

July 2022



Alabama
Commission on
the Evaluation of
Services

Teacher Workforce |
Recruitment & Retention
Evaluation

ALABAMA COMMISSION ON THE EVALUATION OF SERVICES



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July 5, 2022

Members of the Commission,

I am pleased to transmit this report, An Evaluation of Teacher Workforce: Recruitment and Retention, to the Commission. The evaluation examined the size and scope of Alabama's teacher workforce needs and the ability to quantify those needs in varying subjects and grade levels. This was a multi-step evaluation that consisted of three individual reports that have been consolidated into one comprehensive report including stakeholder and staff recommendations.

The full evaluation officially concluded on June 24, 2022. The Alabama State Department of Education and the Alabama Commission on Higher Education participated in stakeholder meetings to discuss the findings and offer recommendations.

I believe this report accurately reflects the status of Alabama's teacher workforce, an improved student-to-teacher ratio, and factors associated with the supply and demand of teachers that are concentrated at the local level.

We very much appreciate the cooperation and assistance of the Alabama State Department of Education, the Alabama Commission on Higher Education, other provider institutions and their staff. I respectfully request that they be given an opportunity to respond during the public presentation of the report.

Sincerely,

A handwritten signature in blue ink, appearing to read 'M Morgan'.

Marcus Morgan
Director





ACKNOWLEDGMENTS

The Alabama Commission on the Evaluation of Services would like to express our sincere gratitude to the researchers, practitioners, and professionals that assisted in this evaluation. In particular, we would like to acknowledge the efforts of the following organizations that contributed significantly to this report.

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Alabama A&M University
Alabama Commission on Higher Education
Alabama State Department of Education
Athens State University
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University of West Alabama

Other States

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Kansas State Department of Education
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Tennessee State Department of Education
Utah Legislative Auditor General

Organizations

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Learning Policy Institute
National Conference of State Legislatures
U.S. Department of Education



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SUMMARY – TEACHER WORKFORCE: RECRUITMENT AND RETENTION

Nationally, research suggests that a widespread supply of teachers is not a perennial problem for most districts and schools. Instead, individual districts and schools may discover that there is a shortage of qualified teachers in varying subjects and grade levels. This multi-step evaluation focused on the processes in place combined with what we know through current and historical data.

WHAT WE FOUND

ACES identified inaccuracies in data published and provided by ALSDE for analysis.

The number of out-of-field teachers reported in ALSDE's report card data is inaccurate. The identified inaccuracies preclude quantifying the current status and needs of certified teachers by subject and grade level. The extent to which the data is inaccurate is unknown, however this information appears to be a leading indicator which informs teacher workforce concerns.

The teacher shortage in Alabama is not a statewide issue rather an issue concentrated at the local level.

ALSDE uses a mix of information to inform the needs of Alabama's teacher workforce. In union with out-of-field teachers, the number of emergency certificates is a leading indicator of workforce concerns. In total, 8.6% of Alabama schools have more than 10% of teachers on emergency certificates. Conversely, 52.5% of Alabama schools have no emergency certificated teachers, indicating the shortage of teachers is heavily localized not statewide.

Improved student-to-teacher ratio tied to the use of alternative and emergency certificates may prove costly.

Retention of non-traditionally certified teachers is substantially lower than those of the traditional route. Over a 13-year study period, 51.6% of all teachers who began with an emergency teacher certificate became licensed professional teachers. Only 32% of teachers entering under an emergency certificate in 2018 are still employed in public education. Alternative and emergency certificated teachers are leaving the profession at the highest rate. Additionally, more first-time teachers are changing districts and leaving the profession faster than the national average. The estimated cost to replace a teacher is between \$9,000 and \$40,000.

Policy decisions drive demand for Alabama teachers; the state responds with certification changes to increase the supply.

Expansion of Alabama's First-Class Pre-K program and the Alabama Literacy Act increased the demand for teachers in the youngest grades. While not surprising, policy decisions to expand the availability of non-traditional certificates and extend the length of emergency certificates resulted in greater use.

A teacher shortage occurs when a school or district does not have the ability to staff vacancies with individuals who are qualified to teach in the fields needed.

Common approaches used to address the shortages caused by inequitable distribution include financial awards, alternative teacher certifications, mentorships, and leadership programs. Alabama has followed suit and made even more administrative changes to increase the pipeline of teachers including the AMSTEP loan forgiveness program to specifically address the hard-to-staff positions within the state.



Programs and initiatives are not implemented with clear, measurable outcomes in mind.

A closer look into three initiatives aimed at the recruitment and retention of Alabama teachers revealed a deficiency of meaningful data collection to inform the stated goals. Moreover, the initiatives examined did not report clear and measurable outcomes at the time of implementation.

At the heart of understanding teacher workforce is the clear accounting of the needs within the local districts and schools. As the state continues to expand the menu of initiatives to address the teacher workforce, Alabama needs to emphasize more meaningful data collection that accurately informs that understanding.

WHAT WE RECOMMEND

The Governor and Legislature should consider:

- Designating an entity to publish an annual teacher workforce report which includes teacher retention and teaching vacancies by school and by subject.
- Targeting state efforts and dollars to school districts and subjects demonstrating the greatest teacher shortage.
- Exploring opportunities for targeted programs to recruit and retain special education teachers.
- Increasing the Hard-to-Staff supplemental award to increase recruitment of math, science, and computer science teachers to areas of greatest need.
- Increasing maximum award amounts or the maximum number of annual awards for the base AMSTEP program to cover up to \$30,000 of student loan debt. (**Accomplished in Act 2022 – 396, 2022 regular session of the Alabama Legislature**)¹
- Evaluating principals on their ability to recruit and retain first-time teachers.

The Alabama State Department of Education should:

- Provide teachers with a queryable database of job vacancies by grade and subject.
- Provide districts with a recurring list of recent professional teacher certifications to facilitate recruitment.
- Establish evaluation criteria in advance of implementing any program changes.

The Alabama Commission on Higher Education should:

- Increase marketing and recruitment efforts of the program by marketing directly to students in teacher education programs or other education related degree programs.
- Begin planning to conduct an evaluation of the first cohorts of AMSTEP to determine the impact of the program.
- Closely monitor and report the outcomes the recent rule changes have made on Alabama's teacher recruitment and retention efforts.

¹ While AMSTEP loan forgiveness is available to computer science teachers, no licensed teachers have received awards as of the time of this evaluation. For that reason, the awards for computer science teachers should maintain at their current amount until an evaluation is performed on its impact.

TEACHER WORKFORCE IN ALABAMA: TEACHERS & STUDENTS IN ALABAMA

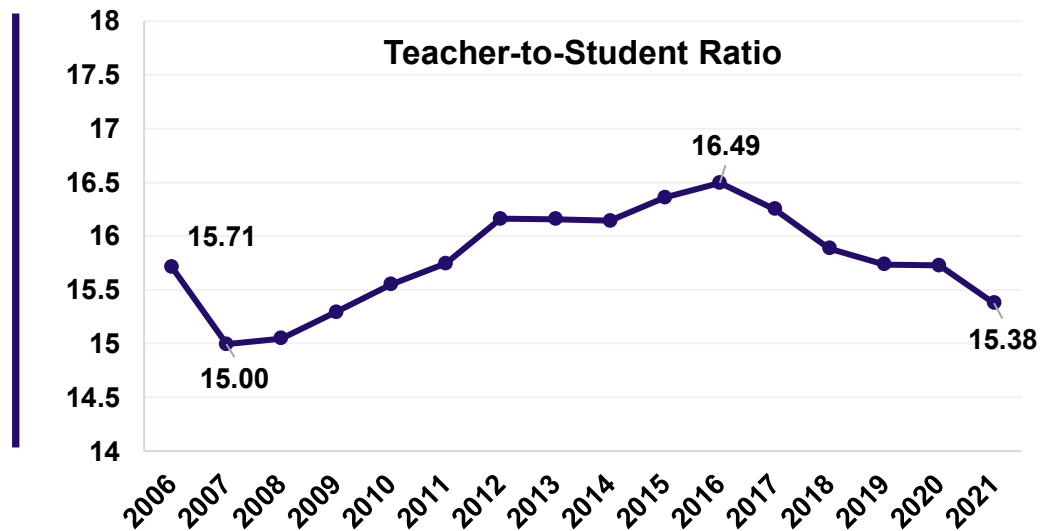
Teacher shortage conversations have been on-going for decades.ⁱ From research to media, widespread reports regarding teacher supply and demand have made teacher shortages a trending conversation nationally, and in Alabama. Common approaches used to address teacher shortages include financial awards, alternative teacher certifications, mentorships, and leadership programs.ⁱⁱ Several states and the federal government have efforts to recruit and retain teachers, notably through loan repayment programs. These programs vary by state but generally have program similarities such as graduated relief, qualifying areas of need, and forgiveness caps.ⁱⁱⁱ Alabama, like other states, has deployed multiple efforts to address the teacher shortage narrative, including its own student loan repayment program. **See AMSTEP**

Nationally, research suggests that a widespread supply of teachers is not a perennial problem for most districts and schools. Instead, individual districts and schools may discover that there is a shortage of qualified teachers in varying subjects and grade levels.^{iv} This evaluation seeks to define the size and scope of the issue in Alabama while looking at the efforts that are underway or that could assist in addressing the issue. Since many efforts are just beginning, this multi-step evaluation will look heavily at the processes in place combined with what we know through current and historical data to present findings and recommendations.

STUDENT-TO-TEACHER RATIO

Though the last fifteen years have seen significant trends in both the total number of teachers and the total number of enrolled students, Alabama has a better teacher-to-student ratio in 2021 than in previous years. This declining trend suggests that a more thorough understanding of which areas (i.e., grade, subject, school/district) are experiencing teacher shortages compared to student enrollments is needed.

Figure 1 | An overall drop in Teacher-to-Student Ratio of 1.12 over the last six years has contributed to a total decrease of 2.16% since 2006.





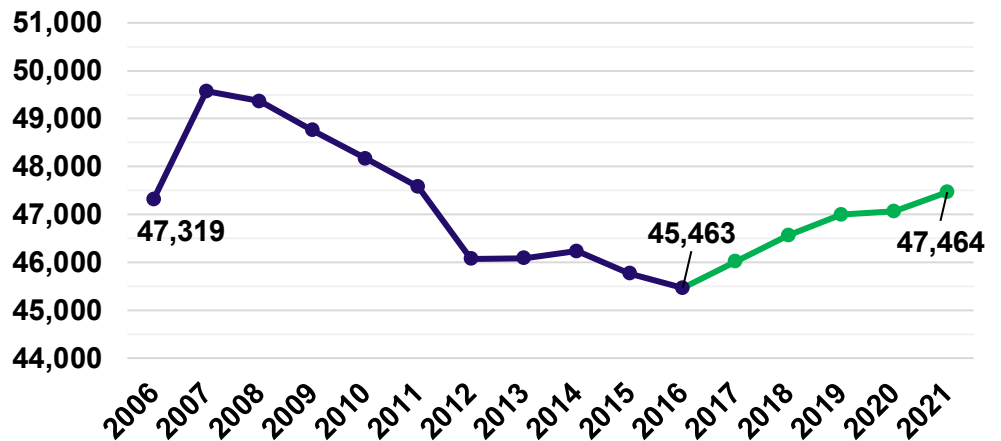
FACTORS INFLUENCING TEACHER-TO-STUDENT RATIO

Overall, the total number of teachers was roughly the same in 2021 (47,464) as it was 16 years ago (47,319). Over that same period of time, the total student enrollment has decreased by 13,818 students or 1.9%.

TEACHERS

Alabama's total number of teachers **declined by 1,856 FTEs between 2006 and 2016**. However, in the last five years, the total number of teachers **has increased by 2,001 FTEs**.

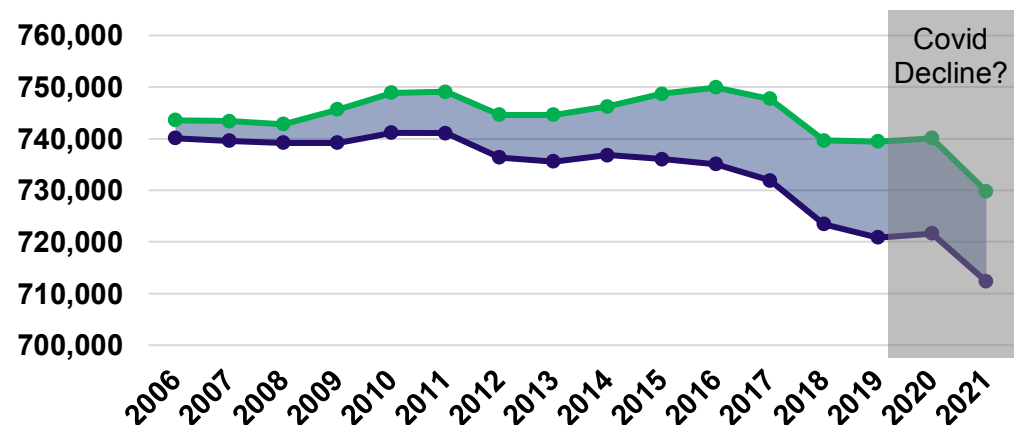
Figure 2 | Total Number of Teachers (FTEs)



STUDENTS

Prior to the drop in total student enrollment during the Covid-19 2021 school year (-10,332), Alabama saw a **decline in Pre-K thru 12th grade enrollment of 3,486 students (-0.47%) from 2006 to 2020**. This is despite a 423% increase in Pre-Kindergarten enrollments in public schools. **This means that kindergarten thru 12th grade enrollment dropped 2.49% between 2006 and 2020**.

Figure 3 | Total Student Enrollment

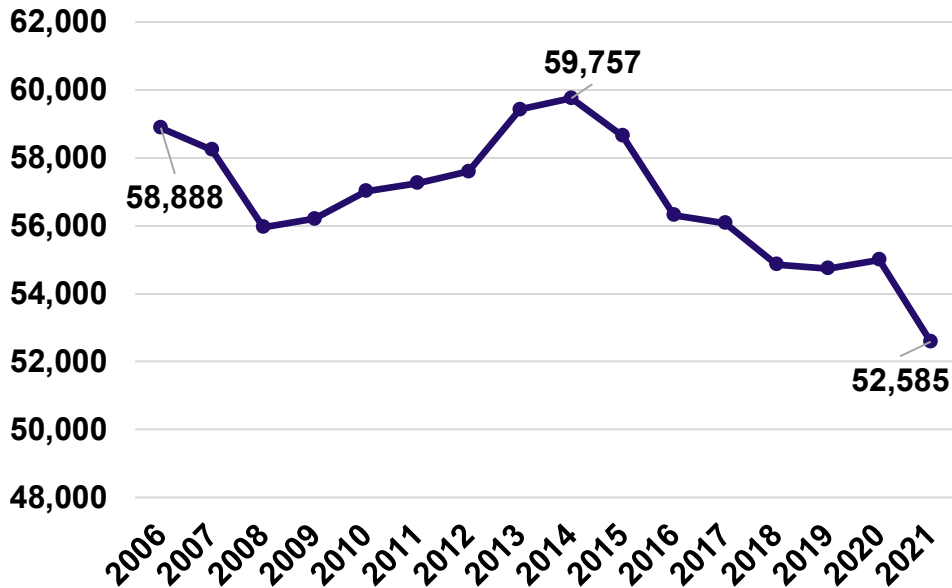


MORE ABOUT STUDENT ENROLLMENT

DECLINE IN KINDERGARTEN ENROLLMENT

Since 2006, Kindergarten averaged losing 420 students each year.

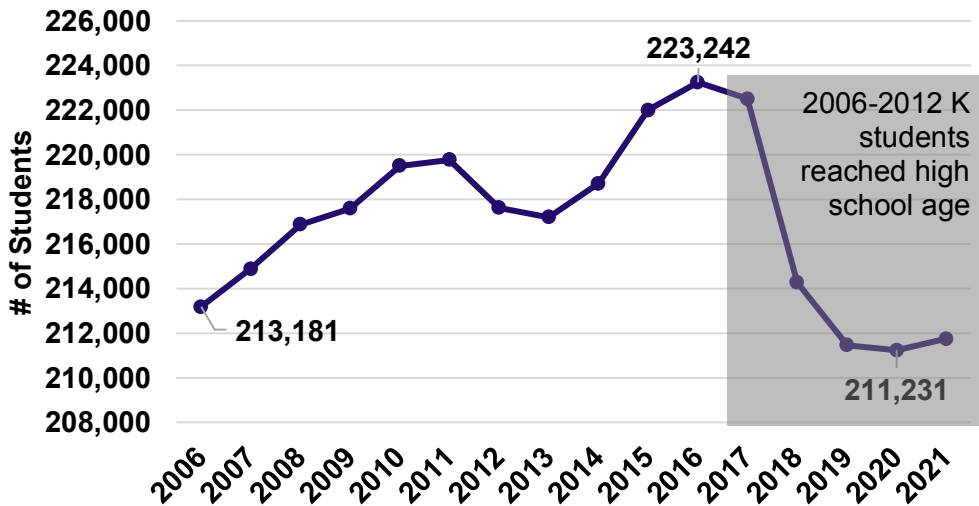
Figure 4 | Kindergarten Enrollment



IMPACTS OF KINDERGARTEN ENROLLMENT ON HIGH SCHOOL ENROLLMENT

The decline in kindergarten enrollment has a strong correlation (90%) to the recent declines in total high school enrollments. While the correlation alone does not completely explain the overall declines in student population, it may serve as a strong predictor of future student enrollment trends.

Figure 5 | High School Enrollment





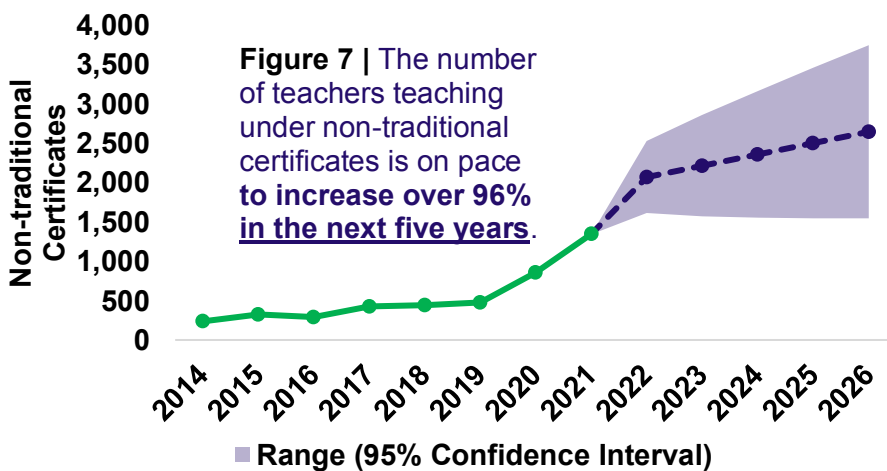
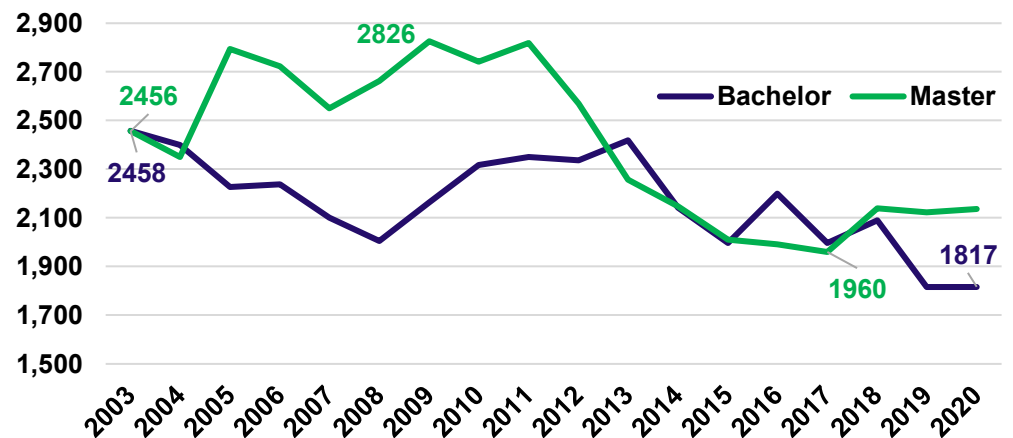
MORE ABOUT TEACHERS

The increase in the total number of teachers is not without concern. While the total number of teachers has increased by 2.6% since 2014, significant declines in the number of education graduates raise concerns. It's also important to note that the increase in the total number of teachers has been buoyed by a steep increase in the number of teachers licensed through alternative and emergency certificates (non-traditional).

DECLINE IN EDUCATOR PREP GRADUATES

Since 2003, **Alabama's educator prep graduates have declined 19.6%**. The most severe decline can be found among those enrolled in bachelor's degree programs. **The number of bachelor's degrees earned in traditional teacher education fields has declined 26% over the last 18 years.**

Figure 6 | Teacher Education Graduates



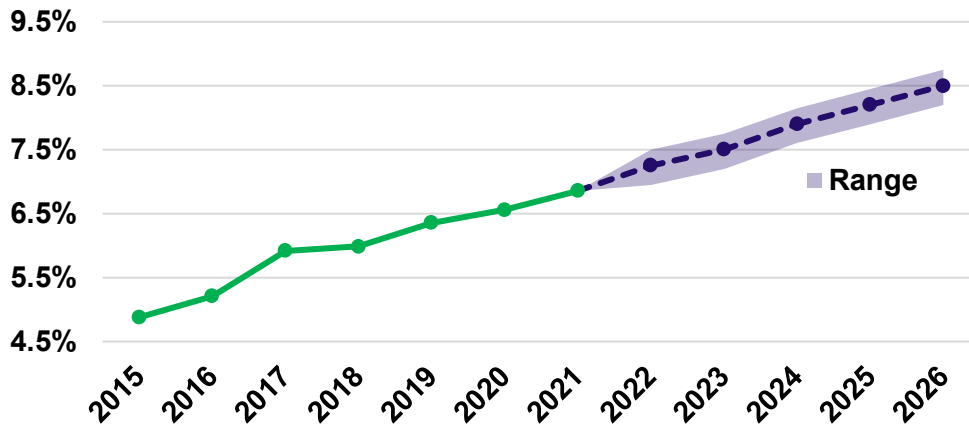
NON-TRADITIONAL CERTIFICATES

Since 2014, the total number of teachers has increased by 1,232 FTEs. Of that increase in the teacher supply, **90% (1,109) can be attributed to the increased number of teachers in the classroom with alternative and emergency certificates.**

IN & OUT-OF-SUBJECT²

Since 2015, the number of teachers teaching out of field has been on a steady rise. This trend is not unexpected when considering other factors such as increases in emergency and alternative certificates and declining enrollments and graduates in educator prep programs. Since 2015, **the number of teachers that are teaching in subjects other than those they are certified to teach increased 2%**. If this trend continues, **by 2026 Alabama will have 8.5% of its teachers not certified to teach the subjects they are employed to teach.**

Figure 8 | % of Out-of-Field Teachers



Despite the steep rise in the number of out-of-subject teachers, there is roughly the same number of schools with 30% and 50% or more of their teachers teaching out of field. **See Table 1.**

TABLE 1

Academic Year	# of schools with 30% or more of teachers teaching out of field*	# of schools with 50% or more of teachers teaching out of field
2015	23	7
2016	27	8
2017	43	10
2018	44	6
2019	38	6
2020	41	9
2021	38	5

* Schools with 50% or more of teachers teaching out of field are also included in the # of schools with 30% or more of teachers teaching out of field.

² The out-of-field teacher data reported by ALSDE is inaccurate. The inaccuracies identified through this evaluation overstate the number of out-of-field teachers in Alabama. The tables and charts in this report reflect the information as reported.



ALABAMA'S TEACHER PIPELINE

The Alabama State Department of Education (ALSDE) has opened the teacher pipeline with varying efforts to address the state's teacher shortages. In recent years, ALSDE has created pathways to enter the teaching field for prospective teachers that have not completed traditional education preparation programs. Some efforts include:

- Eliminating the basic skills test for individuals with a bachelor's degree applying through various certification approaches.
- Extended emergency certificates from one academic year to two consecutive academic years, with the option of an additional two years.
- Adopted the Higher Education Transitional Certificate which allows those teaching in higher education to transition to K-12.
- Individuals who hold a valid Alabama professional certificate in a teaching field may verify 2 years of classroom teaching experience and pass a Praxis subject area test in a different teaching field to add a new area. This approach was expanded to include Algebra I, Geometry, and Collaborative K-6 and 6-12 (for certain individuals).
- Individuals who hold a Middle School Math (grades 4-8) Certificate can now teach Algebra I and Geometry at any grade level.
- Praxis subject area tests are no longer required for those applying for Alabama certification if they hold National Board Certification.
- Piloting alternative certification approach through online modules with Teachers of Tomorrow.
- Expedited file review and fee waiver for initial Alabama certificate for military personnel and their spouse.
- Individuals who hold at least a bachelor's equivalent for a Career and Technical Education Certificate can now add additional areas to their certificate by verifying the appropriate occupational proficiency and 2 years of classroom teaching experience.
- Individuals who don't meet certain GPA requirements can still teach if a higher Praxis score is attained.
- Reduced the number of course hours required in the teaching field to complete a Class B program to seek admissions to an alternate program.
- Streamlined the Class B program requirements for biology, chemistry, and physics by eliminating the requirements pertaining to supporting competencies in other areas of science.

While the traditional population of teachers may be shrinking, it does not represent the total potential teacher workforce pool in Alabama. An in-depth analysis of the impact that non-traditional routes have on the overall teacher supply will be needed to understand how these trends impact overall teacher recruitment and retention. This analysis could prove timely considering recent efforts to increase the pipeline for entry into the teaching profession in recent years.



ALABAMA MATH & SCIENCE TEACHER EDUCATION PROGRAM (AMSTEP)

AMSTEP's legislation was designed to have students prepare for being a teacher in math, science, or computer science by completing a required traditional educator prep program. AMSTEP's legislative charge is a two-fold teacher recruitment mission to:

- encourage individuals to enroll in and complete programs leading to Alabama certification in mathematics, science, or computer science; and
- improve the educational system in Alabama by encouraging those who complete the program to accept math, science, or computer science teaching positions in Alabama.

Teacher recruitment is defined as “the effort to increase the numbers of qualified persons willing to accept teaching positions.”^v It is common practice that loan repayment programs serve as a recruitment and retention tool.^{vi} It is often found that recruitment programs have the ancillary benefit of higher retention rates among program participants when compared to those that did not participate.^{vii} Entering its fourth year of awards, Alabama's loan repayment program should drive demand to achieve stated outcomes, but current participation indicates the program is retaining teachers rather than recruiting new ones. While this is a worthwhile outcome, it is not intended to be AMSTEP's primary one.

In the program's early years, policymakers and the Alabama Commission on Higher Education (ACHE) realized that AMSTEP's initial design created limitations. Originally, eligible participants did not include residents from other states or individuals who graduated from other states' teacher prep programs. This reduced the program's reach and thus its ability to recruit teachers from outside the state. Changes were made in the spring of 2021 to eliminate these limitations. Regardless, AMSTEP's current design and administration does not align with the program's two-fold purpose of recruitment. This inability to attract new teachers is seen in the current use of the program. To date, AMSTEP has only used 32% of the program's funding and the first-time participation has decreased each year since the program's inception.

AMSTEP BY THE NUMBERS

HARD-TO-STAFF SCHOOLS

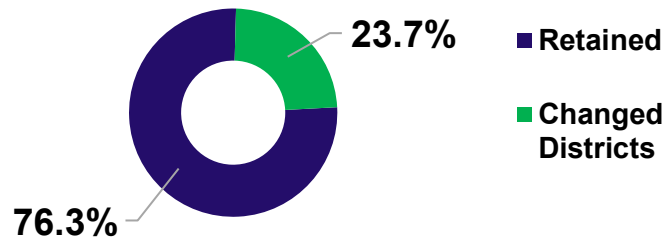
One objective of AMSTEP is to recruit teachers to take math, science, and computer science positions in hard-to-staff schools. To achieve this outcome, recipients employed in hard-to-staff schools receive a supplemental award for each semester they are employed in these schools. Despite no changes in the list of hard-to-staff schools since its inception, only 5 teachers have received the supplemental award. This result aligns with evidence that supplemental awards must be significant to recruit teachers to hard-to-staff schools over nearby, more appealing locations.^{viii}



RETENTION

Early data suggests that AMSTEP is helping school districts retain their teachers. Of the 61 recipients, only two (3.3%) are no longer employed in public schools. Of those remaining, **45 (76.3%) remained in the same school district since their first award.** While a more thorough impact evaluation will be needed in the coming years, these early results indicate the AMSTEP may be effective at retaining teachers in schools.

Figure 9 | % of Recipients that Changed Districts

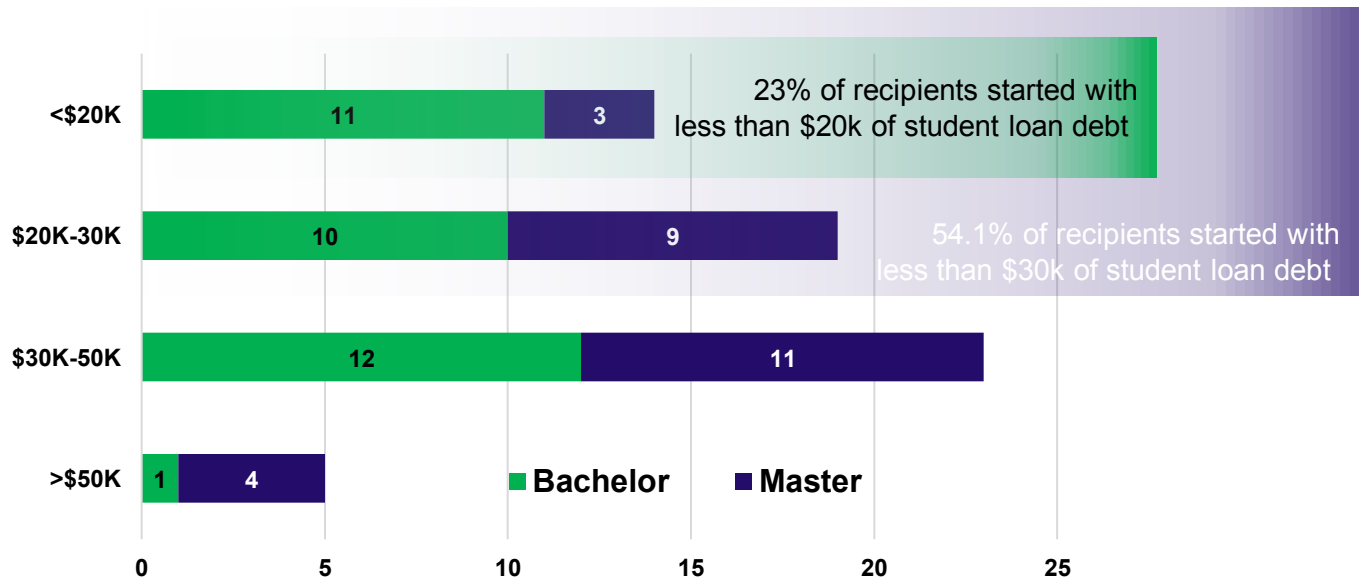


DEBT TO AWARD

Through the first three years of AMSTEP, three participants had 100% of their outstanding federal student loan debt repaid. Since the program is only entering its fourth full year, no other participants have received the maximum loan repayments offered by the program.

For current AMSTEP recipients, **the max \$20,000 award is large enough to cover the full federal student loan indebtedness for 32.4% of those recipients with a bachelor’s degree and 11.1% of those with a master’s degree (23% of all recipients).**

Figure 10 | Amount of federal student loan indebtedness per AMSTEP recipient



Leading evidence suggests that the larger the award amount, the better the recruitment and retention results of these type of programs.^{ix} **If the maximum program award was increased to \$30,000**, it would cover the total indebtedness for **61.8% of recipients with a bachelor’s degree** and **44.4% of those with a master’s (54.1% of all recipients)**.

Reviewing other state award amounts shows that Alabama has the 3rd largest award amount and similar service requirements when compared to other southern states’ programs. **See Table 2.**

TABLE 2

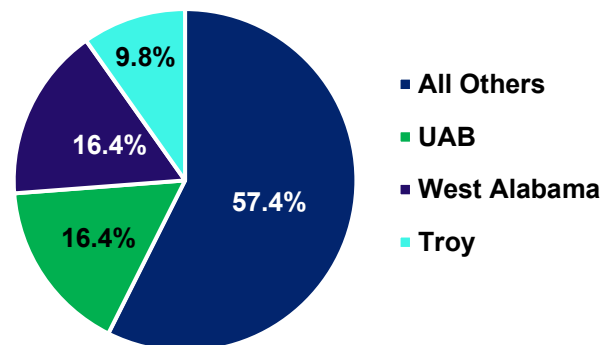
State	Life Max Award Amount	Max Service Years
Alabama	\$20,000	4
Mississippi	\$15,000	3
Tennessee	\$20,000	4
Oklahoma	Not to exceed three times the average annual undergrad tuition cost	5
South Carolina*	\$60,000	Dependent on area and subject
Arkansas	\$12,000	3
Texas	\$25,000	5
West Virginia	\$40,000	5

* South Carolina forgives loans at (1) the rate of 20% annually or \$3,000, whichever is greater; or (2) 33.3% or \$5,000, whichever is greater, depending on whether teaching in either a critical area and/or subject shortage area.

WHERE PARTICIPANTS WENT TO COLLEGE

Forty-three percent of all AMSTEP recipients earned their teaching certificate from three colleges or universities. Research indicates that future teachers are more likely to assume student loan debt and choose fields if they know repayment options exist.^x The low participation rate for most of the state’s colleges indicates an opportunity to expand marketing efforts in these institutions to raise awareness of AMSTEP’s benefits.

Figure 11 | College Attended



UTILIZATION

There have been thirty-three participants with an undergraduate degree and twenty-seven participants with graduate degrees. Though 40% of all awardees were first-time public-school teachers, AMSTEP has experienced a year-over-year decrease in first-time participation since 2018. (**See Table 3**) Of the 61 participants who received an award, 25 (41%) were previously employed in some role in an Alabama public school system. The declining participation rates combined with less than 60% of recipients being first-time teachers, indicate the need to increase program recruitment efforts.

TABLE 3

Year	# of First-Time Participants
2019	35
2020	14
2021	12



TEACHER SUPPLY & DEMAND: DEFINING THE TEACHER SHORTAGE PROBLEM

Teacher Shortage

A teacher shortage occurs when a school or district does not have the ability to staff vacancies with individuals who are qualified to teach in the fields needed.

As previously shown, between 2006 and 2020, Alabama experienced a decline in Pre-K thru 12th grade student enrollments, while seeing an increase in the total number of teachers. This indicates the statewide teacher “**supply**” has outpaced many of the factors that would normally lead to increased “**demand**” for teachers.

ACES examined data from multiple statewide data sets³ to provide context and benchmarks around remaining supply⁴ and demand factors:

- How does teacher turnover affect supply and demand (*Teacher Retention and Attrition*)
- What is first-time teacher turnover (*Teacher Attrition*)
- How first-time teachers enter the system (*New Teacher Pathways and Transfers*)
- How long teachers are retained (*Teacher Retention and Attrition*)

TABLE 4 | Factors that impact teacher supply and demand

Supply Factors	Demand Factors
Teacher Retention	Teacher Attrition
Traditional Teacher Pathways (Traditional Educator Prep Programs)	Pupil-Teacher Ratio
Non-traditional Teacher Pathways (Alternative Educator Prep Programs)	Population Growth
Out of State/Transfers	Student Enrollment

For Alabama to maintain an ongoing understanding of its teacher workforce supply and demand, Alabama will need to collect and report more targeted information. While all states report teacher information to the U.S. Department of Education, some states collect information beyond the federal requirements and make it publicly available.⁵ The information collected and reported by states like Illinois and Colorado help those states maintain an on-going comprehensive understanding of their workforce needs. Although the Alabama State Department of Education (ALSDE) reports annually to the US Department of Education information that describes the teacher workforce, this information does not assist in furthering the understanding of factors impacting the state’s teacher supply or demand.

³ See [Data and Methodologies](#) for a more detail on the data sets and analysis involved in ACES statistical analysis.

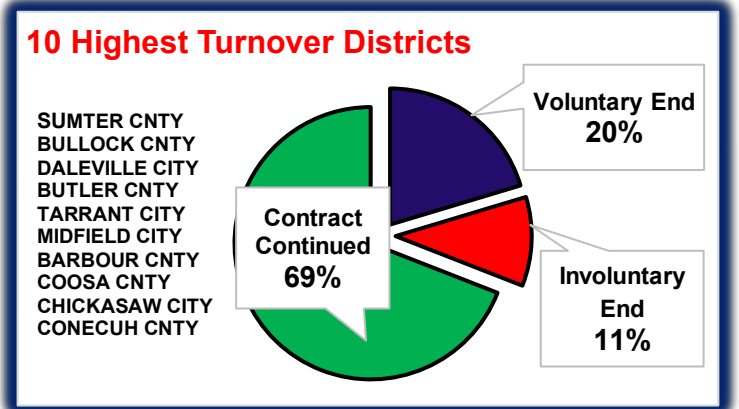
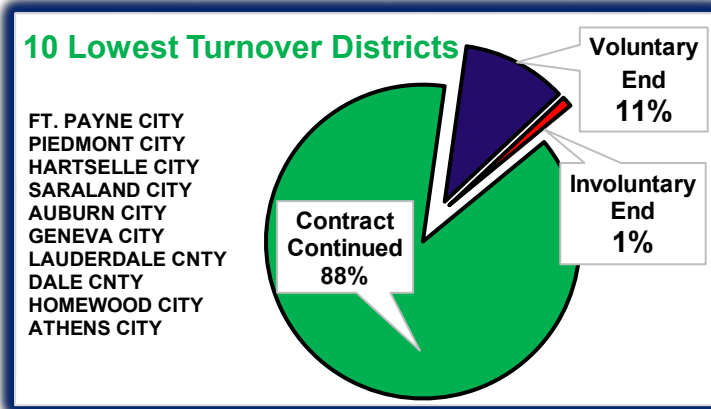
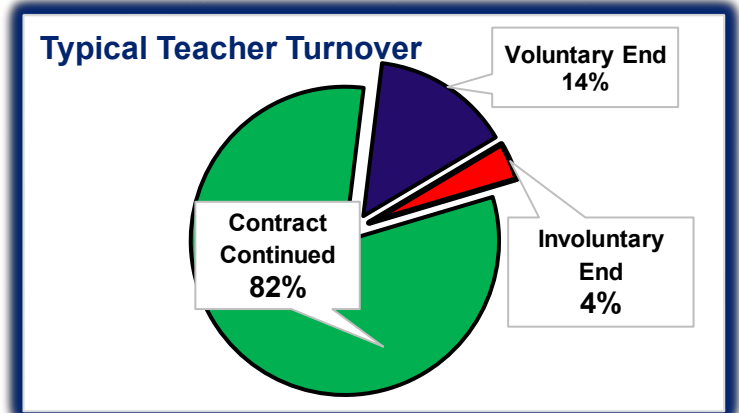
⁴ While the concept of economic supply is complex and described through various mathematical equations, for the purposes of this report, **teacher supply** refers to **the actual number of first-time teachers that enter public P-12 education**.

⁵ See [Colorado](#), [Illinois](#), [Massachusetts](#), and [Nebraska](#)

SUPPLY AND DEMAND: ALABAMA'S ANNUAL TEACHER TURNOVER

Since 2013, about 4% of Alabama's teachers are terminated each year. The largest turnover group is single year contracts, pointing to increased turnover rates created by districts. Examining each district's turnover rates show high turnover districts struggling with a 32% turnover rate, while low turnover districts replace less than half that number and rarely terminate any teachers.

Figure 12 | Teacher turnover in districts with the highest turnover rates is nearly 70% higher than the typical state turnover.



THE MAIN DEMAND FACTOR: FIRST-TIME TEACHER TURNOVER

First-time teachers in Alabama only stay in their first job for more than three years around 50% of the time. While first-time teacher loss is high nationally, Alabama's three-year exit rate is worse than the national rate of 44% of new teachers exiting within the first five years of employment.^{xi}

TABLE 5 | Over 50% of first-time teachers exit their first job within three years of entry.

Entry Year	Exit Year													First-Time Teachers	3-Year Exits
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021			
2010	189	767	283	123	78	59	49	52	44	43	32	34	2,124	58%	
2011		195	549	213	125	81	57	42	33	44	22	33	1,753	55%	
2012			312	773	335	244	118	84	71	96	50	54	2,811	51%	
2013		\$ 10,296,000		358	825	405	235	129	100	118	75	58	3,041	52%	
2014			\$ 12,096,000		324	933	400	257	116	119	76	95	3,125	53%	
2015				\$ 13,356,000		311	899	366	286	180	97	110	3,065	51%	
2016					\$ 14,841,000		359	933	414	300	88	123	3,141	54%	
2017						\$ 14,922,000		361	854	428	194	172	3,036	54%	
2018							\$ 14,940,000		359	1015	347	322	3,291	52%	
2019	MINIMUM REPLACEMENT COSTS FOR NEW TEACHER EXITS								\$ 14,643,000		415	633	494	3,486	
2020										\$ 16,722,000		165	782	2,863	
2021											\$ 10,305,000		309	4,033	
3-Year Loss			1,144	1,344	1,484	1,649	1,658	1,660	1,627	1,858	1,145	1,585	35,769		

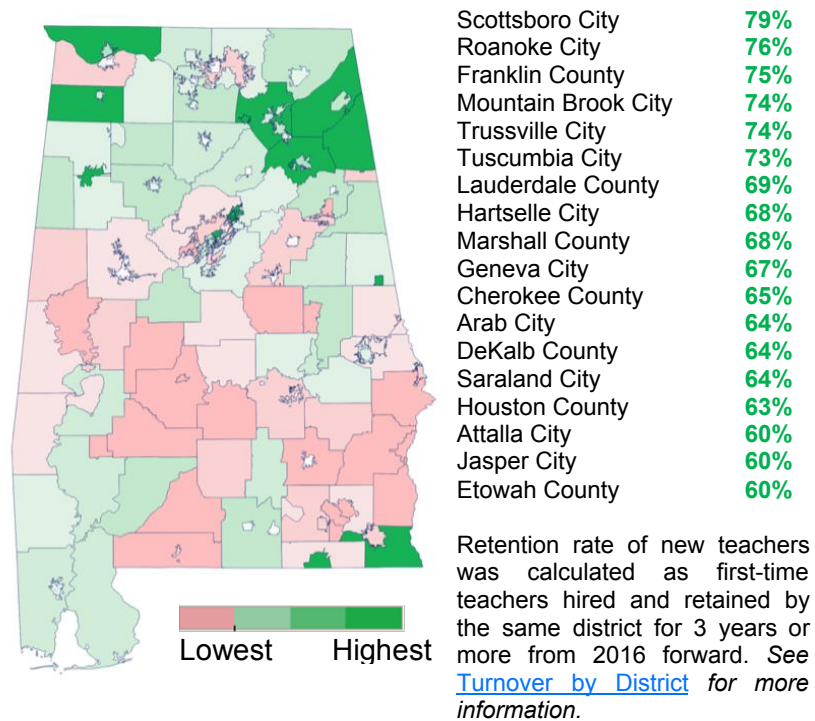


The cost of replacing these first-time teachers is high, estimated between \$9,000 and \$40,000 per new hire.^{xii} Replacing the **16,305 new teachers who left** over the last ten years is likely to have cost Alabama between \$146 million and \$652 million. If the rate of new teacher retention reached 60%, a rate already achieved by some Alabama school districts, Alabama public schools would have added 1,500 teachers to the current supply and saved districts \$13.5 million over ten years. Targeting efforts to the factors causing half of new teachers to leave could raise the supply of teachers, break the cycle of high turnover, save districts money, and lead to a more experienced teacher workforce.

FIRST-TIME TEACHER TURNOVER BY DISTRICT

Only 18 of 143 Alabama school districts have a first-time teacher retention rate above 60% since 2016. This inability to retain first-time teachers creates a churning turnover. As districts replace the normal attrition population (from retirement and life changes) with a high attrition population of new teachers, the overall attrition rate increases at higher and higher rates. This sets up an exponential growth of attrition in some districts.⁶ The potential attrition spiral highlights the need to understand what works to retain teachers and target resources to areas in need. Unless some intervention happens to reduce the rate of attrition in new teachers, districts cannot recover.

Figure 13 | Less than 20 school districts in Alabama have a first-time teacher retention rate above 60% since

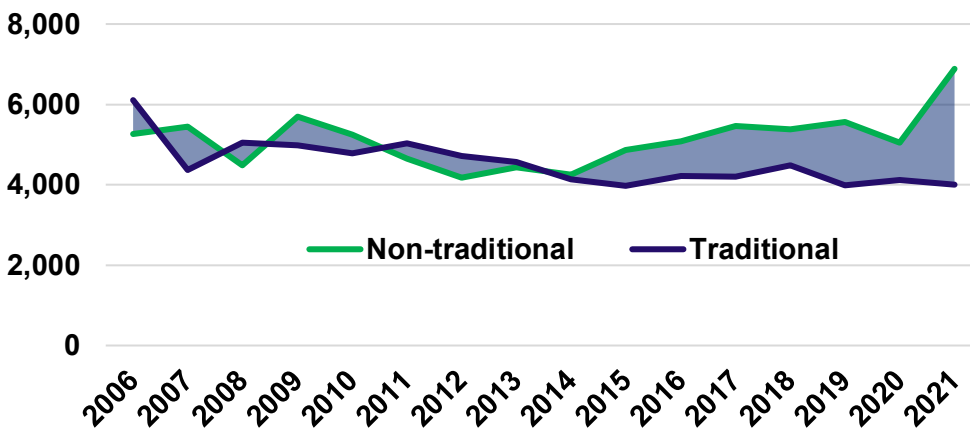


⁶ $Loss_0 = (P_0 \cdot A)$ where P = Teacher Population, A = Normal Attrition (5 to 8%)
 $Loss_1 = ((P_0 - Loss_0) \cdot A) - (Loss_0 \cdot NewA)$ where $NewA$ = New Teacher Attrition (45-65%)
 $Loss_2 = ((P_0 - Loss_1) \cdot A) - (Loss_1 \cdot NewA)$
 $Loss_n = ((P_0 - Loss_{n-1}) \cdot A) - (Loss_{n-1} \cdot NewA)$

SUPPLY: TRADITIONAL & NON-TRADITIONAL PATHWAYS

Since 2014, **non-traditional teacher certificates** far outpace **traditional certificates**. As previously shown, the state increased its teacher workforce by 2,000 over the last five years. Traditional certificates – graduating from a bachelor’s degree program focused in varying education fields – are not growing, revealing the growth in hiring is coming from non-traditional certificates – changing careers; entering the profession through an alternative route.

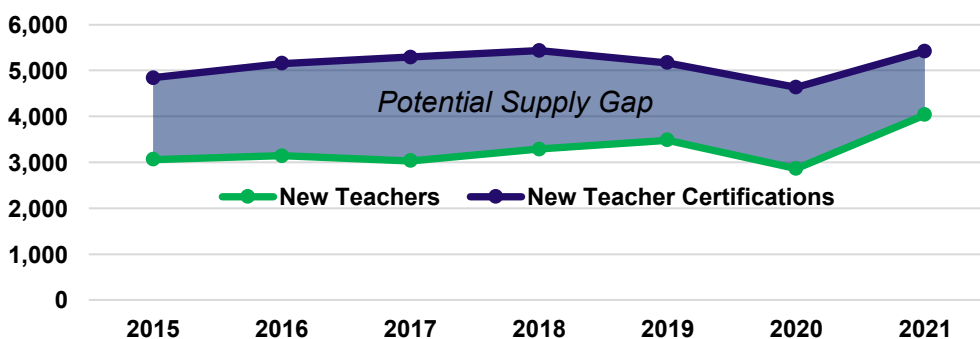
Figure 14 | The state awarded 56% more non-traditional certificates than traditional certificates since 2014.



SUPPLY GAP: FIRST-TIME CERTIFICATES VS. FIRST-TIME TEACHERS

Each year, at least 25% of teachers receiving their first teaching certificate do not enter public education.⁷ The gap between the number of people initially granted ALSDE teaching certificates and those hired each year points to a teacher supply that may be lost before it even reaches Alabama classrooms. It is unclear whether these potential teachers are going to other states, private schools, online teaching, or careers outside of education; but they do represent the potential “*supply gap*” that exists.

Figure 15 | Teachers that enter public education consists of 75% or less of all potential teachers.



⁷ For this report, **public education** means employment in a public Alabama P-12 school.



HOW LONG TEACHERS ARE RETAINED

SUPPLY BY CERTIFICATE PATHWAY

An examination of all teachers beginning employment in public education between 2006 and 2018 show **traditionally prepared bachelor's degree teachers** retain at better levels than any other certificate pathway. Those entering with a traditional Master's or an Alternative Master's certificate are a close second. The remaining **non-traditionally prepared teachers** are only retained about 50% of the time. Studies suggest this difference in retention between traditional and non-traditionally prepared teachers is not unique to Alabama.^{xiii} However, with non-traditional certifications continuing to rise, Alabama needs to improve retention of this population or risk escalating an already high turnover rate.

TABLE 6 | The state's overall poor teacher retention rate of 63% is bolstered by the large number of traditionally prepared bachelor' level teachers.

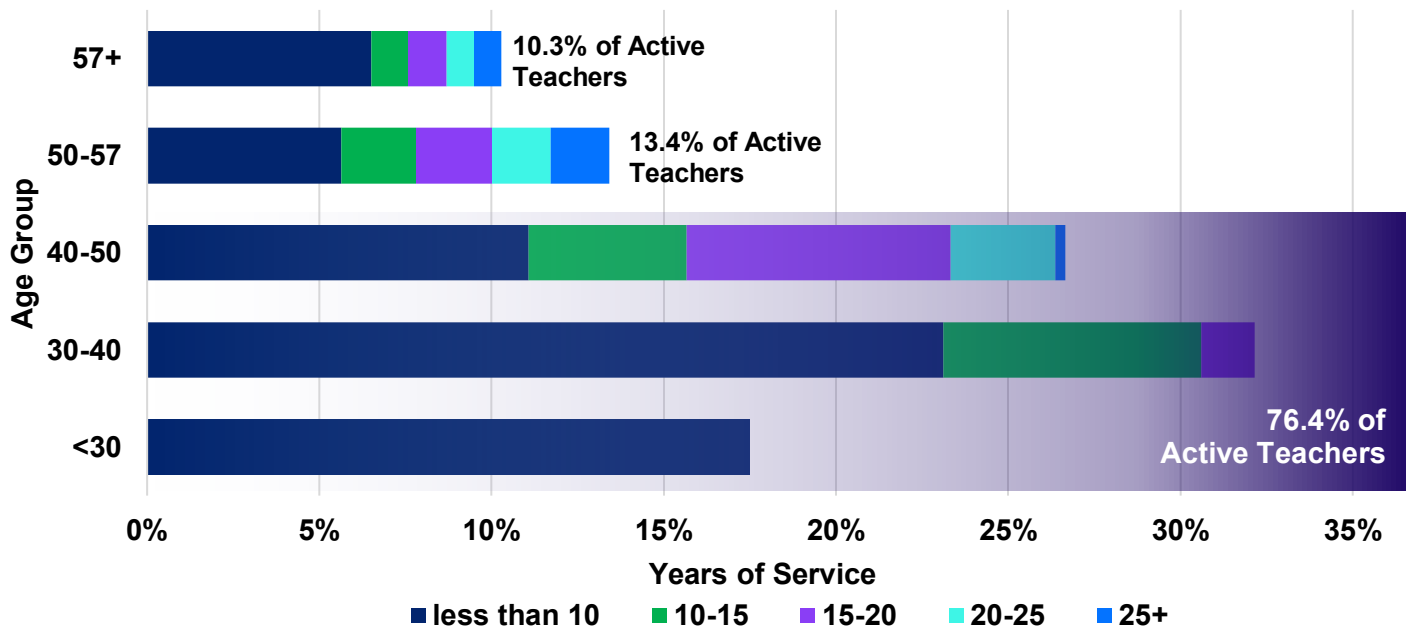
Certificate Path	Attrited Teachers			Retained Teachers			% Retained
	Changed Jobs then Left Public Education	Left Public Education	Total Leavers	Changed Job but Stayed (Movers)	Stayed in Same Job	Total Retained	
Bachelor	2,836	4,112	6,948	9,868	5,544	15,412	69%
Master	878	1,241	2,119	2,522	1,443	3,965	65%
Emergency	1,070	1,844	2,914	1,888	650	2,538	47%
Alternative	586	906	1,492	1,182	479	1,661	53%
Other	158	331	489	274	243	517	51%
Total	5,528	8,434	13,962	15,734	8,359	24,093	63%

PREDICTABLE DEMAND: TEACHER RETIREMENT

Alabama is not at risk of mass retirement. Alabama's teacher retirement trends have been steady since 2006. This is an example of normal attrition and is consistent among all sub-populations that can be readily tracked and projected.

Only 10% of the current teacher workforce is within five years of the typical retirement age (60-62). Only a third of all current teachers have the 10 years of service required to be vested in the state's retirement system.^{xiv} The average age of current teachers is approximately 40 years old. This age distribution is consistent with the global US labor force.^{xv} Steady Alabama teacher retirements indicate retirements are not contributing to an overall increase in the demand for teachers.

Figure 16 | Most Alabama teachers are not nearing retirement despite a third of them being vested in the state’s retirement system.



UNIDENTIFIED DEMAND: TEACHER VACANCIES

Alabama does not currently track teacher vacancies, a standard measurement utilized by other states to better define teacher needs. Though ALSDE maintains an online employment job board, upon initial review, it appeared to have varying degrees of utilization across the districts. In an effort to determine if the job board accurately quantifies the current needs in Alabama’s public schools, ACES surveyed all 143 school districts. Survey results showed the job board was not an accurate indicator of the needs reported by the responding districts.

Another factor contributing to the inability to quantify needs is the deficiency of information collected on recruitment variables. ALSDE collects data for out-of-field and emergency teachers; however, the information is not used to recruit or pair properly credentialed teachers to those positions. Also, Alabama does not collect state level data to determine recruitment efforts aimed at positions lacking a properly credentialed teacher. A recent report emphasized that states should know “[h]ow many vacancies relate to a new position, versus those aimed to properly staff a position currently covered by an out-of-field or not fully certified teacher, [such information] would give a fuller picture of the teacher shortage and allow districts to better define hiring strategies and teacher talent allocation.”^{xvi}



ALABAMA’S TEACHER RECRUITMENT AND RETENTION EFFORTS

What Works in Teacher Retention: Teacher Mentoring Programs

Effective evidence-based teacher mentoring programs retain teachers and increase educational attainment among students. Although there are varying degrees of features and effectiveness of mentoring programs, evidence from multiple sources is in accord that mentoring programs work to reduce teacher turnover.^{xvii} These programs assign novice teachers to veteran teachers, generally for the first 2 years of employment, to provide support in areas such as classroom observation and consultation, instructional planning and preparation, and classroom instruction.^{xviii}

Alabama’s Teacher Mentor Program was first established by the legislature in 2004 and received consistent funding since 2017. Current teacher mentors receive a modest \$1,000 for a minimum of 90 hours of work. Currently, 134 districts participate in the voluntary program with 4,213 mentees enrolled as of the second semester of the 2021-2022 academic year. Even with large participation in the program, ACES analysis demonstrates most districts have trouble retaining first-time teachers.

At this time, 7 districts are piloting a more intensive, New Teacher Center mentoring program. Due to Alabama’s low first-time teacher retention rate, the state should consider evaluating the effectiveness of this pilot program to determine if it should be implemented statewide. **If Alabama experiences similar results from the New Teacher Center program, ACES estimates the benefits to the state would be about \$39 per dollar spent.**

Alabama attempts to address the supply of teachers through a myriad of interventions despite the lack of information quantifying the need by district, subject, grade, or credential. Newer efforts as of January 2022 continue to increase the potential supply of non-traditional teachers into the teaching pipeline. In response to local education agencies and institutions of higher education reporting the impact of Alabama’s teacher shortage, ALSDE updated the following pathways increase the quantity of available teachers.^{xix} Notably, none of these efforts are currently being evaluated for effectiveness.

TABLE 7 | ALSDE updated pathways to increase the quantity of available teachers. (January of 2022)

Effort	Description
Additional Teaching Field Approaches	Two-year experience requirement eliminated
Advanced Pay	Interpretation of law now includes any approved advanced degree as eligible for advanced pay if the degree major is in any area of education (e.g., curriculum and instruction and secondary education)
Certificate Reciprocity	Subject-area testing for applicants suspended
Certificate Renewal / Reinstatement	Certificate renewal requirements are suspended for the 2022 and 2023 renewal cycle
Conditional Certificate in Teaching Field Approach	Additional P-12 and 6-12 teaching fields will be added beginning with the 2022-2023 school year
Emergency and Career Tech Temporary Certificates	LEAs may now request a 2 nd certificate area, if only one was requested at the time the original certificate was issued
GPA Requirement	Decreased Alternative Programs and other approaches GPA from 2.75 to 2.50 for certain alternative routes and for admission completion in an approved program
Special Education	An alternate route leading to a certificate in Collaborative Special Education for grades 6-12 is being created and will be available for the 2022-2023 academic year



The state also directly funds many programs supporting pathways into teaching or [teacher workforce diversity](#). For FY 2022, Alabama appropriated over \$21,000,000 to teacher recruitment and retention efforts.

TABLE 8 | State-funded programs to recruit and retain teachers (including [diversity programs](#)).

Program Name	Receiving Institution	State Dollars	Projected Outcome
Teach for America	ALSDE	\$822,000	Equal academic opportunity through recruiting and retaining teachers in approved Alabama areas. Intent: employ veterans of U.S. Armed Forces where possible
National Board Certification of Teachers	ALSDE	\$13,712,908	Retain accomplished teachers in the profession
Alabama Teacher Mentor Program	ALSDE	\$4,000,000	Provide novice teachers with access to mentoring from veteran teachers as a retention effort
Future Teachers of Alabama	ALSDE	\$250,000	Promote teaching as a profession to middle and high school students
Alabama Math & Science Teacher Edu Program	ACHE	\$746,750	Recruit STEM teachers in hard to staff areas by incentivizing pay up to \$20,000 more per year
Principal Mentor Program	ALSDE	\$438,907	Provides support to new principals to maximize leadership success through prioritizing, modeling, guidance, coaching, and encouragement
Alabama Recruit & Retain Minority Teacher Pilot	ACHE	\$700,000	Recruit and retain African American Male students into traditional education program
AKEEP Education Teacher & Recruitment Partnership	ACHE	\$100,000	Recruit multicultural diversified teachers from Korea to Alabama.
Blackbelt Teaching Initiative	UWA	\$450,000	Provides teacher education majors funding for their education and provide additional dollars to jump-start educational initiatives in the schools where they will teach
Total State Funds		\$21,659,472	

*This table does not reflect Alabama’s teacher recruitment and retention campaign because those efforts were initially funded in 2019 via a three-year contract.



TEACHER RECRUITMENT & RETENTION: SHORTAGE INDICATORS

ALSDE Data Inaccuracy

Although out-of-field data is collected and reported by ALSDE, ACES identified inaccuracies in the data which precludes quantifying the current status and need of certified teachers by subject and grade level. The extent to which the data is inaccurate is unknown.

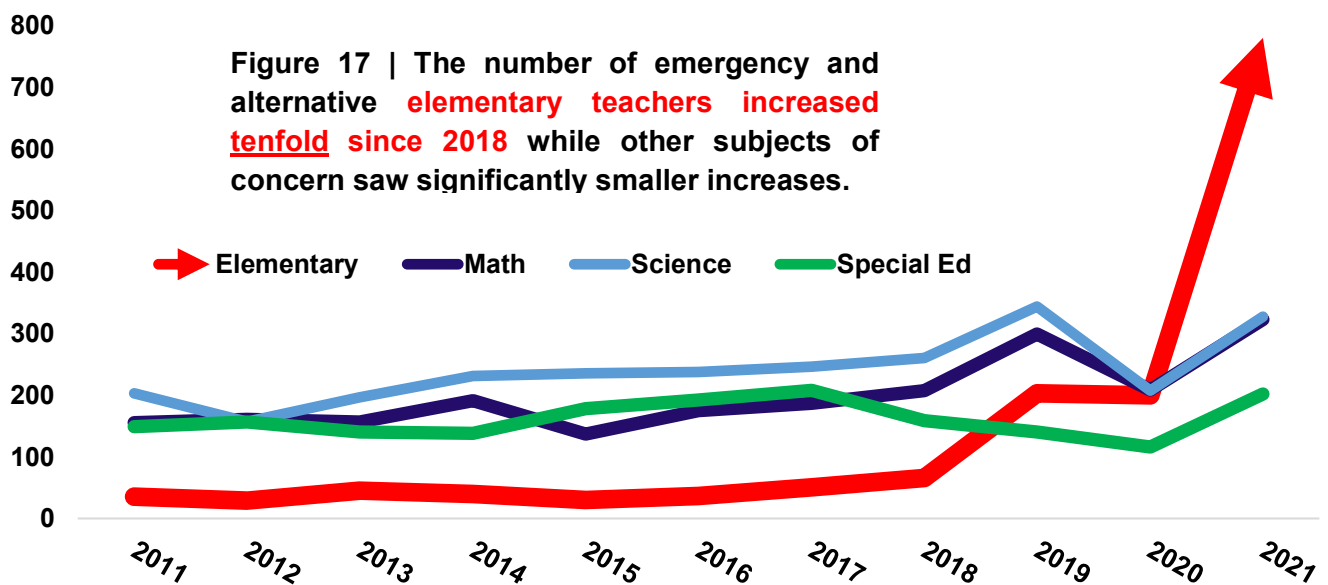
There is a steady increase in the number of teachers entering the classroom using emergency certificates. This increase is coupled with a **reported** rise in the number of out-of-field teachers. These two factors combined may be shortage indicators, but to what extent?

Policies are Driving Demand for More Teachers

Alabama’s student-to-teacher ratio *continued* to improve since 2016, but the use of emergency certificates dramatically increased with it. These increases can be tied to Alabama’s First-Class Pre-K, Alabama Literacy Act, and longer-term emergency certificates.

USE OF ALTERNATE AND EMERGENCY CERTIFICATION IS RISING IN ELEMENTARY SCHOOLS

An acute increase in emergency and alternate certificates coincides with Alabama programs that generated immediate increased need for teachers in the youngest grades. Alabama’s First-Class Pre-K program grew to serve 45% of Alabama’s 4-year-olds over the last few years, with many of those classes added in public elementary schools across the state. The Alabama Literacy Act created an immediate need for literacy specialists focused on raising K-3 reading proficiency throughout the state. The existing experienced teacher workforce filled that need. The demand from policy changes resulted in a spike of emergency and alternative certificates in a teaching field that was traditionally well supplied by Alabama Colleges of Education.



Similar to the Literacy Act, the Alabama Numeracy Act of 2022 requires around 700 elementary math coaches to be added to the workforce over the next few years, one for each elementary school under 800 students, two for schools larger than 800.^{xx} The FY2023 ETF budget includes \$15,000,000 to begin implementation of the act. Math coaches must have five-years teaching experience, many leaving classrooms that must then find replacement teachers. The spike in demand for 700 or more new elementary teachers is likely to accelerate the rise of emergency and alternative certificate teachers.

LONGER EMERGENCY CERTIFICATES RESULTED IN MORE EMERGENCY CERTIFICATES

Before 2019 legislation, Alabama restricted emergency teacher certificates to only one year.^{xxi} Since, emergency teacher certification is renewable up to four years.^{xxii} Analysis shows that even when factoring the increased use of emergency certificates, the student-to-teacher ratios in high schools and elementary schools improved. The improving student-to-teacher ratio in high schools and elementary schools regardless of emergency certificates indicates there is not a statewide shortage of teachers. Rather, there is a new, increased demand for teachers that is being filled with emergency certificate holders.

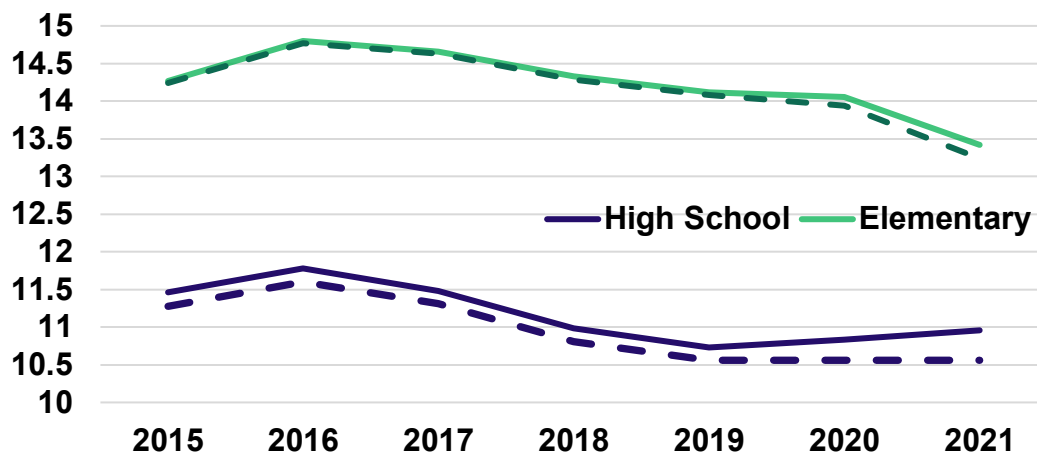


Figure 18 | Student-to-teacher ratios improve regardless of emergency certificates.

- - - Total student-to-teacher rate
 — Student-to-teacher rate with emergency

EMERGENCY CERTIFICATES ARE WEAK LINK TO CAREER TEACHERS

Over a 13-year study, only 51.6% of all teachers who began with an emergency teacher certificate became licensed professional teachers. Only 32% of the teachers who received an emergency certificate in 2018 were still employed in public education in 2021. Not surprisingly, Alabama reforms to increase the supply of emergency certificates resulted in more prevalent use of them. However, the increased use has not resulted in more professionally licensed teachers.



TEACHER WORKFORCE IS A LOCAL ISSUE

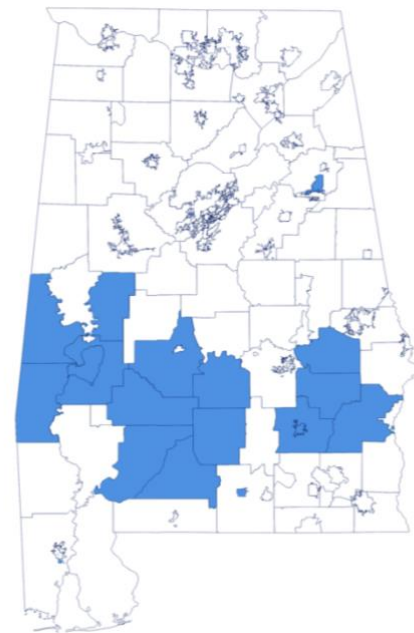
Alabama’s teacher workforce issues are concentrated in subjects and districts, not statewide. According to the U.S. Department of Education, a teacher shortage is an area of specific grade, subject matter, discipline classification, or a geographic area in which there is an inadequate supply of elementary or secondary school teachers.^{xxiii} However, the Department allows states to identify their own teacher shortage areas.⁸ Alabama uses a mix of information to inform its teacher workforce concerns, but two of the leading indicators appear to be the number of out-of-field teachers⁹ and the use of emergency certificates.^{xxiv} For more information supply of teachers **see Teacher Supply by Subject: Colleges of Education -vs- Other Pathways.**

EMERGENCY CERTIFICATE USE IS HEAVILY CONCENTRATED

Research across the United States shows the distribution of teachers in certain subjects is not equitable within states, districts, or schools.^{xxv} Alabama is no different. Less than 14% of the state’s school districts depend on emergency certificates. Those 20 districts rely on emergency certificates to staff classrooms with 1/3 or more schools using emergency certificates to employ teachers.¹⁰ In total, 121 schools (8.6%) have more than 10% of teachers on emergency certificates while 737 (52.5%) have **no** emergency certificated teachers.

Figure 19 | Districts with a 1/3 or more schools with at least 10% of teachers on an emergency certificate:

- | | |
|----------------|----------------|
| Andalusia City | Linden City |
| Anniston City | Lowndes County |
| Barbour County | Macon County |
| Bullock County | Marengo County |
| Butler County | Midfield City |
| Chickasaw City | Monroe County |
| Choctaw County | Pike County |
| Conecuh County | Sumter County |
| Dallas County | Troy City |
| Hale County | Wilcox County |



⁸ Neighboring states out-of-field teacher rates are as low as .06% and as high as 12.5%. However, these rates are not comparable because each state has the autonomy to establish its own certification and qualification requirements.

⁹ As previously noted, the out-of-field teacher data reported by ALSDE is inaccurate. The inaccuracies identified through this evaluation overstate the number of out-of-field teachers in Alabama.

¹⁰ There is not a standard or benchmark used to determine when a school or district’s rate of emergency teachers is too excessive. Due to this lack of a recognized standard, ACES used a rate of 10% of emergency certificated teachers as a benchmark for analysis.

THE STATEWIDE TEACHER WORKFORCE ISSUE: SPECIAL EDUCATION

There are 41 districts in the state with more than 20% of special education teachers not certified in special education. Out-of-field special education teachers consistently make up about 15% of all special education teachers in Alabama.

Students with disabilities grew since 2015 by about the same number as general education students declined. While consistent with national trends, only in special education does enrollment growth account for workforce pressure.

RECENT STATE-FUNDED TEACHER WORKFORCE INITIATIVES

PURCHASED MEDIA CAMPAIGN

ALSDE contracted for a digital media campaign to “recruit and retain” teachers and “increase the favorable perception” of public education in 2020.^{xxvi} To date, ALSDE reports spending \$1.5 million of the total contracted \$4,000,000 which continues through FY2023. ACES research identified five other similar state-funded campaigns across the country.^{xxvii}

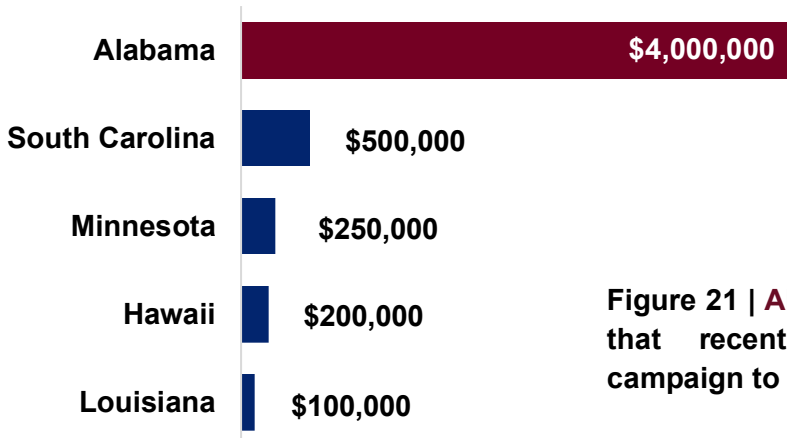
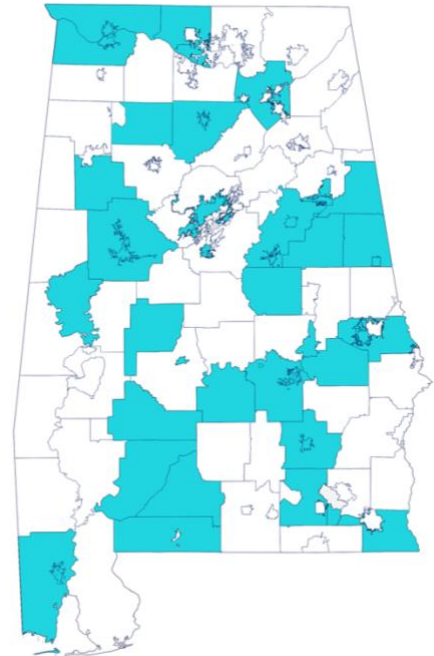


Figure 21 | Alabama is one of five states that recently purchased a media campaign to recruit and retain teachers.

ALSDE did not establish measurable goals prior to contracting for the campaign. In public education, there is little data that marketing awareness campaigns improve recruitment or perception.^{xxviii} Both ALSDE and the contracted firm verified that there is no way to track if any teachers recruited can be attributed to the purchased campaign. Marketing firms measure digital campaign success by key performance indicators (KPI) of website traffic, click rates, video, engagement and listening rates.

Figure 20 | 41 districts across Alabama overly rely on special education teachers not certified in the discipline.





Auxiliary Teacher Grant Program

In conjunction with the Auxiliary Teacher Grant Program appropriation, HB429 was introduced during the 2022 Regular Session but did not pass. HB429 required ALSDE to “establish and maintain a comprehensive plan to phase in the employment of auxiliary teachers”, first focusing on the most underperforming schools.

The \$5.4 million appropriation will be used to pair auxiliary teachers with certified classroom teachers in K-3 in underperforming elementary schools.^{xviii} Alabama currently has 2,458 instructional assistants provided by federal funding to provide additional academic support and learning opportunities to help low-achieving children master challenging academics.^{xix}

AUXILIARY TEACHERS

Alabama recently appropriated \$5,439,463 for the Auxiliary Teacher Grant Program for Underperforming Schools in FY2023.^{xxix} Understanding the desired outcomes for auxiliary teachers in Alabama is essential to measuring success.

Alabama has not established intended outcomes for auxiliary teachers. Available evidence shows mixed effects surrounding the use of auxiliary teachers.^{xxx} Small pockets of research demonstrate that specialized auxiliary or instructional assistants may be effective at increasing student achievement.^{xxxi} Other benefits reported in teacher aide and instructional assistant studies include more time for instructional teachers to plan, manage classroom time and efforts, and provide teachers with classroom administrative duties.^{xxxii} A recent survey of teachers conducted by the Alabama Commission on Higher Education reported that 38% of respondents considered leaving the teaching profession within the next five years. Some of those teachers indicated the following *lack of work resources* as possible reasons for leaving.^{xxxiii}

- Too little time for instructional preparation
- High student-to-teacher ratios
- Too little or no time for collaboration among peers
- Lack of resources to properly teach course content

To evaluate the effectiveness of the Auxiliary Teacher Grant Program, *it is necessary to establish outcomes for the program that can be tracked and measured.*

DATA & METHODOLOGIES

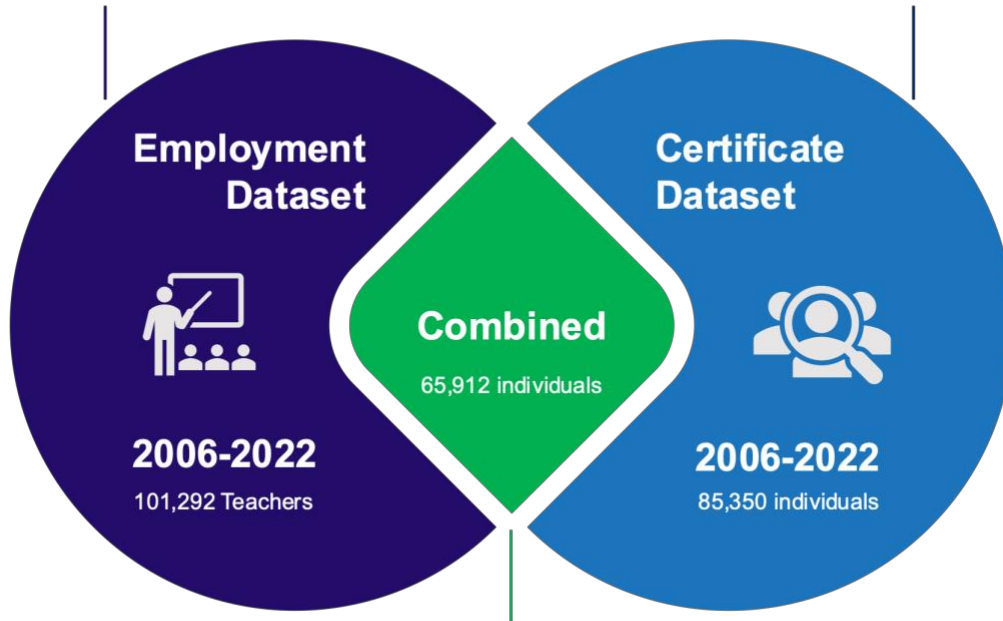
There is no single source of information in Alabama that contains information on teacher qualifications and employment. To perform the supply and demand factors analysis for this report, ACES had to use and combine multiple data sources. Although there is some commonality to the datasets, they are not relational.¹¹ The limitations presented when combining and analyzing data from non-relational datasets are numerous, but specific to this analysis are two-fold:

1. Aggregates or summations from each individual dataset are not complete representations of all the datasets.
2. The available, usable data after combining datasets only captures 65% of the total records for the period of analysis.

DESCRIPTION OF THE DATASETS USED IN THE SUPPLY AND DEMAND FACTORS ANALYSIS.

Analysis of teacher turnover, first-time teachers, years-of-service, or teacher age was completed using the **Employment Dataset** from the Teachers' Retirement System of all public, P-12 education school districts in the state.

Analysis of career pathways, first-time certificates, or subject matter was completed using the **Certificate Dataset** from the Alabama State Department of Education.



Analysis of teacher turnover, first-time teachers, years-of-service, or teacher age through the lens of certificate types or subject matter was completed using the **Combined Dataset** created by merging the two, non-relational datasets.

To compensate for these limitations, ACES performed similar analysis across datasets ensuring that the results were statistically representative, thus validating the reliability of the results.

¹¹ A relational database organizes data items using pre-defined relationships to link values from multiple tables. This capability enables you to retrieve an entirely new table from data in one or more tables with a single query.



TURNOVER BY DISTRICT

School System	% Retention	School System	% Retention	School System	% Retention
ALABASTER CITY	44%	ENTERPRISE CITY	31%	MUSCLE SHOALS CITY	39%
ALBERTVILLE CITY	57%	ETOWAH COUNTY	60%	ONEONTA CITY	40%
ALEXANDER CITY	22%	EUFAULA CITY	27%	OPELIKA CITY	39%
ANDALUSIA CITY	59%	FAIRFIELD CITY	24%	OPP CITY	55%
ANNISTON CITY	24%	FAYETTE COUNTY	48%	OXFORD CITY	34%
ARAB CITY	64%	FLORENCE CITY	43%	OZARK CITY	24%
ATHENS CITY	44%	FORT PAYNE CITY	58%	PELHAM CITY	33%
ATTALLA CITY	60%	FRANKLIN COUNTY	75%	PELL CITY	47%
AUBURN CITY	48%	GADSDEN CITY	49%	PERRY COUNTY	16%
AUTAUGA COUNTY	39%	GENEVA CITY	67%	PHENIX CITY	34%
BALDWIN COUNTY	54%	GENEVA COUNTY	38%	PICKENS COUNTY	36%
BARBOUR COUNTY	20%	GREENE COUNTY	21%	PIEDMONT CITY	33%
BESSEMER CITY	31%	GUNTERSVILLE CITY	50%	PIKE COUNTY	18%
BIBB COUNTY	56%	HALE COUNTY	33%	PIKE ROAD CITY	38%
BIRMINGHAM CITY	35%	HALEYVILLE CITY	46%	RANDOLPH COUNTY	45%
BLOUNT COUNTY	52%	HARTSELLE CITY	68%	ROANOKE CITY	76%
BOAZ CITY	43%	HENRY COUNTY	27%	RUSSELL COUNTY	18%
BREWTON CITY	33%	HOMEWOOD CITY	58%	RUSSELLVILLE CITY	50%
BULLOCK COUNTY	32%	HOOVER CITY	52%	SAINT CLAIR COUNTY	43%
BUTLER COUNTY	36%	HOUSTON COUNTY	63%	SARALAND CITY	64%
CALHOUN COUNTY	54%	HUNTSVILLE CITY	36%	SATSUMA CITY	44%
CHAMBERS COUNTY	40%	JACKSON COUNTY	55%	SCOTTSBORO CITY	79%
CHEROKEE COUNTY	65%	JACKSONVILLE CITY	25%	SELMA CITY	17%
CHICKASAW CITY	29%	JASPER CITY	60%	SHEFFIELD CITY	7%
CHILTON COUNTY	38%	JEFFERSON COUNTY	41%	SHELBY COUNTY	47%
CHOCTAW COUNTY	38%	LAMAR COUNTY	56%	SUMTER COUNTY	37%
CLARKE COUNTY	53%	LANETT CITY	21%	SYLACAUGA CITY	44%
CLAY COUNTY	54%	LAUDERDALE COUNTY	69%	TALLADEGA CITY	26%
CLEBURNE COUNTY	55%	LAWRENCE COUNTY	45%	TALLADEGA COUNTY	36%
COFFEE COUNTY	32%	LEE COUNTY	38%	TALLAPOOSA COUNTY	55%
COLBERT COUNTY	34%	LEEDS CITY	43%	TALLASSEE CITY	50%
CONECUH COUNTY	14%	LIMESTONE COUNTY	52%	TARRANT CITY	23%
COOSA COUNTY	19%	LINDEN CITY	40%	THOMASVILLE CITY	18%
COVINGTON COUNTY	56%	LOWNDES COUNTY	29%	TROY CITY	35%
CRENSHAW COUNTY	50%	MACON COUNTY	44%	TRUSSVILLE CITY	74%
CULLMAN CITY	50%	MADISON CITY	55%	TUSCALOOSA CITY	31%
CULLMAN COUNTY	49%	MADISON COUNTY	47%	TUSCALOOSA COUNTY	40%
DALE COUNTY	37%	MARENGO COUNTY	50%	TUSCUMBIA CITY	73%
DALEVILLE CITY	24%	MARION COUNTY	46%	UNIVERSITY CHARTER SCHOOL	73%
DALLAS COUNTY	29%	MARSHALL COUNTY	68%	VESTAVIA HILLS CITY	57%
DECATUR CITY	44%	MIDFIELD CITY	26%	WALKER COUNTY	57%
DEKALB COUNTY	64%	MOBILE COUNTY	49%	WASHINGTON COUNTY	47%
DEMOPOLIS CITY	32%	MONROE COUNTY	55%	WILCOX COUNTY	10%
DOTHAN CITY	34%	MONTGOMERY COUNTY	36%	WINFIELD CITY	60%
ELBA CITY	40%	MORGAN COUNTY	57%	WINSTON COUNTY	57%
ELMORE COUNTY	48%	MOUNTAIN BROOK CITY	74%	Grand Total	42%

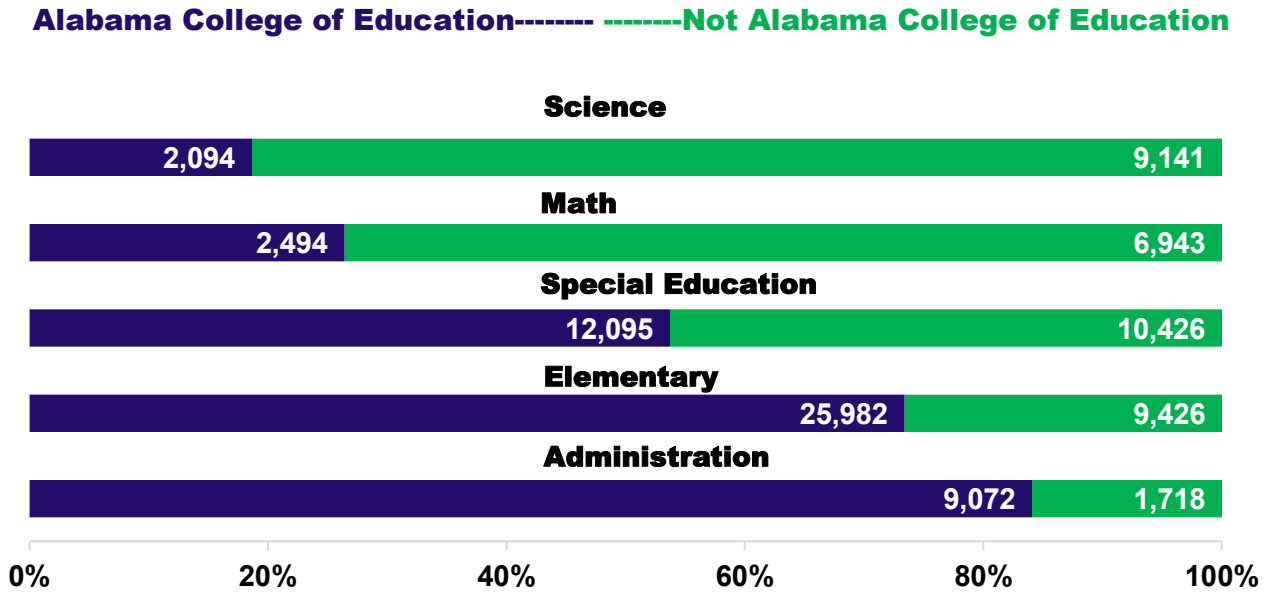
* School districts that began on or after 2016 are not included.

** Escambia County is not included because of uncertainty regarding its employment data.

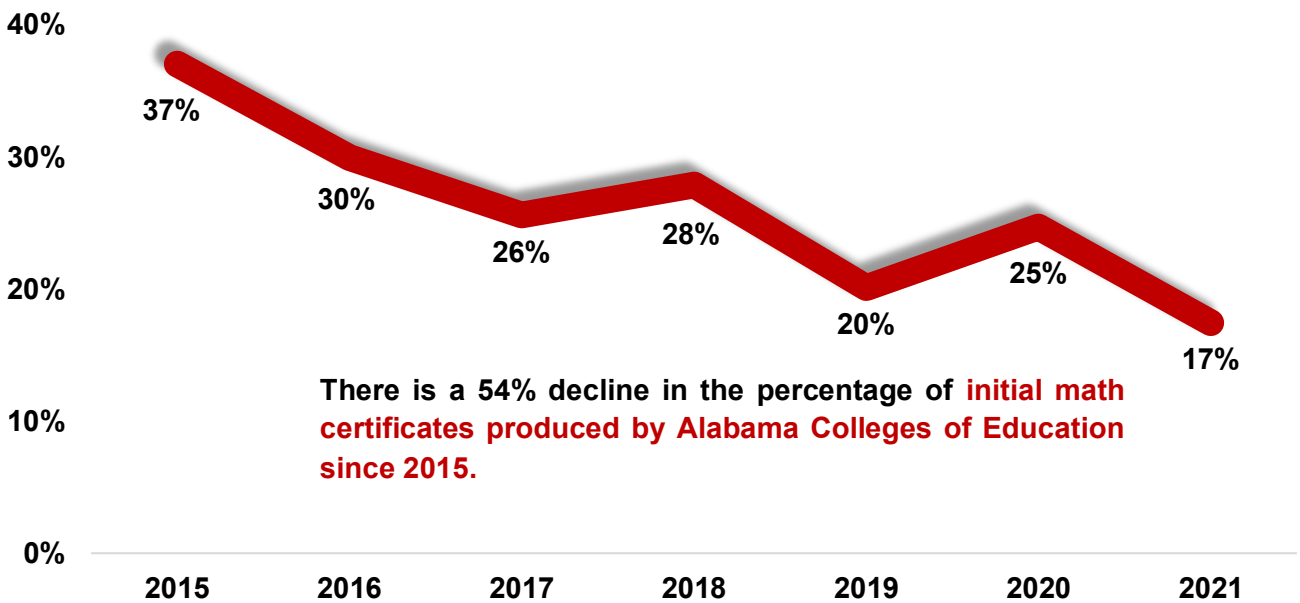


TEACHER SUPPLY BY SUBJECT: COLLEGES OF EDUCATION -VS- OTHER PATHWAYS

Alabama’s Colleges of Education produced only 4,588 math and science teachers since 2006. Those institutions produced 9,072 school administrators during the same time. This inverted relationship demonstrates that Alabama public schools require alternative pipelines to staff core subjects.



Alabama Colleges of Education only produced about 26% of the state’s math teachers over the last 17 years. Recent production continues to decline, with an all-time low of just 53 *initial* math certificates issued in 2021. The decline began before the disruption of the pandemic and continued despite new initiatives like the AMSTEP.





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- ⁱⁱ Student Loan Forgiveness. NCSL.2020. <https://www.ncsl.org/research/education/student-loan-forgiveness.aspx>
- ⁱⁱⁱ Id.
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