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The Impact of the PART 147 Act on FAA Mechanic Written Exam Passage Rates

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Aviation Maintenance Technician Schools (AMTS) experienced one of the most significant changes in 2022. Overnight, the old Part 147—which had remained largely intact for over 50 years—was completely erased and replaced by the new Part 147. One of the noteworthy features of this drastic regulatory change is that for most AMTS, the responsibility of curriculum oversight shifted from the FAA to individual institutions. It is important to monitor learning outcomes because of this change. Passage rate data published by the FAA for 14 quarters were examined (seven quarters before the rewrite and seven quarters after). Results indicate that there is no statistically significant difference in pass rates before and after the rewrite, although the scores improved in all the measures we studied.

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Introduction

The 2022 modernization of 14 C.F.R. Part 147 (Part 147) represents one of the most significant changes to aviation maintenance education. For years, aviation maintenance organizations have voiced concerns regarding the aviation maintenance workforce (U.S. Government Accountability Office [GAO], 2023). Industry reports projected shortages of Airframe and Powerplant (A&P) mechanics due to retirements and fleet expansions (Aviation Technician Education Council [ATEC], 2024a). Additionally, technologically advanced aircraft demand a more modern approach to aviation maintenance education and training (ATEC, n.d.-b; GAO, 2003).

The new Part 147 went into effect on September 21, 2022, and overnight, the old Part 147 was completely replaced. These new regulations were introduced in Congress under the name "Promoting Aviation Regulations for Technical Training (PARTT) 147 Act of 2019" (S.3043/H.R.5427). It was incorporated into the Consolidated Appropriations Act (H.R. 133) and signed into law on December 27, 2020. There was an almost two-year delay before the new Part 147 became effective.

Although the modernization was intended to improve responsiveness, relevance, and workforce alignment, it is important to monitor the transition to the new Part 147. Changes in curriculum oversight, course sequencing, and assessment criteria may impact student performance and learning outcomes. If the intent of regulatory reform was to increase institutional responsiveness and improve workforce throughput, declines in certification examination pass rates could exacerbate existing shortages. Conversely, short-term performance fluctuations may represent transitional adjustment rather than being indicative of a long-term trend. Evaluating aggregate pass rate trends is therefore not only an educational question but also a workforce development issue.

Monitoring outcomes during this transition has been difficult due to inconsistencies in the publication schedule of pass rate data. Additionally, the Federal Aviation Administration (FAA) is not required to publish any pass rate reports until three years after the rewrite (14 C.F.R. § 147.25, 2022). Even though 2025 marks three years after the rewrite, the FAA has indicated that the full report will not be published until January 2027 (FAA, 2024a). However, the FAA has published several preliminary reports following the rewrite, and we analyzed the data from these reports for this study.

Literature Review

Aviation Maintenance Technician Schools (AMTS) operate under regulatory authority established by the FAA, and for much of their history they have been governed by highly prescriptive, hour-based curriculum requirements (ATEC, 2022). Additionally, much of the old Part 147 required schools to teach outdated technologies (ATEC, 2022). The 2022 rewrite shifted this framework toward a competency-based model aligned with the Mechanic Airman Certification Standards (ACS), which granted institutions greater flexibility in curriculum design while maintaining the FAA's authority over standardized certification testing. It also transferred the responsibility of curriculum oversight from the FAA to individual institutions (ATEC, 2022).

Historical Development of FAA Part 147

Part 147 governs the certification and operation of AMTS under the FAA. Historically, Part 147 prescribed minimum seat-time and curriculum requirements in General, Airframe, and Powerplant subject areas. Students in an AMTS were required to receive 1,900 hours of instruction, which were split between time in class and in the shop (Hunt, 2010; Summey et al., 2004). The 1,900-hour rule is further divided into 400 hours of materials from the General curriculum, 750 hours of Airframe instruction, and 750 hours of Powerplant instruction (14 C.F.R. § 147.21, 1992). Additionally, the FAA was responsible for curriculum oversight. This structure reflected a compliance-oriented model in which regulatory oversight emphasized instructional inputs rather than measured educational outcomes.

For decades, this hour-based framework remained largely unchanged. The old Part 147 curriculum was developed in the 1940s and underwent a major revision in 1970 (Broderick, 2017; GAO, 2003), a minor revision in 1992 (Hunt, 2010), and other minor revisions throughout the years. There were two efforts to enact major changes to Part 147—in 1994 and 1998—but both efforts failed due to resistance from the industry (Broderick, 2017). Thus, the new Part 147 is the first successful major revision since 1970.

ATEC and industry organizations have been at the forefront of advocating for the modernization of Part 147 (ATEC, n.d.-b). Educational models and technology have changed since the 1970s (ATEC, 2022; GAO, 2003). While the old Part 147 promoted uniformity among AMTS, critics argued that much of the curriculum was outdated, with little flexibility to incorporate technological changes. Even the FAA acknowledged the benefits of the new Part 147: "The new rule will enable schools to teach students with a curriculum that incorporates new innovations and technologies" (FAA, 2022, para. 3).

Today, aviation maintenance education occurs across diverse institutional environments and can be found in four-year universities, two-year community colleges and technical schools, private for-profit technical schools, and even in a few high schools. These institutions differ in funding structures, faculty composition, admission criteria, student demographics, and institutional missions. For example, an AMTS curriculum in a four-year university will typically include maintenance management courses, such as management theory, human resources, and basic accounting. Teaching management skills is beyond FAA's requirement for AMTS (Summey et al., 2004).

The 2022 Part 147 Modernization Rule

One noteworthy feature of the new Part 147 is that it completely replaced the previous Part 147. It was not a major revision in the sense of adding, modifying, or removing parts of the old Part 147; it was a complete rewrite. All the requirements of the old Part 147 fell into obsolescence on September 21, 2022. The new Part 147 replaced rigid hour requirements with a competency-based framework tied to the Mechanic ACS (14 C.F.R. § 147.17, 2025; FAA, 2021). Rather than mandating specific instructional hour totals for each subject area, the new rule requires institutions to ensure students demonstrate competency in ACS-defined knowledge, risk

management, and skill elements (FAA, 2024b). This transition paralleled similar ACS reforms across other airman certification domains.

While removing the seat-time requirement was one of the more prominent features of the new Part 147, the intent was to transfer the responsibility of curriculum oversight from the FAA to the Department of Education (ATEC, 2022). Under the old Part 147, an AMTS cannot make changes to its curriculum without FAA approval in advance (14 C.F.R. § 147.38(b), 1992), but the new Part 147 allows schools that are accredited according to 20 U.S.C. 1001(a)(5) to be exempt from developing quality control systems approved by the FAA (14 C.F.R. § 147.23, 2022). In other words, FAA AMTS inspectors are not experts in educational matters, and thus, they should not have regulatory oversight over issues pertaining to curriculum or course delivery methods. In ATEC's summary of the new Part 147, they succinctly state, "for nationally accredited programs, the FAA will defer to the Department of Education expertise in all areas concerning quality of education" (ATEC, 2022, para. 4).

This regulatory intent emphasizes flexibility, innovation, and alignment with contemporary industry needs by granting AMTS the authority to develop curriculum and implement instructional methods. In practice, this marks a drastic deviation in that the FAA.

> will no longer approve curricula, methods of instructional delivery (i.e., no more FAA distance learning authorizations required), how and where educational content is consumed (i.e., schools will have the opportunity to provide training at an additional fixed location, such as a high school), grading systems, testing schedules, or class sizes (ATEC, 2022, p. 1).

Airman Certification Standards

The transition from the Practical Test Standards (PTS) framework to the ACS is novel to aviation maintenance certification. However, ACS is not a new concept in aviation: Testing for pilot certificates and ratings transitioned from the PTS to the ACS in 2016 and 2017 (FAA, 2017). While the PTS has been used for nearly 30 years, the ACS is intended to go beyond the PTS. For the PTS, an applicant for a certificate or rating must perform flight procedures or maneuvers to a standard, but under the ACS, they must demonstrate the ability to "integrate knowledge, skills, and risk management proficiency" (Wright, 2019, para. 2). In other words, the FAA (2017) considers the ACS as an integration of "the standards for what an applicant needs to know, consider, and do in order to pass both the knowledge test and the practical test for a certificate or rating" (p. 5).

The benefit of the ACS from both the mechanic and pilot certification perspectives is that everything is built from the same standard (ATEC, n.d.-a). The ACS aligns training and testing standards, which ensures that what is being taught by instructors and what is being evaluated by examiners are from the same standard (ATEC, n.d.-a). It is incumbent upon each institution to align its curriculum to the ACS (14 C.F.R. § 147.17, 2025).

Pass Rate Reports

Under the old Part 147, the FAA was required to publish norms reports of school pass rates for written exams (ATEC, 2024b). In 2024, less than two years after the rewrite, ATEC became aware that the FAA intended to stop publishing these reports but planned to release reports that comply with the new 14 C.F.R. § 147.25 (ATEC, 2024b). However, a search of the Airman Knowledge Test Statistics database showed that the reports were still published for a short period of time after the rewrite. The FAA eventually stopped publishing these reports, and then, at the end of 2024, the FAA published a report covering 16 months of pass rate data (for reference, reports were normally published every three months before the Part 147 rewrite; FAA, n.d.).

The new report tracks pass rates based on the requirements of 14 C.F.R. § 147.25 (2022), entitled "Minimum passage rate." The new regulation only requires tracking students' pass rates within 60 days after graduation, which ATEC opines as a "pretty narrow look" (ATEC, 2024b, para. 1). Furthermore, 14 C.F.R. § 147.25 paragraph (c) (2022) states:

> For students who take a combination of tests within the 60-day window specified in paragraph (b) of this section, an aviation maintenance technician school must count a failure on any one test as a student failure for purposes of determining the pass rate, unless that failed test is subsequently passed within the 60-day window.

While the 60-day window is not new—the old norms reports only tracked exam results within 60 days of graduation—the method for determining the pass rate is new. If a student fails an exam but passes it within the 60-day window, under the new Part 147 rules, it would be counted as passing (14 C.F.R. § 147.25 (c) (2022); see also FAA, 2024a). This is different than how the old norms reports tracked pass rates, which reported the results of the first attempt rather than multiple attempts. It is also important to note that under the new reporting requirements, pass rates are calculated by all tests attempted within the 60-day window: "If a student passes the written and oral tests but fails the practical test within 60 days, they are classified as a Failing Student" (FAA, 2024a, p. 1).

Furthermore, after the rewrite, the pass rates are tracked two ways by the FAA. The school pass rate report includes all the exams. For example, if a student passes the AMG written but fails the AMP written and did not pass the AMP on retest within 60 days, then that student is counted as failing. However, in the second pass rate report, which is by topic, if a student passes the AMG written, then the student is counted as passing for AMG. If the student fails the AMP practical and did not pass on the subsequent attempt or attempts within 60 days, then that student is counted as failing for AMP, and this student is counted as failing for the school report.

This method could lower the overall pass rate score for institutions because just one failure that has not been retested within 60 days will be marked as a failure. On the contrary, it could also mask failed attempts, as students have a long window to retake any failed exams, and upon passing within the 60-day window, it would be counted as passing. For example, if a student passed the written and oral exams, but failed the practical exam within 60 days of graduation, instead of recording two passes and one fail (66%), it is now only recorded as one

failure (0%). Another example would involve a student who failed two attempts and passed one attempt, but this student retook the exams before the 60-day window and passed the two previously failed attempts. Instead of recording it as a 33% pass rate, it is now recorded as a 100% pass rate. These examples show a dramatic difference in what is recorded and what actually happened. This does not paint an accurate picture of students' success. While the new Part 147 rules allow for retesting to count as passing, those who attempt the exams too close to the 60-day window and fail have little to no time to obtain retraining and reschedule exams, particularly for the oral and practical (O&P) exams.

Furthermore, early testing for the O&P exam under 14 C.F.R. § 65.80 may also be a factor for inaccurate scores. Title 14 C.F.R. § 65.80 (2022) allows a student to take the O&P exam in their last semester of coursework without first passing the written exams. Thus, the success or failure of students who elect to take the O&P early will not be tracked, as they have not graduated yet. To qualify for early O&P testing, students must demonstrate that they have "made satisfactory progress at the school and are prepared to take the oral and practical tests" (14 C.F.R. § 65.80, 2022).

There may be some students who delay taking the O&P until after they graduate because they are either not prepared or have not made satisfactory progress. If they choose to take the O&P within 60 days after they graduate, their pass rate will be tracked, but if they are less prepared or did not show satisfactory progress in their last semester, they may have lower testing outcomes than their peers who took the O&P prior to graduation. In this situation—since the new Part 147 considers O&P scores in pass rate calculations—it could lower the overall pass rates. Conversely, those who took it early and failed will not have the failure tracked, which may increase overall scores.

Research Questions

Research Question 1: Is there a difference in the pass rates before the Part 147 rewrite and the pass rates after the rewrite?

Null hypothesis: There is no difference in the pass rates before and after the Part 147 rewrite.

Research Question 2: Is there a difference in the pass rates of each exam topic before the Part 147 rewrite and the pass rates after the rewrite?

Null hypothesis: There is no difference in the pass rates of each exam topic before and after the Part 147 rewrite.

Research Question 3: Is there a difference in the pass rates of different school types before the Part 147 rewrite and the pass rates after the rewrite?

Null hypothesis: There is no difference in the pass rates of different school types before and after the Part 147 rewrite.

Methodology

This study utilized a quasi-experimental design, where the causal impact of an independent variable is tested (Shek & Wu, 2018). However, unlike a true experiment, in a quasi-experimental design, participants are not randomly assigned (Shek & Wu, 2018). In this study, the participants belonged to either the pre- or post-rewrite groups. The pre-rewrite group serves as the control group, and the post-rewrite group serves as the experimental group. The intervention is the Part 147 rewrite, and the pass rate is the dependent variable.

The quasi-experimental design was chosen because this design "evaluates the effect of an intervention, event, or policy without randomly assigning participants or units to conditions" (Hassan, 2026, para. 1). For this study, an experimental design would be nearly impossible to achieve. Under the old Part 147, AMTS cannot deviate from FAA-approved curriculum, nor can they bypass the seat-time requirement. Thus, under the old Part 147, it was impossible to randomly assign one population to study under a competency-based curriculum. Similarly, if this study was conducted under the new Part 147, a group of students would have to be randomly assigned to take the old Part 147 curriculum and abide by old Part 147 rules. This poses a major problem: Components of the old Part 147 have been removed, and new components have been added to the ACS and to the tests. Thus, a group of students randomly selected to study under the old Part 147 requirements would not be fully prepared to take the written, oral, and practical exams, which would affect test results.

The pass rate datasets used in this study were extracted from the Airman Knowledge Test Statistics, which are publicly available on FAA's website (FAA, n.d.). The FAA continued publishing norms reports for two quarters after the rewrite in 2022, but they stopped publishing reports after the first quarter of 2023 (ending on March 31, 2023). The next report appeared at the end of 2024, containing the dates August 1, 2023 to December 31, 2024, which is roughly five quarters (plus one month). There is a gap of four months, from April 1 to July 31, 2023, where the data is missing. No explanation could be found as to what happened to the data.

For data analysis, we compiled data from seven quarters prior to the rewrite and data from seven quarters plus one additional month after the rewrite to compare the differences in pass rates. Data before the rewrite were published as Microsoft Excel spreadsheets, but data after the rewrite were published as PDF documents. Data from the PDF documents required manual entry into a compiled Excel spreadsheet.

Adjusting the Pass Rates

Once the data were compiled, the pass rates were adjusted based on the population, the exam type, and the school type, which were the three variables of interest. The rationale for making these adjustments is that the data would be skewed if we used the pass rates supplied in the report. This is not the fault of the FAA, and the pass rates they supplied are accurate. However, the pass rates they provided are not intended to be used for analysis without adjustments, as shown below.

Consider this example: There are five schools, and each school has different numbers of applicants and the number of applicants who passed (see Table 1). Table 1 is constructed to be a simplified version of the pass rate reports. If the pass rate column was averaged, the result would be 83.48%. However, the results from schools with fewer applicants (Schools C, D, and E) would skew the dataset. To find the actual pass rate, the total number of applicants was divided by the number of applicants who passed (83 and 88, respectively), which is 94.32%. This is only used for illustration purposes. The actual difference in the pass rate based on the two types of calculation in the reports is smaller.

Table 1
Comparing Two Methods of Calculating Pass Rates

School	# of Applicants	# Passed	Pass Rate
A	43	42	97.67%
B	38	36	94.74%
C	4	3	75.00%
D	1	1	100.00%
E	2	1	50.00%
Total	88[b]	83[b]	Avg. 83.48%[a]

Note. Hypothetical example of two types of pass rate calculations. This Table shows that averaging the Pass Rate column is inaccurate.
[a] The average of the Pass Rate column is 83.48%, but that number is skewed by the schools with fewer applicants. [b] The actual Pass Rate is calculated based on the number passed divided by the number of applicants. In this case, 83 ÷ 88 = 94.32%.

To analyze the dataset using the actual pass rate, the data must be further adjusted, as *t*-tests or ANOVAs require a single dependent variable for analysis. In other words, it would be meaningless to conduct a *t*-test comparing the number of applicants passed before the rewrite and after the rewrite, as the total number of applicants is different. Furthermore, because the population between the two datasets is different, the pass rate must be adjusted according to population differences for the *t*-test comparisons to be accurate.

The population differences were adjusted first (see Table 2). In the seven quarters leading up to the rewrite, there were a total of 17,310 applicants, and 14,130 passed, with an actual pass rate of 81.6%. In the seven quarters (plus one month) following the rewrite, there were a total of 30,513 applicants, and 26,044 passed, with an actual pass rate of 85.4%. Interestingly, if the pass rate column was averaged, it would result in a before-rewrite pass rate of 86.2%, which is higher than the actual pass rate of 81.6%. After the rewrite, the average of the pass rate column is 86.3% versus the actual pass rate of 85.4%.

Table 2
Pass Rates with and without Population Adjustment

	Before Rewrite	After Rewrite
# of Applicants [1][a]	17,310	30,513
# Passed [2][a]	14,130	26,044
Actual PR [2] ÷ [1][b]	81.6%	85.4%
Average of PR column[c]	86.2%	86.3%

Note. This Table shows the importance of adjusting the pass rates based on population size. [a] The number of applicants and the number of applicants passed are drawn from FAA's report. [b] The actual pass rate is the number passed ÷ the number of applicants. This shows the true pass rate. [c] The "Average of PR column" is calculated by taking an average of the pass rate column in the FAA pass rate reports.

To adjust for the population difference, the number of applicants after the rewrite (30,513) was divided by the number of applicants before the rewrite (17,310), which is a factor of 1.763. The number of applicants who passed before the rewrite was multiplied by 1.763 (see Table 3). This number is the weighted score by population. The average of the weighted score by population in the hypothetical example in Table 3 is 29.266. The average of the weighted score (29.266) was divided by the actual pass rate of 81.6% (0.816) to find the score factor of 35.865, and the weighted score of the population was divided by 35.865 to find the adjusted pass rate. The average of the adjusted pass rate column is 81.6%, which is the same as the actual pass rate column, and having an adjusted pass rate allows for the comparison of the means of the two groups (before rewrite and after rewrite) with a single dependent variable using the *t*-test. No population adjustments were made for the scores after the rewrite, since the population factor for that group is 1.00; however, the adjusted pass rate was still calculated using the score factor method. Similarly, for testing the difference between topics and school type, the population adjustments were made based on the number of applicants for each category.

Table 3
Hypothetical Population Adjustment Calculation

School	# Passed		Population Factor		Weighted Score Population		Score Factor		Adjusted Pass Rate
A	42	×	1.763	=	74.046	÷	35.865	=	2.0646
B	36	×	1.763	=	63.468	÷	35.865	=	1.7697
C	3	×	1.763	=	5.289	÷	35.865	=	0.1475
D	1	×	1.763	=	1.763	÷	35.865	=	0.0492
E	1	×	1.763	=	1.763	÷	35.865	=	0.0492
					Avg. 29.266				Avg. 0.8160

Note. Because the population size between pre- and post-rewrite data is different, one set of pass rates must be adjusted to the other set. This Table shows that after the pass rates are adjusted, the Adjusted Pass Rate column can be averaged to show true Pass Rate.

Results

A total of 1,200 rows of data were used for analysis, which comprises the pass rates of 200 schools in the FAA's norms and pass rate reports. Three pass rates for each school were further divided based on the three written exam topics: General (AMG), Airframe (AMA), and Powerplant (AMP), and pass rates were reported for before the rewrite and after the rewrite.

Analysis of Overall Scores

Research Question 1 states, "Is there a difference in the overall pass rates before the Part 147 rewrite and the pass rates after the rewrite?" An independent *t*-test was used to analyze the overall pass rates before the rewrite ($n = 600$) and after the rewrite ($n = 600$). Normal distribution was assumed based on the central limit theorem (Sheposh, 2024; West, 2021), and Levene's test showed that the variances were similar for the pass rates before and after the rewrite, $F(1, 1198) = .023$, $p = .88$. Using the adjusted pass rate, the pass rates before the rewrite were lower ($M = 81.6\%$, $SD = 1.28$) than the scores after the rewrite ($M = 85.4\%$, $SD = 1.36$); however, this difference was not statistically significant, $t(1194.2) = .49$, $p = .63$. We accept the null hypothesis that the pass rate difference before and after the rewrite was not statistically significant.

Analyses by Topic

Research Question 2 states, "Is there a difference in the pass rates of each exam topic before the Part 147 rewrite and the pass rates after the rewrite?" Three independent *t*-tests were conducted to analyze the pass rates for AMA before the rewrite ($n = 200$) and after the rewrite ($n = 200$), for AMG before ($n = 200$) and after ($n = 200$), and for AMP before ($n = 200$) and after ($n = 200$). Pass rates were adjusted for population differences for each test group rather than the overall population. Normal distribution was assumed based on the central limit theorem (Sheposh, 2024; West, 2021), and Levene's test of equal variances was tested for each topic, and the results for the pass rates of all three topics showed that the variances were similar. For AMA: $F(1, 398) = 0.03$, $p = .87$; for AMG: $F(1, 398) = .07$, $p = .79$; for AMP: $F(1, 398) = .002$, $p = .96$. The pass rates for all three exam topics were higher after the rewrite; however, we accept the null hypothesis that the differences in pass rates based on exam topics were not statistically significant (see Table 4).

Table 4
Pass Rates by Topic

	Before Rewrite		After Rewrite			Difference
Topic	*M* [1]	*SD*	*M* [2]	*SD*	*p*	[2] – [1]
AMA	83.0%	1.23	87.6%	1.42	.73	4.6%
AMG	80.5%	1.38	82.2%	1.35	.90	1.7%
AMP	81.6%	1.18	85.2	1.22	.77	3.6%

Note. Mean pass rates before and after the rewrite are organized by the test subject. While there are differences in the pass rates before and after the rewrite, the differences are not statistically significant.

Analyses by School Type

Research Question 3 states, "Is there a difference in the pass rates of different school types before the Part 147 rewrite and the pass rates after the rewrite?" Schools were categorized as "High School," "Private," "Two-Year," and "Four-Year." For the purposes of this analysis, "High School" pass rates were removed due to a small sample size ($n = 3$). Of the other three, there were 46 Private schools (138 lines of pass rate data), 125 Community/Technical Colleges (375 lines of pass rate data), and 26 Universities (78 lines of pass rate data). A one-way ANOVA was conducted to compare pass rates by school type before the rewrite, and there was no statistical difference among the school types: $F(2, 588) = .73$, $p = .48$ (see Table 5). Similarly, a one-way ANOVA comparing the pass rates among the school types after the rewrite also showed no statistical difference: $F(2, 588) = .30$, $p = .74$ (see Table 5).

Table 5
Pass Rates by School Types

	Private		Two-Year		Four-Year		
	M	*SD*	*M*	*SD*	*M*	*SD*	*p*
Before Rewrite	75.6%	.96	87.8%	1.10	88.8%	.96	.48
After Rewrite	80.9%	1.06	89.2%	1.09	90.0%	1.40	.74

Note. Mean pass rates before and after the rewrite are organized by the type of institution.

To further explore the effects of the rewrite on the school type, three independent *t*-tests were conducted for school type before and after the rewrite. Normal distribution was assumed based on the central limit theorem (Sheposh, 2024; West, 2021), and Levene's test showed equal variances for all three groups: Private, $F(1, 274) = .00$, $p = .99$; Two-Year, $F(1, 748) = .14$, $p = .71$; and Four-Year $F(1, 154) = .002$, $p = .97$. While pass rates were higher after the rewrite for all types of institutions, there were no statistically significant differences among all three school types (see Table 6). Taken together, we accept the null hypothesis for Research Question 3 in that the differences in pass rates based on school type were not statistically significant.

Table 6
Changes in Pass Rate Before and After the Rewrite by School Types

	Before Rewrite		After Rewrite			Difference
School	*M* [1]	*SD*	*M* [2]	*SD*	*p*	[2] – [1]
Private	75.6%	.96	80.9%	1.07	.66	5.3%
Two-Year	87.8%	1.10	89.2%	1.09	.86	1.4%
Four-Year	88.8%	.96	90.0%	1.40	.95	1.2%

Note. Pass rates were different before and after the rewrite, but the differences are not statistically significant.

Discussion

There were three possible outcomes to our analyses: No statistically significant difference, statistically significant change in the positive direction, and statistically significant

change in the negative direction. In all the analyses conducted, the difference in pass rates before and after the rewrite showed no statistically significant difference. Since there is no statistically significant change, these results indicate that the Part 147 rewrite had no statistically significant impact on the learning outcomes, as evidenced by pass rates. This is considered a positive outcome.

Overall Pass Rate Difference

The first research question addresses the overall difference in pass rates before and after the Part 147 rewrite. The difference was not statistically significant. This suggests that the new Part 147 regulations have no negative effect on the testing outcomes. Though not statistically significant, there is an increase in post-rewrite pass rates. The average pass rate before the rewrite was 81.6% and after the rewrite was 85.4%, a 3.8% difference.

An 85.4% is considered a high average pass rate when compared to pilot certification exams, which average around 80% (Hoover, 2022). The high average pass rate could be explained by a high level of motivation exhibited by aviation students (Brady et al., 2001; Summey et al., 2004). Brady et al. further found that aviation students behave as adult learners according to the constructs in Knowles' learning model (2001). It is believed that aviation students are more mature learners because they see education as the first step of their career (Brady et al., 2001; Summey et al., 2004).

Pass Rate Differences by Topic

The second research question addresses differences in pass rates by topic. When examining pass rates by exam topic, the order of pass rates—from highest to lowest—remained the same before and after the rewrite. Airframe had the highest score, followed by Powerplant and General. There were increases in average pass rates among the three topics. Perhaps the most noteworthy is that the General exam showed the smallest increase (1.7% as compared with 3.6% and 4.6%; see Table 4). However, these changes were not statistically significant.

This is an interesting result, because one of the major changes in the rewrite was allowing students to take the General written exam after completing General courses (14 C.F.R. § 147.31, 2022). Prior to the rewrite, the General written exam was normally taken with either the completion of the Airframe or Powerplant curriculum, though a few exceptions allowed for an earlier testing of the General written exam.

According to the Law of Recency, the things learned last will be remembered the best (Davis, n.d.); thus, if students are allowed to take the General written exam after the completion of the General courses (instead of waiting to take it with either the Airframe or Powerplant written exams), the scores should be higher. However, not all schools group the General classes together. In some cases, the General courses are spread out across the entire Part 147 curriculum. In this case, the scores may not be higher as General classes are taken over many semesters or years. But in some cases, the General courses are taken first. For those who take the General courses together and in short order, the written exam scores should be higher.

Pass Rate Differences by School Type

The third research question addresses the pass rate differences among the three school types. Analysis comparing data from different types of schools showed that private schools made the most improvement (5.3%), which is larger than the overall average of 3.8%. This could be due to curricular flexibility. In many two- and four-year schools, changing the curriculum is a long and arduous process. It has to be first approved by curriculum committees on various levels (department, college, university). Before the Part 147 rewrite, schools also had to obtain FAA approval. The process to modify, add, or remove courses could take up to a year or more. Private institutions may have more flexibility to modify curriculum to ensure student success. Furthermore, some of the private institutions have industry partners. One of the large private institutions boasts six industry partnerships, including U.S. major airlines, U.S. regional airlines, and an international flagship airline. This same school also offers industry-approved training.

Two- and four-year schools showed an improvement in pass rates after the rewrite (1.4% and 1.2%, respectively), but this was not statistically significant. While two- and four-year schools showed improvement that is lower than the average increase, it should be noted that their pass rates were already high (in the high 80s) before the rewrite. This shows the need to examine not just the overall pass rates but also consider the school type.

In 2004, Summey et al. found that the average pass rate of two- and four-year schools was 87.7%. The finding in 2004 is very similar to the pass rates pre-rewrite in 2021-2022 (87.8% for two-year schools and 88.8% for four-year schools). Summey et al.'s finding is slightly lower than our findings, where the average pass rates of two- and four-year schools exceed 89%. However, the difference is small. This shows that the quality of education and training provided by two- and four-year schools has remained high.

Furthermore, when comparing two- and four-year schools, the difference is negligible. Before the rewrite, the difference between two- and four-year schools was 1.0%, and the difference after the rewrite was 0.8%. This is in alignment with existing literature. Summey et al. (2004) found no statistical difference between the pass rates of two-year and four-year schools. However, Summey et al. (2004) excluded private maintenance schools from their study.

We included Private schools in this study because the number of applicants from private schools was the highest among the different school types. In the seven quarters before the rewrite, there were 8,911 applicants from Private schools, as compared to 6,385 and 1,942 from two- and four-year schools, respectively. Similarly, in the seven quarters (plus one month) after the rewrite, the number of applicants from private schools exceeded the second-highest number by more than 2,700 applicants. When comparing the results of private versus two- and four-year schools, the contrast is much sharper, with a difference of 12.2% before the rewrite (see Table 6), but private schools closed the gap with 8.3% after the rewrite (see Table 6).

Limitations

One limitation is that pass rates are tracked only for students who test within 60 days of graduation. This is true for data tracking before and after the rewrite. There is no data on how

many students took the exams past 60 days of graduation. Furthermore, "graduation" does not necessarily mean graduation from all coursework. For example, if a student finishes their coursework for Powerplant on December 15, 2024 (the end of the fall semester), they would be issued a graduation certificate with December 15, 2024 as the date of graduation. If they are finishing their Airframe curriculum in the next semester, say on May 15, 2025, and they elect to study and attempt the Airframe and Powerplant exams together in May, then their testing record for Powerplant would not be tracked, as they are outside of the 60-day window. Or if they decide to postpone their testing by two months to study, then by July 15, 2025, none of their testing records are tracked.

Additionally, students who initially fail but pass on subsequent attempts within 60 days are counted as passing; any single failure that remains after the 60-day window is recorded as a failure. This could have two effects: First, it could mask the failures, as students can reattempt the exams within 60 days. Second, this could lower a school's overall pass rate if students have a recorded failure before reattempting the exam within the 60-day window.

Another limitation is that the report issued after the rewrite is preliminary. The FAA (2024a) pass rate report for data after the rewrite includes the following notice:

> This report is for informational purposes only and is based on preliminary data. This preliminary report is not intended to be used for regulatory compliance determinations until data for a full three-year period is available in January 2027. The FAA reserves the right to update the methodology and reporting framework as necessary to ensure accuracy of the report. (p. 1)

Recommendations for Future Research and Practice

We recommend continuous monitoring of test results across school types, particularly between private schools and two- and four-year schools. Additionally, future research should explore the impact of the new tracking method, which combines written and O&P outcomes as a singular result. Better pass rate tracking is possible if the FAA changed the methodology and reporting framework to include statistics on early O&P testing under 14 C.F.R. § 65.80. The FAA should also track individual test statistics rather than the collective results of multiple tests, and the 60-day window for tracking test results should be expanded.

Due to the way the FAA tracks pass rates, the pass rate reports are incomplete, and in some cases, lacking valuable data. Schools should track their own pass rates, including the number of attempts a student took to pass an exam. Knowing this could help schools improve. Schools should examine their curriculum to see if AMG courses are grouped together. Due to the new regulations, students can take the AMG written exam after completing the AMG courses. This means students should take the AMG courses within a couple of semesters and take the AMG written exam after they finish the AMG courses. The improved knowledge retention and recall due to the recency effect may be beneficial. Future research should examine the effect of the Law of Recency on programs where AMG classes are grouped together and programs where AMG courses are scattered across the curriculum.

The large increase in pass rates in private schools should be further explored. This could be explored using qualitative approaches, such as case studies. Understanding how private schools improved under the new Part 147 may yield beneficial educational practices and policies for public two- and four-year AMTS. Lastly, there should be longitudinal efforts to track the pass rates to determine if the improvements in pass rates continue. These studies could be conducted with future changes to the ACS.

Conclusion

The Part 147 rewrite represented the most significant change under 14 C.F.R. Part 147 since 1970. Much has changed in the five decades since, and more change is expected in the coming years in the aviation maintenance industry. Already, the number of applicants in the 1.75 years after the rewrite is 76% higher than the number of applicants 1.75 years before the rewrite. This is a positive trend for workforce development.

As AMTS prepares its graduates for the industry, it is important to teach and train students on modern aircraft maintenance technology and practices. In doing so, AMTS can develop a competent workforce that is prepared for the contemporary aviation maintenance industry. Thus, the maintenance training curriculum must remain flexible to adapt to these changes, but the outcomes of the new Part 147 must be examined to determine their impact on learning outcomes.

In the almost four years since the Part 147 rewrite, preliminary pass rate data show no significant difference between pass rates before and after the rewrite. While not statistically significant, the pass rates increased in all the measures in our study. This is a positive outcome for AMTS operating under the new Part 147. The new Part 147 was still nascent when we extracted the pass rate data; thus, our results are preliminary and represent the initial changes schools are making. The FAA, AMTS, and the industry should ensure that the new Part 147 continues to produce positive outcomes from its graduates.

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