Open Access Library Journal
2026, Volume 13, e15280
ISSN Online: 2333-9721
ISSN Print: 2333-9705

Research on the Continuous Improvement Mechanism of Teaching Quality in Aviation Maintenance Training Institutions Based on the PDCA Cycle Theory

Ting Wang

The 93756th Unit of the People's Liberation Army of China, Tianjin, China
Email: wangting031@126.com

How to cite this paper: Wang, T. (2026) Research on the Continuous Improvement Mechanism of Teaching Quality in Aviation Maintenance Training Institutions Based on the PDCA Cycle Theory. *Open Access Library Journal*, **13**: e15280.
https://doi.org/10.4236/oalib.1115280

Received: March 31, 2026
Accepted: May 24, 2026
Published: May 27, 2026

Abstract

Aviation maintenance support is a core support link in the air force combat capability generation chain, and the quality of its personnel is directly related to flight safety and combat effectiveness. As key bases for training pre-selected and promoted non-commissioned officers, aviation maintenance training institutions urgently need to address systemic predicaments such as teaching content lagging behind the actual combat needs of the military, teaching models emphasizing knowledge imparting, and the disconnection between teaching evaluation and feedback mechanisms. This paper uses the PDCA cycle theory, the core tool of total quality management, as the analytical framework to systematically construct a four-stage integrated teaching quality improvement mechanism of "planning - doing - checking - handling". This mechanism forms an endogenous closed loop of self-diagnosis, self-correction and self-improvement through scientific planning of top-level design, standardized execution of the teaching process, multi-dimensional diagnosis of teaching effectiveness, and dynamic iteration of the curriculum system, providing a systematic solution for the intrinsic and high-quality development of aviation maintenance training in the new era.

Subject Areas

Pedagogy

Keywords

Aviation Maintenance Training, Teaching Quality, PDCA Cycle, Continuous Improvement, Closed-Loop Mechanism, Non-Commissioned Officer Education

1. Introduction

In the context of an era of accelerated evolution of information and intelligent warfare forms, air force equipment technology is evolving rapidly, combat styles are undergoing profound changes, and unprecedented high demands are placed on aviation maintenance support forces. Maintenance personnel are not only the "health doctors" of equipment maintenance, but also the "multipliers" of combat effectiveness. Their professional competence, practical operation ability and battlefield adaptability directly determine whether the battle eagle can take off at any time and fight efficiently [1]. Aviation maintenance training institutions, as the "converter" and "refueling station" connecting academy education with military positions, have core functions of pre-job training for pre-selected non-commissioned officers and capability enhancement training for promoted non-commissioned officers. This stage of training is highly job-oriented, practical and time-sensitive. It is the last line of defense for shaping qualified aircraft combat personnel, and the importance of its teaching quality is self-evident [2].

However, looking at the current situation of aviation maintenance training, there are still many deep-seated contradictions that restrict the improvement of teaching quality. On the one hand, there is a significant "time lag" between the teaching content and the actual combat requirements of the military. New equipment, new combat methods, and new training methods have not been integrated into the classroom in a timely manner, resulting in a disconnection between what the trainees have learned and what the military needs; On the other hand, the teaching methods still largely remain in the traditional one-way indoctrination mode of "instructors talk and students listen", which makes it difficult to effectively cultivate students' advanced abilities such as independent thinking and collaborative problem-solving. Furthermore, the teaching evaluation system is relatively monotonous, overly dependent on summative assessment, lacking dynamic monitoring and effective feedback throughout the learning process, making it difficult to form an improvement loop that promotes the spiral improvement of teaching quality [3]. The root cause of these problems lies in the lack of an internal operating mechanism that can systematically integrate teaching inputs, processes, outputs and feedback and drive their continuous optimization.

Total quality management, as an advanced management philosophy, has the core ideas of "continuous improvement" and "customer-centricity". The PDCA cycle (Plan-Do-Check-Act) proposed by Dr. Deming, as the cornerstone of total quality management, provides a structured, scientific model of problem-solving and process improvement. The model emphasizes that any activity should begin with meticulous planning, followed by strict execution, supplemented by objective inspection, and ultimately culminate in effective processing and standardization, thus forming a spiral improvement loop [4]. This theory is highly adaptable and instructive for addressing systemic and structural quality problems in aviation maintenance training.

In view of this, this paper aims to systematically deconstruct and reconstruct the entire teaching process of aviation maintenance training using the PDCA cycle theory as the meta-framework. By mapping the four stages of PDCA to different links of teaching activities and infusing them with the professional connotations of aviation maintenance training, a logically consistent and operationally efficient "plan - do - check - handle" mechanism for continuous improvement of teaching quality is constructed. This mechanism can not only effectively respond to the aforementioned practical challenges, but also fundamentally promote the fundamental transformation of aviation maintenance training from experience-driven to data-driven, from extensive management to fine governance, and from static courses to dynamic systems.

2. The PDCA Cycle Theory and Its Applicability in Military Vocational Education

2.1. The Core Essence of the PDCA Cycle Theory

The PDCA cycle, also known as the Deming cycle, is a classic model proposed by American quality management expert Dr. William Edwards Deming for continuous improvement of work processes and product quality [5]. It consists of four interrelated, end-end stages:

1) Planning stage: This is the starting point and key of the cycle. At this stage, it is necessary to set clear goals, identify problems or opportunities for improvement, analyze the current situation, identify the root causes, and accordingly develop a detailed action plan. The plan must be specific, measurable, achievable, relevant and time-bound (SMART principle). In the context of teaching, this corresponds to the setting of teaching objectives, the formulation of teaching syllabuses, the planning of teaching resources and the selection of teaching strategies [6].

2) Implementation stage: This stage is the process of putting the plan into practice. Take action on a small scale or on a full scale according to the established plan. The key is to follow the plan strictly and collect relevant data and information in the process to provide a basis for subsequent checks. In teaching, this covers the implementation of all teaching activities such as classroom instruction, practical operation, tutoring and answering questions [7].

3) Inspection phase: Also known as the "assessment" or "diagnosis" phase. The core task of this stage is to compare the results of the implementation with the intended goals and assess the effectiveness of the plan. Through data analysis, identify what is going well and what is going wrong, and delve into the causes of the problems. This is an evidence-based reflection process. In the field of teaching, this is manifested in various forms of teaching evaluation, student situation analysis, effectiveness assessment, and teaching reflection.

4) Processing stage: This is the end of the cycle and the beginning of the new cycle. Take corresponding measures based on the conclusions of the inspection phase. For successful experiences, standardize and solidify them to form new work norms; For failures or parts that do not meet expectations, analyze the reasons,

revise the plan, and incorporate them into the next PDCA cycle in order to improve in the next round of practice. In teaching, this is reflected in the update of course content, the innovation of teaching methods, the improvement of management systems, etc.

The PDCA cycle is not a linear, one-off process, but an endless spiral ascending process. Each cycle builds on the lessons learned from the previous one, which leads to a continuous and gradual improvement in the quality of work.

2.2. Adaptability Analysis of PDCA Cycle in Aviation Maintenance Training

The application of the PDCA cycle theory to aviation maintenance training has a profound inherent logical fit.

First of all, a high degree of consistency in the objectives. The PDCA cycle emphasizes "customer-centricity," and the ultimate "customer" of aviation maintenance training is the frontline combat force. The demand of the force for aircraft maintenance personnel is the starting point and the end point of all the work of the training institution. The PDCA cycle requires a precise definition of "customer needs" at the planning stage, which is in perfect alignment with the fundamental requirement that aircraft training must be "close to the military and focused on actual combat."

Secondly, systematic requirements for the process. Aviation maintenance work itself is a highly systematic, standardized and procedural precision operation that allows no room for carelessness. The structured and procedural problem-solving approach advocated by the PDCA cycle is precisely in line with the inherent characteristics of aircraft maintenance work. Transferring this mindset to teaching management helps to establish an equally rigorous and standardized teaching operation system.

Again, the continuity of improvement. Modern forms of warfare and equipment technology are evolving rapidly, and the knowledge, skills, and methods of aircraft support must also be constantly updated. This determines that aircraft maintenance training cannot be a one-time effort and must establish a dynamic mechanism that can self-perceive, self-correct, and self-improve. The concept of "continuous improvement" in the PDCA cycle is the theoretical source for building this dynamic mechanism.

Finally, a data-driven decision-making culture. The PDCA cycle emphasizes evaluation based on objective data rather than subjective assumptions during the inspection phase. This helps to abandon empiricism in maintenance training and establish a culture of scientific decision-making based on learning data, assessment data, and feedback data, making teaching improvements more precise and effective.

To sum up, the PDCA cycle theory provides a mature, reliable and highly adaptable theoretical lens and action guide for solving the quality dilemma of aviation maintenance training.

3. Planning Stage: Teach through Practice, Scientifically Plan the Top-Level Design of Teaching

The planning stage is the cornerstone of the entire PDCA cycle, and its quality directly determines the success or failure of the subsequent stages. In aviation maintenance training, the core task of the planning stage is to answer the fundamental questions of "what to teach" and "how to teach", that is, to conduct a scientific, forward-looking, and precise top-level design of teaching [8].

3.1. Precisely Anchor the Goals of Talent Cultivation

The goal of talent development is the general outline of teaching activities. In the planning stage, it is necessary to go beyond the traditional knowledge-based approach and establish a three-dimensional goal system that is ability-based and job demand-oriented.

1) Knowledge objectives: Clearly define the core theories, basic principles, technical procedures and safety norms that trainees should master. This knowledge must be the most up-to-date and screened essence necessary to support their job performance, with outdated and redundant content excluded.

2) Competency Objectives: Focus on typical tasks that trainees can complete independently, standardly, and efficiently. This includes, but is not limited to: the ability to perform routine maintenance and inspection of equipment, the ability to diagnose and troubleshoot common faults, the ability to perform emergency repairs in complex conditions, the ability to perform data-based predictive maintenance, and the ability to collaborate and communicate as a team. Capability objectives must be specific, measurable and achievable.

3) Quality objectives: Emphasize the cultivation of the professional spirit of aircraft maintenance, such as the fine tradition of "extreme responsibility and meticulous maintenance", the sense of safety responsibility of "holding the state property with one hand and the life of a comrade with the other", and the military character of loyalty, expertise, responsibility and dedication. These implicit qualities are the soul of the combat effectiveness of aircraft maintenance personnel and must be carried through the entire teaching process.

The setting of goals must not be done in isolation; it must be based on in-depth research into the needs of the "customer" - that is, the frontline combat troops. Through regular visits, discussions, analysis of annual training reports and training summaries of the unit, the unit's new requirements for the capabilities of non-commissioned officers at different levels (pre-selection/promotion), common support problems and typical failure cases are precisely transformed into specific and measurable talent development indicators.

3.2. Systematically Design a Standardized Curriculum System

After clarifying the goals, it is necessary to build a standardized curriculum system that can effectively support the achievement of the goals. This is the core output of the planning stage.

1) The unification of the overall curriculum framework (at the macro level) for a course, it is necessary to unify its teaching ideology, teaching objectives, teaching content framework, teaching key and difficult points, teaching method suggestions and assessment methods. This ensures that when different instructors teach the same course, their directions, standards and core content remain highly consistent. For example, it is necessary to clearly define the position and role of the course in the entire aircraft maintenance professional training system, clarify its supporting relationship to subsequent courses or job positions, and enable instructors to have a deep understanding of "why they teach".

2) The refinement of chapter teaching units (at the micro level) breaks down the overall standards of the course to each specific teaching unit (chapter or topic). Each unit should have a clear connection to the curriculum, specific learning objectives, detailed teaching content and logical sequence, recommended teaching methods and means, and immediate effectiveness testing methods. This refined design provides a clear "operation manual" for high-quality classroom teaching, especially helping to enhance the basic teaching skills of young teachers and ensure the stability of teaching quality.

A dynamic selection mechanism for teaching content. Planning stages are not set in stone. It is necessary to establish a dynamic content update mechanism, resolutely eliminate outdated and redundant knowledge points, and significantly increase the proportion of content on new equipment, new technologies, and new support models. At the same time, the ideological and political elements of the curriculum should be organically integrated into the professional knowledge system, and the values contained in the aircraft maintenance major should be deeply explored to achieve the resonance of value shaping with knowledge imparting and ability cultivation, and avoid rigid preaching.

3.3. Carefully Plan the Allocation of Teaching Resources

Quality teaching implementation cannot do without adequate resource guarantees. During the planning stage, it is necessary to make forward-looking planning and allocation of key resources such as teachers, teaching materials, equipment, venues, and information platforms.

1) Teaching staff building: Based on the curriculum requirements, plan the knowledge structure, skill level and teaching ability improvement path of the instructors, especially to strengthen the training of "dual-qualified" instructors, who can not only explain the theory clearly, but also be proficient in practical operation, and even have some military practical experience.

2) Teaching conditions construction: Plan and build highly realistic practical teaching environments, including simulation training centers, comprehensive exercise fields, etc., to ensure that trainees can hone their skills under conditions similar to real combat and solve the problems of limited and high risks of practical training resources.

3) Information platform construction: Plan to build an intelligent teaching sup-

port platform that integrates online learning, virtual simulation, data collection and analysis to provide a solid technical foundation for the implementation of blended teaching and precise diagnosis in the subsequent inspection stage.

The results of the planning stage should eventually be solidified into authoritative, clear and operable teaching standard documents such as the Curriculum Standards and Chapter Teaching implementation plans, providing clear action guidelines and normative standards for the implementation stage.

4. Implementation Stage: Standards Lead, Standardizing the Execution of the Entire Teaching Process

The implementation phase is a crucial step in putting the blueprint of the planning phase into practice. The core lies in "building according to the plan", that is, conducting teaching activities in a standardized and orderly manner strictly in accordance with established standards and plans [9].

4.1. Strictly Follow the Standardized Teaching Process

The success of the implementation phase is highly dependent on faithful adherence to the standards set in the planning phase. This requires every faculty member to be a steadfast practitioner of the standards.

1) Normalize pre-class preparation. Teachers are required to prepare lesson plans, courseware, teaching AIDS, practical equipment, etc. in accordance with the Chapter Teaching Implementation Plan. The collective lesson preparation system should be regularized, and through discussions, demonstrations and mutual evaluations among teachers, ensure a high degree of consistency in understanding and grasping of teaching standards, and effectively bridge individual differences.

2) Classroom teaching is structured. In the classroom, instructors should follow a uniform teaching process such as introduction (stimulating interest, setting goals), new instruction (explaining key points, demonstrating operations), consolidation (organizing exercises, applying knowledge), and summary (refining and elevating, assigning homework). For practical classes, a uniform operation process, safety norms and quality standards must be strictly followed, and the concept of "safety first, quality above all" should be internalized into the behavioral habits of the students.

Diversified teaching methods. Under the premise of following a standardized framework, instructors are encouraged to flexibly apply various teaching methods such as case teaching, project-driven, task-oriented, heuristic, and discussion-based teaching based on real-time feedback from students and classroom context, in order to stimulate students' learning initiative and creativity and avoid rigidity in the teaching process.

4.2. Strengthen the Embedding of Formative Assessment

The implementation stage is not only a process of knowledge transmission, but also a continuous process of collecting feedback data. Therefore, formative assessment must be deeply embedded in every aspect of the teaching process, making it an integral part of the teaching.

1) Immediate feedback: Through in-class questioning, quizzes, observing students' operations, etc., get an immediate understanding of students' mastery of knowledge points and provide targeted guidance to achieve "teaching-learning-assessment" integration.

2) rocess recording: Using an information platform, the system records process data such as students' attendance, assignments, experiment reports, group cooperation performance, and interim test results to form a complete personal learning profile, providing a basis for personalized teaching and precise assistance.

Two-way interaction: Establish a smooth communication channel between teachers and students, encourage students to raise questions and suggestions at any time during the learning process, enable teachers to dynamically adjust the teaching pace and strategy, and form a positive teaching interaction ecosystem.

4.3. Foster a Positive Teaching Culture Atmosphere

The smooth implementation of the implementation phase also requires a positive, rigorous and mutually supportive teaching culture as a soft environment support.

1) Promote the professional spirit of aircraft maintenance. Throughout the teaching process, always emphasize the core values such as safety, quality and responsibility, and internalize and externalize the "extreme responsibility and meticulous maintenance" spirit of aircraft maintenance by telling the stories of aircraft maintenance models and analyzing typical cases.

2) Advocate a rigorous attitude towards learning. Teachers are required to lead by example, be meticulous in teaching, and strive for excellence in knowledge, setting an example of being rigorous and realistic for students.

3) Promote teamwork. Encourage the formation of good collaborative relationships among instructors and students, and jointly enhance teaching and learning outcomes through collective efforts and experience sharing, fostering students' sense of teamwork.

The core output of the implementation phase is the high-quality teaching implementation process itself, as well as the large amount of raw data on the state of "teaching" and "learning" accumulated during this process, which will serve as valuable material and direct basis for checking the implementation phase.

5. Inspection Phase: Multi-Dimensional Diagnosis, Objective Assessment of Teaching Effectiveness

The inspection phase is the "sensor" and "diagnostic instrument" of the PDCA cycle. Its purpose is to provide a comprehensive and precise assessment of the implementation effect of the implementation phase through objective and multi-dimensional data analysis, and to provide targeted improvement for the planning phase [10].

5.1. Build a Full-Cycle, Multi-Dimensional Diagnostic System

Diagnosis during the inspection stage should not be confined to a single final exam, but should run through the entire teaching process, cover multiple dimensions, and form a three-dimensional perception network.

1) Pre-class learning situation diagnosis: Through methods such as teaching liaison meetings, structured questionnaires, and student profile analysis, gain a deep understanding of students' knowledge base, ability starting point, learning style, interests and hobbies, and job cognition to provide an initial basis for precise teaching and ensure that the teaching starting point matches the actual situation of students.

2) In-class process diagnosis: Dynamic monitoring of students' learning progress based on formative assessment data. Analyze the accuracy of in-class quizzes, the completion and standardization of practical tasks, the participation and contribution in group discussions, etc., to identify common problems and individual differences in teaching in a timely manner and achieve dynamic regulation of the teaching process.

3) Final course outcome diagnosis: Conduct a detailed analysis based on the results of the terminal assessment (theoretical examination and practical assessment). Not only focus on macro indicators such as average scores and pass rates, but also delve into micro levels such as score rates of knowledge points, achievement of ability dimensions, discrimination and reliability of test questions, to precisely identify weak links in teaching and shortcomings in ability development.

4) Post-class comprehensive diagnosis: After the course ends, through structured questionnaires, in-depth interviews, graduate follow-up surveys, etc., the overall satisfaction of the course, the cutting-edge nature of the content, the effectiveness of the methods, the simulation of the practical links, and the support for the position are comprehensively evaluated to obtain direct feedback from "end users".

5.2. Deepen Data-Driven Attribution Analysis

The value of the inspection phase lies not only in identifying problems but also in delving into the root causes behind them to avoid treating symptoms rather than root causes.

1) Correlation analysis: Cross-referencing and correlation analysis of data from different sources and at different stages. For example, associate a student's cultural foundation data with their theoretical course grades to analyze whether a weak foundation is the main cause of poor performance; Associate a student's personality traits with their performance in team collaboration tasks to explore the influence of non-intellectual factors.

2) Root cause tracing: Use quality management tools such as fishbone diagrams and 5Why analysis to analyze the diagnosed problems layer by layer. For example, if a practical skill is generally poorly mastered, it is necessary to keep asking: Is the teaching method improper? Is it a lack of training time? Is it that the simulation

equipment is not realistic enough? Or is it due to the trainees' fear of difficulty? Until the root cause is found.

3) Produce a diagnostic report: Systematically integrate all the analysis results to form a detailed "Course Teaching Diagnosis and Improvement Recommendations Report". The report should clearly present the teaching results, the main problems existing, the underlying causes of the problems, and initially propose operational improvement directions, providing a solid and objective basis for decision-making in the processing stage.

The essence of the inspection phase is to move from empirical judgment to data-driven decision-making to ensure that subsequent improvement measures are targeted, precise and effective, thereby truly exerting its role as an improvement engine.

6. Processing Phase: Dynamic Iteration, Solidification of Results and Initiation of New Cycles

The processing phase is the "action hub" and value landing point of the PDCA cycle. It transforms the diagnostic conclusions of the inspection phase into specific improvement actions and sets a higher starting point for the next cycle.

6.1. Solidify the Successful Experience and Form New Standards

The successful experiences and proven effective practices identified during the inspection phase must be summarized, refined and standardized to prevent their loss.

1) Revise teaching standards: Formally incorporate proven effective teaching content, teaching methods, evaluation methods, etc. into the Curriculum Standards and chapter Teaching implementation plans to make them new norms that all teachers must follow and institutionalize excellent practices.

2) Promote excellent practices: Organize excellent teachers to conduct demonstration teaching, experience sharing sessions or compile teaching case collections, transform individual wisdom into organizational assets, promote the improvement of overall teaching quality, and create a positive atmosphere of competition and learning.

3) Improve systems and processes: If certain management processes or support services (such as teaching supervision, resource allocation) are proven to be efficient, they should also be solidified into new work systems or operational processes to enhance the overall operational efficiency of the organization.

6.2. Drive the Dynamic Iteration of the Curriculum System

For the problems and shortcomings exposed during the inspection stage, the core task of the handling stage is to carry out systematic and forward-looking transformation and upgrading to ensure that the curriculum system remains vibrant at all times.

1) Rolling update of the content system: Dynamic optimization of the curricu-

lum based on the latest demands of the troops, the frontiers of technological development, and the conclusions of diagnostic reports. Track new equipment, new tactics, new training methods and incorporate them into teaching in a timely and organic manner; Dig deep into the ideological and political elements of the curriculum, enhance their integration and effectiveness with professional content, and ensure that ideological and political education has both momentum and effectiveness.

2) Hybrid innovation of teaching models: Actively explore blended teaching models that combine online and offline. Under the premise of ensuring information security, build high-quality online course resources, use technologies such as VR/AR/MR To construct virtual and real combined training fields, expand the learning time and space of students, and meet their personalized and ubiquitous learning needs.

3) Deep reconstruction of practical teaching: Significantly increase the proportion of practical teaching, especially advanced comprehensive and confrontational exercises. Create realistic combat training scenarios close to field airports and complex electromagnetic environments, promote training with advanced support concepts such as task-based maintenance, and focus on forging trainees' excellent combat skills and battlefield adaptability.

4) Specialized training for advanced skills: Add discussion-based, project-based, and case-based teaching segments, design complex problems derived from real support difficulties in the military or disputes at the forefront of equipment technology, guide trainees to conduct in-depth exploration, and cultivate their critical thinking, innovation ability, and the ability to solve complex engineering problems.

6.3. Initiate a New PDCA Cycle

The end of the processing phase marks the successful completion of this cycle and the beginning of a new cycle at a higher level. Based on the results of this cycle, the new standards that have been solidified, and changes in the external environment (such as the deployment of new equipment and the update of combat regulations), re-examine and set more challenging talent development goals, initiate a new round of planning phase work, and re-plan and re-optimize the top-level design of teaching. Through this repetitive and never-ending PDCA cycle, the teaching quality of aviation maintenance training can achieve continuous, stable and spiral improvement in a closed-loop ecosystem of self-diagnosis, self-correction and self-improvement.

7. Construction of the PDCA Closed-Loop Mechanism Operation Assurance System

In order for the continuous improvement mechanism of teaching quality based on the PDCA cycle to take root and be effective in the long term, a strong operational guarantee system must be established to provide solid organizational, technical and cultural support for it.

1) Strengthen organizational leadership and top-level design. Establish a teaching quality committee or leading group headed by the main leaders of the training institution, and incorporate the construction of the PDCA closed-loop mechanism into the medium - and long-term strategic plan for the development of the institution. Formulate supporting systems such as the "Teaching Quality Management Measures Based on the PDCA Cycle", clearly define the specific responsibilities, authorities and work processes of departments and positions such as academic affairs, teaching and research sections, and teachers in the four stages, and ensure that the mechanism operates with rules to follow and responsibilities to individuals.

2) Build an intelligent teaching data center. Invest the necessary resources to build an intelligent teaching data center that integrates automatic data collection (learning situation, attendance, homework, tests, online learning behavior, feedback), secure storage, intelligent analysis (learning analysis, teaching diagnosis, prediction and early warning), and visual presentation. The center will serve as the "nerve center" and "smart brain" of the PDCA cycle, providing strong, real-time data support for objective diagnosis in the inspection stage and scientific decision-making in the processing stage.

3) Foster a quality culture of full participation. Promote a quality culture of "quality first, continuous improvement, data-driven, and student-centered" among all faculty and staff. Through various means such as special training, publicity and guidance, benchmarking and demonstration, and incentives and recognition, make the concepts, methods and tools of the PDCA cycle deeply rooted in people's minds, and make every teacher consciously become a participant, promoter and beneficiary of teaching quality improvement. The depth and effectiveness of participation in the PDCA cycle will be incorporated into the performance assessment, title evaluation and appointment, and commendation system to create effective positive incentives.

4) Establish an external interactive feedback mechanism. Take the initiative to strengthen ties with frontline combat units, equipment research and development and manufacturing companies, sister institutions and related research institutes, and establish regular information exchange, demand research and graduate tracking feedback mechanisms. Take the voices of external "customers" and the latest developments in the industry as important input sources for setting goals in the planning stage and iterating courses in the processing stage to ensure that the training work always resonates with the combat effectiveness requirements of the troops and the cutting-edge of scientific and technological development, maintaining its strong vitality and adaptability.

8. Conclusions

The improvement of teaching quality in aviation maintenance training institutions is a complex systematic project that cannot be accomplished by piecemeal partial improvements. Based on the PDCA cycle theory as the meta-framework, this paper systematically constructs A four-stage integrated teaching quality improvement mechanism of "planning (P) - doing (D) - checking (C) - handling (A)". The mechanism starts logically with "teaching through combat, precise planning" as the process guarantee with "standard leading, normative execution" as the feedback calibration with "multi-dimensional diagnosis, objective evaluation" as the evolutionary path with "dynamic iteration, solidifying results", forming an endogenous closed loop that is logically rigorous and operationally efficient.

Through the regular operation of this mechanism, aviation maintenance training institutions can effectively solve the practical predicaments such as lagging teaching content, single model, and disconnected evaluation, and establish a dynamic balance of self-perception, self-correction, and self-improvement. This will not only significantly enhance the precision, effectiveness and job fit of talent cultivation, but also fundamentally promote the modernization of governance capacity and governance system of training institutions, achieving a profound transformation from experience-driven to data-driven and from extensive management to fine governance. Looking ahead, with the continuous deepening, improvement and innovation of this PDCA closed-loop mechanism, aviation maintenance training will surely provide stronger, more reliable and higher-quality talent support for forging a world-class air force maintenance support force that is "ready to be called, ready to fight, and ready to win", laying a solid foundation for winning future high-end wars.

Conflicts of Interest

The author declares no conflicts of interest.

References

[1] Li, J., Jiang, K. and Ma, N. (2024) Research on the Construction of the Training System for Non-Commissioned officers in Aviation Maintenance Quality Control. *Journal of Science and Education*, No. 1, 33-35. (in Chinese)

[2] Ma, H., Zhou, K. and Guo, Z. (2023) Investigation and Analysis on the Current Learning ability of Aviation Maintenance Non-Commissioned officer Vocational and Technical Education Students. *China Military-to-Civilian Conversion*, No. 20, 52-53. (in Chinese)

[3] Zhu, H. (2025) How the Army Aviation Forces Can Effectively Prevent Human Errors in Aircraft Maintenance Support under the New Situation. *China Military-to-Civilian Conversion*, No. 20, 37-38. (in Chinese)

[4] Peng, X. and Cao, G. (2026) Evaluation for Improving the Quality of Special Education Teaching: From the Perspective of PDCA Teaching and Evaluation Integration. *Modern Special Education*, No. 5, 66-67. (in Chinese)

[5] Feng, X. (2026) Construction of a System for Cultivating Top-Notch Innovative Talents Based on PDCA Theory. *Heilongjiang Higher Education Research*, **44**, 8-15. (in Chinese)

[6] Wang, F., Zhang, F. and Zheng, S. (2026) Exploration and Practice of Course-Based

Ideological and Political Education Based on PDCA Cycle: A Case Study of the "Pharmacology" Course. *Educational Teaching Forum*, No. 2, 128-131. (in Chinese)

[7] Ding, X. and Xu, S. (2020) Research on the Teaching Reform of Administrative Management Course Based on the "PBL + PDCA Cycle". *Journal of Higher Education*, **11**, 122-125. (in Chinese)

[8] Liu, C. and Xu, J. (2024) Construction and Improvement of Teaching Quality Monitoring System in Higher Vocational Colleges: An Analysis Based on PDCA Cycle Theory. *Educational Teaching Forum*, No. 47, 41-44. (in Chinese)

[9] Zhao, R., Meng, C., Feng, J. and Zhuang, Z. (2024) Research on the Construction of Job-Oriented Quality Courses Based on PDCA Cycle. *Modern Vocational Education*, No. 12, 145-148. (in Chinese)

[10] Wang, H. (2023) Internal Logic, Deductive Approach and Practical Exploration of Teaching Mode Reform of Economics and Management Courses in Higher Vocational Colleges from the Perspective of PDCA Cycle. *Modern Vocational Education*, No. 34, 69-72. (in Chinese)