8	81.2

Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education.

Table B3. Postsecondary experience of students in the 2010/11–2012/13 cohorts and college admissions competitiveness rating, by postsecondary outcomes

College experience and college admissions competitiveness rating	Students who pursued a bachelor's degree in any field	Students who pursued a bachelor's degree in education (entrants)	Students who completed a bachelor's degree in education (completers)	Completers who earned an initial instructional license	Completers with a license who entered teaching in Indiana
Percent of students receiving any financial aid					
Year 1	75.6	82.2	82.0	82.9	84.4
Year 2	73.1	79.2	79.1	79.2	80.2
Year 3	75.7	80.6	83.4	83.3	83.6
Year 4	77.1	82.6	86.9	87.1	86.8
Percent of students receiving a Pell Grant					
Year 1	34.9	36.7	29.7	26.5	28.6
Year 2	32.7	35.0	28.8	25.0	27.1
Year 3	30.8	33.7	28.8	25.1	27.7
Year 4	29.3	32.1	28.1	24.3	26.6
Percent of students receiving 21st Century Scholarship					
Year 1	8.1	9.4	8.4	6.8	7.6
Year 2	8.0	9.6	8.7	6.8	7.4
Year 3	7.6	9.4	8.8	6.9	7.5
Year 4	7.4	9.2	8.8	6.9	7.5
Percent of students enrolling in a remedial English language arts or math course					
Year 1	14.3	14.1	9.9	8.6	9.4
Year 2	5.5	4.7	1.7	1.5	1.9
Year 3	2.4	2.1	0.8	0.4	0.6
Year 4	1.0	0.8	0.3	0.2	0.2
Average grade point average					
Year 1	2.7	2.8	3.2	3.3	3.2
Year 2	2.9	2.9	3.3	3.3	3.3
Year 3	3.0	3.0	3.3	3.4	3.4
Year 4	3.0	3.1	3.4	3.5	3.4
Average number of credits earned					
Year 1	22.7	24.2	28.3	28.8	28.5
Year 2	24.8	25.9	30.6	31.2	30.9
Year 3	25.4	27.1	31.8	32.4	32.0
Year 4	25.0	26.3	29.7	30.2	30.1
Barron's admissions competitiveness rating of first-year college or university attended (percent)					
Highly competitive or very competitive	35.9	28.5	39.3	37.6	33.5
Competitive or less competitive	52.2	59.1	49.3	52.7	55.9
Two-year (unrated)	11.9	12.4	11.3	9.8	10.6
Total number of students	117,944	11,080	4,533	2,503	1,719

Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education and Barron's Educational Series, Inc. (2013).

Table B4. Evaluation ratings for all teachers in Indiana public schools, 2013/14–2017/18

School year	Total number of teachers with evaluation ratings	Teacher evaluation rating (percent of total)				
		Ineffective	Improvement necessary	Effective	Highly effective	Effective + highly effective
2013/14	41,392	0.4	2.0	58.8	38.8	97.6
2014/15	45,378	0.5	1.9	51.3	46.4	97.7
2015/16	47,530	0.3	1.7	53.2	44.8	97.9
2016/17	49,087	0.4	1.8	50.6	47.1	97.8
2017/18	49,761	0.4	1.9	54.2	43.6	97.7

Source: Authors' analysis of data provided by the Indiana Department of Education.

Table B5. Completers with a license in the 2010/11–2012/13 cohorts who entered teaching in an Indiana public school and remained teaching for a second, third, and fourth year, by percentage of racial/ethnic minority enrollment and student teaching hours required in education program

Characteristic of education program	Ever taught in Indiana public school		Remained teaching for a second year		Remained teaching for a third year		Remained teaching for a fourth year	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Racial/ethnic minority enrollment								
Low (4.3 percent or lower)	89	69.7	57	93.0	34	94.1	16	87.5
Medium (4.4–15.5 percent)	2,044	67.1	1,303	90.9	1,064	83.4	585	72.8
High (15.6 percent or higher)	329	76.3	240	91.7	196	84.7	125	78.4
Student teaching hours required								
Low (490 or fewer)	471	73.0	329	90.6	297	84.2	205	73.2
Medium (491–639)	1,146	63.4	691	90.2	538	82.2	276	72.8
High (640 or more)	845	72.7	580	92.4	459	85.6	245	76.3

Note: Education programs were classified into three groups: those in the lowest 25 percent (low), middle 50 percent (medium), or highest 25 percent (high) of programs in each characteristic among all public education programs in Indiana (averaged across 2014–2018).
Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education and publicly available data from the U.S. Department of Education (n.d. a, n.d. b).

Table B6. Evaluation ratings for completers in the 2010/11–2012/13 cohorts who entered teaching in an Indiana public school, by year of teaching and characteristics of education program attended

Year of teaching and characteristic of education program	Number of teachers with evaluation results	Evaluation rating (percent of total)				
		Ineffective	Improvement necessary	Effective	Highly effective	Effective + highly effective
First year of teaching						
Racial/ethnic minority enrollment						
Low (4.3 percent or lower)	42	2.4	2.4	83.3	11.9	95.2
Medium (4.4–15.5 percent)	864	0.6	4.1	83.4	11.9	95.4
High (15.6 percent or higher)	149	2.0	5.4	78.5	14.1	92.6
Student teaching hours required						
Low (490 or fewer hours)	221	1.4	4.5	77.4	16.7	94.1
Medium (491–639 hours)	440	0.5	3.2	83.9	12.5	96.4
High (640 or more hours)	394	1.0	5.1	84.5	9.4	93.9
Second year of teaching						
Racial/ethnic minority enrollment						
Low (4.3 percent or lower)	26	0.0	0.0	80.8	19.2	100.0
Med (4.4–15.5 percent)	708	0.4	3.2	70.8	25.6	96.3
High (15.6 percent or higher)	130	0.0	3.8	73.1	23.1	96.2
Student teaching hours required						
Low (490 or fewer hours)	185	0.0	2.2	68.6	29.2	97.8
Medium (491–639 hours)	359	0.3	3.9	70.2	25.6	95.8
High (640 or more hours)	320	0.6	3.1	74.4	21.9	96.3
Third year of teaching						
Racial/ethnic minority enrollment						
Low (4.3 percent or lower)	13	0.0	7.7	69.2	23.1	92.3
Medium (4.4–15.5 percent)	348	0.3	2.3	62.9	34.5	97.4
High (15.6 percent or higher)	76	0.0	3.9	69.7	26.3	96.1
Student teaching hours required						
Low (490 or fewer hours)	121	0.0	2.5	62.8	34.7	97.5
Medium (491–639 hours)	168	0.6	2.4	60.7	36.3	97.0
High (640 or more hours)	148	0.0	3.4	69.6	27.0	96.6

Note: Education programs were classified into three groups: those in the lowest 25 percent (low), middle 50 percent (medium), or highest 25 percent (high) of programs in each characteristic among all public education programs in Indiana (averaged across 2014–2018). None of the differences in the evaluation results by each education program characteristic were statistically significant.

Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education and publicly available data from the U.S. Department of Education (n.d. a, n.d. b).

Table B7. The hazard probability of completing a bachelor's degree in any field (including education) and of completing a bachelor's degree in education, by year of college, 2010/11–2017/18

	Completing a bachelor's degree in any field				Completing a bachelor's degree in education			
Year of college/ university	Number enrolled	Number completed the degree	Number exited	Hazard probability	Number enrolled	Number completed the degree	Number exited	Hazard probability
Year 1	11,039	0[a]	710	0.000	8,562[b]	0[a]	710	0.000
Year 2	10,329	37	626	0.004	7,852	28	626	0.004
Year 3	9,666	164	573	0.017	7,198	110	573	0.015
Year 4	8,929	3,351	538	0.375	6,515	2,234	538	0.343
Year 5	5,040	2,237	507	0.444	3,743	1,430	507	0.382
Year 6	2,296	808	562	0.352	1,806	478	562	0.265
Year 7	926	268	333	0.289	766	148	333	0.193
Year 8	325	102	223	0.314	285	62	223	0.218

a. Fifteen students who received a bachelor's degree in their first year (including 13 whose degree was in education) were excluded from this analysis. All these students were in the 2010/11 cohort.
b. This excludes the 2,477 students who received a bachelor's degree in a field other than education.
Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education.

Table B8. Results from selected regression models predicting completing a bachelor's degree in any field and completing a degree in education, 2010/11–2017/18

	Completing bachelor's degree in any field			Completing bachelor's degree in education		
Predictor	Null model[a]	Model without missing high school variables[b]	Full model	Null model[a]	Model without missing high school variables[b]	Full model
Year enrolled (year 4 is the reference category)						
Year 2	0.007***	0.006***	0.006***	0.008***	0.007***	0.007***
Year 3	0.036***	0.029***	0.029***	0.036***	0.028***	0.028***
Year 5	1.293***	2.119***	2.137***	1.191***	2.240***	2.275***
Year 6	0.971	2.325***	2.359***	0.771***	2.253***	2.288***
Year 7	0.743***	2.178***	2.234***	0.520***	1.848***	1.906***
Year 8	0.752**	2.419***	2.506***	0.539***	2.038***	2.112***
Cohort (2010/11 cohort is the reference category)						
2011/12 cohort		1.002	1.015		0.984	0.997
2012/13 cohort		1.108*	1.111*		1.087	1.081
Year enrolled (year 1 is the reference category)						
Year 2		0.954	0.954		1.029	1.033
Year 3		0.728***	0.726***		0.761***	0.758***
Year 4 or later		0.433***	0.434***		0.442***	0.445***
Demographic and background characteristic and high school academic preparation						
Female student			1.136***			1.256***
Race/ethnicity (White is the reference category)						
Black			0.962			0.836
Hispanic			0.958			0.944
Other races/ethnicities			0.745***			0.708**
Eligible for the national school lunch program			0.837***			0.813*

Predictor	Completing bachelor's degree in any field			Completing bachelor's degree in education		
	Null model[a]	Model without missing high school variables[b]	Full model	Null model[a]	Model without missing high school variables[b]	Full model
English learner student			0.969			0.606
Student in special education			0.756**			0.610***
Number of Advanced Placement exams passed			0.985			1.018
Received an honors diploma			1.175***			1.278***
Experience in first year of college/university						
Received any financial aid		0.801***	0.786***		0.767***	0.742***
Received a Pell Grant		0.840***	0.888**		0.815***	0.877**
Received a 21st Century Scholarship		1.141*	1.216**		1.193*	1.301**
Enrolled in remedial courses in English language arts or math		0.691***	0.71***		0.641***	0.679***
Number of credits earned		1.063***	1.059***		1.075***	1.07***
Grade point average		1.822***	1.73***		2.234***	2.015***
Experience in any year of college/university (time-varying)						
Received any financial aid		1.615***	1.599***		1.801***	1.765***
Received a Pell Grant		0.862***	0.884***		0.859***	0.893*
Received a 21st Century Scholarship		0.929	0.934		0.882	0.878
Enrolled in remedial course in English language arts or math		0.125***	0.127***		0.059**	0.06**
Characteristic of the first college/university of enrollment[c]						
Enrollment (per 1,000 students)		0.994***	0.993***		0.991***	0.991***
Racial/ethnic minority percentage of enrollment		1.000	1.000		1.000	1.000
Average amount of federal, state, local, and institutional aid awarded ($1,000)		1.091***	1.082***		1.102***	1.079***
Average amount of Pell Grant awarded ($1,000)		0.787**	0.798**		0.703***	0.723**
Percentage of students receiving federal, state, local, or institutional aid		1.005	1.006*		0.998	1.000
Percentage receiving a Pell Grant		0.979***	0.979***		0.982**	0.980***
Barron's admissions competitiveness rating (highly competitive or very competitive is the reference category)						
Competitive or less competitive		0.993	0.981		0.939	0.933
No rating or two-year institution		2.047***	1.981***		2.299***	2.276***
Number of observations	35,638	35,638	35,638	26,412	26,412	26,412
Number of students	11,039	11,039	11,039	8,562	8,562	8,562

* Significant at $p = .05$; ** significant at $p = .01$; *** significant at $p = .001$.
Note: Estimates in the table are the exponentiated coefficients from models using a cloglog link function, which can be interpreted as hazard ratios. Hazard ratios greater than 1 indicate a positive statistical relationship, and hazard ratios less than 1 indicate a negative relationship. For a categorical predictor (such as female student), a hazard ratio of 1.14 indicates that the probability of completing a bachelor's degree in a given year is 14 percent higher for female students than for male students. For a continuous predictor (such as first-year grade point average), the hazard ratio is the multiplier that shows how the probability of completing the degree changes for a one unit increase in the value of the predicator. For example, a hazard ratio of 1.73 for first-year grade point average (for example, a grade point average increase from 2.5 to 3.5) indicates that a one unit increase corresponds to a 73 percent greater likelihood of completing a bachelor's degree in education, whereas a hazard ratio of 0.80 for average amount of Pell Grant awarded indicates a 20 percent lower likelihood of completing a bachelor's degree for a $1,000 increase in the average amount of Pell Grant awarded.
a. Includes no predictors except time indicators.
b. See appendix A section on missing data on covariates.
c. College/university data are for full-time students in their first college/university of enrollment.
Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education and publicly available data from the U.S. Department of Education (n.d. a, n.d. b).

Table B9. Estimated median time for completing a bachelor's degree in any field (including education) and for completing a bachelor's degree in education, 2010/11–2017/18 (years)

Characteristic	Completing a bachelor's degree in any field	Completing a bachelor's degree in education
Overall	4.38	4.51
Cohort		
2010/11	4.41	4.53
2011/12	4.40	4.53
2012/13	4.33	4.47
Year of enrollment		
Year 1	4.31	4.45
Year 2	4.35	4.43
Year 3	4.55	4.65
Year 4 or later	5.02	5.19
Gender		
Female	4.36	4.47
Male	4.45	4.64
Race/ethnicity		
Black	4.40	4.63
Hispanic	4.40	4.54
White	4.37	4.50
Other	4.59	4.75
In special education in high school		
Yes	4.59	4.88
No	4.37	4.50
Eligible for the national school lunch program in high school		
Yes	4.49	4.64
No	4.36	4.49
Received an honors diploma in high school		
Yes	4.33	4.44
No	4.45	4.62
Received financial aid in first year of college/university enrollment		
Yes	4.41	4.55
No	4.24	4.34
Received a Pell Grant in first year of college/university enrollment		
Yes	4.44	4.57

Characteristic	Completing a bachelor's degree in any field	Completing a bachelor's degree in education
No	4.35	4.48
Received a 21st Century Scholarship in first year of college/university enrollment		
Yes	4.25	4.35
No	4.39	4.53
Enrolled in remedial English language arts or math course in first year of college/university enrollment		
Yes	4.61	4.77
No	4.35	4.48
Grade point average in first year of college/university enrollment		
2.5	4.61	4.84
3.0	4.40	4.55
3.5	4.19	4.30
Credits earned in first year of college/university enrollment		
18	4.81	5.08
24	4.52	4.68
30	4.25	4.37
Received any financial aid in any year after first year of college/university enrollment		
Yes	4.31	4.43
No	4.67	4.86
Received a Pell Grant in any year after first year of college/university enrollment		
Yes	4.44	4.56
No	4.35	4.48
Enrolled in remedial English language arts or math course in any year after first year of college/university enrollment		
Yes	>8	>8
No	4.37	4.50
College/university enrollment[a]		
5,000	4.30	4.41
10,000	4.32	4.44
15,000	4.35	4.47
Percent of college/university students receiving federal, state, local, or institutional aid[a]		
50	4.42	4.51
60	4.38	4.51
70	4.33	4.51
Average amount of financial aid awarded to college/university students[a]		
$5,500	4.58	4.69
$6,500	4.51	4.63
$7,500	4.45	4.58
Percent of college/university students receiving a Pell Grant[a]		
40	4.43	4.56
45	4.51	4.64
50	4.60	4.71
Average amount of Pell Grant awarded to college/university students[a]		
$3,500	4.25	4.33
$4,000	4.33	4.44
$4,500	4.41	4.55

Characteristic	Completing a bachelor's degree in any field	Completing a bachelor's degree in education
Barron's admissions competitiveness rating for college/university of enrollment		
Highly competitive or very competitive	4.41	4.53
Competitive or less competitive	4.42	4.58
Two-year institution or no rating	3.94	3.98
Total number of students	**11,039**	**8,575**

Note: The median time to completion was estimated based on results from regression models of the outcomes that accounted for student and institutional characteristics. (See a list of characteristics under the full model for each outcome in table B6.)
a. College/university data are for full-time students in their first college/university of enrollment.
Source: Authors' analysis of data provided by the Indiana Department of Education and the Indiana Commission for Higher Education, publicly available data from the U.S. Department of Education (n.d. a, n.d. b), and Barron's Educational Series, Inc. (2013).

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