

PREPARING THE AIRCRAFT MAINTENANCE TECHNICIAN FOR TOMORROW: ASSESSMENT OF THE NEW AMT CURRICULUM

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ABSTRACT

The aviation maintenance technician (AMT) is a critical component in ensuring the safety and reliability of the aircraft maintenance operations. Hence it is critical that students AMT's receive proper education and training that will prepare them for work in the hangar floor. Realizing this, a newly integrated curriculum for student AMT's was developed. This paper outlines the methodology that was used to assess the revised AMT curriculum that integrates alternative learning methodologies, and previous FAA sponsored human factors research into a coherent whole. The paper describes the assessment methodology, which was used to test how the curriculum helps meet educational objectives and student performance objectives.

INTRODUCTION

In order for the FAA to provide the public with continuing safe, secure, efficient and reliable global air transportation, it is important to have undergraduate aircraft maintenance technology programs that encourage careers in the field and address the FAA technology requirements for the future. Three new Advisory Circulars for aircraft maintenance technology under the FAA Research, Engineering, and Development Authorization Act of 1997, Section Three (Law 105-155), mandate research on future training requirements on projected changes in regulatory requirements for aircraft maintenance and power-plant licensees. The introduction of the new Part 66 imparts future training requirements (training levels and objectives) for AMT/AMT-T personnel training procedures. Applied research is needed to develop and implement an alternative methodology for learner-focused curriculum that is integrated into laboratory experiences via interactive modules of skill mastery and evaluation/assessment. Charged with oversight in the certification, manufacture, maintenance and operation of US civil aircraft, the FAA has mandated changes in the training of AMT personnel. The mandates call for new/updated safety enhancements for AMT/AMT-T training programs and skill requirements for technicians. The general industry of aircraft maintenance technology requires more rapid training in appropriate skills while also enhancing quality and safety performance. The newly integrated AMT/AMT-T curriculum (White, 1997) for aviation maintenance technician (AMT) and aviation maintenance technician-transport (AMT-T) was developed as a performance-outcome based integrated curriculum to address the aircraft maintenance industry need for better-qualified AMT personnel, possessing higher levels

of technical and human factors expertise. The general objective of this research is to develop, implement, and assess the newly integrated curriculum using alternative training methodologies for technician technology skill transfer and application that demonstrates acceptable student performance through the various levels of the integrated curriculum. The specific objectives of this research are twofold:

- (1) Conduct applied research that builds upon previous FAA human factors research to implement the AMT/AMT-T performance-outcome based curriculum that encompasses safety, team building, human factors issues, error control and analysis, and computer and technical material usage by integrating class-room experience, interactive hands-on laboratory exercises of skill mastery and evaluation/assessment, and multimedia based educational/learning modules for active learning experience.
- (2) Develop an assessment methodology and conduct a detailed assessment for portions of the integrated curriculum to test whether it meets educational objectives and student performance objectives (desired learning outcomes) and use the results to further enhance the effectiveness of the curriculum, the learning experience, and the educational delivery system.

This paper outlines the assessment methodology to evaluate the newly integrated AMT-T curriculum.

OVERALL ASSESSMENT METHODOLOGY

The classic closed-loop outcome based assessment methodology (Nichols, 1996) will be used. Figure 1. illustrates the assessment paradigm. Using the assessment methodology the evaluators will be able to determine whether or not the curriculum has met program objectives and to test whether or not the curriculum has produced the desired learning outcomes and student behavior that results in the desired student performance levels. A critical element of the assessment methodology will be to focus on continuous program improvements. These improvements can range from making changes at the curriculum level (e.g., changes to the program content, delivery system, etc.) or at the assessment level (e.g., addition or deletion of assessment measures, changes to criteria, etc.). A battery of assessment tools will be used and each of these are described below.

Qualitative Assessment

The typical qualitative assessment tools will include oral examinations, interviews, and juried competitions. The advantages of qualitative assessment include the ability to judge the whole within a context, flexibility in assessment, and the potential for revealing unexpected findings.

Quantitative Assessment (Cognitive, Attitudinal, Behavioral)

Cognitive assessment measures student knowledge of the curriculum material. The assessment procedure measures the knowledge on three levels, including basic knowledge of general principles or practices; knowledge of general principles, practices and operational concepts; and high level of knowledge regarding principles, practices and operational concepts. Cognitive tests that are commonly used include standardized tests, locally developed tests by experts/instructors, and course grades.

Attitudinal assessment measures the beliefs and opinions of the student related to the learning context, his/her attitude toward the training process, and his/her role as an AMT. Data to support these findings can be obtained from alumni and students who complete the program.

Behavior/performance assessment procedures assess the ability of the student to use and apply the knowledge. It also assesses student ability to perform tasks or processes with speed and accuracy and to acceptable industry standards.

Data Collection Instruments

Appropriate data collection instruments will be used to facilitate qualitative and quantitative assessment. These include objective tests, laboratory exercises, quizzes, essays, short exams, team exercises, oral exams, capstone projects, questionnaires, alumni surveys, employer surveys, verbal protocols, and others.

Protocol for Data Collection

The experimental design will be outlined, including the steps involved in data collection. Detailed protocol will result according to when and how data collection instruments will be administered.

Data Reduction and Analyses

Data analysis procedures will be developed, along with routines on statistical packages to facilitate easy data analysis following data collection.

Establish Criteria for Program Success

Identification and determination will be made regarding whether or not training has produced the desired learning outcomes and whether or not students have achieved desired performance levels. Subject matter experts from industry partners will observe and evaluate instructional/learning experiences. The basic benchmark activities/courses will be reflective of all student skill levels for inspection training, aircraft maintenance team training, and CD-ROM human factors training.

CONCLUSION

The focus of the research will be the implementation and assessment of the integrated AMT/AMT-T curriculum on aircraft maintenance technology learning, post-training aircraft maintenance technology performance (ability to meet performance objectives and demonstrate acceptable performance), and on-the-job performance as demanded by the aircraft maintenance industry and the FAA. The results will facilitate the establishment of technician performance benchmarks relative to the integrated curriculum requirements.

In addition, the high degree of control that such an assessment affords will create the opportunity for systematic and extensive training that would not otherwise be possible. The results of the research will provide a curriculum assessment methodology and guidelines for training that will serve as a road-map for other AMM programs embarking upon implementation of the integrated curriculum. It will provide a detailed set of guidelines on training strategies, training methods and mechanism for delivering more effective and efficient AMT/AMT-T training for different units/sub-units of the curriculum. The research effort will provide benchmarks for training strategies and the models will enable the associated risks and direct expenses for prospective strategies to be quantified prior to their actual implementation. This will naturally lead to safer, more cost-effective strategies, within the framework of the proposed comprehensive training program.

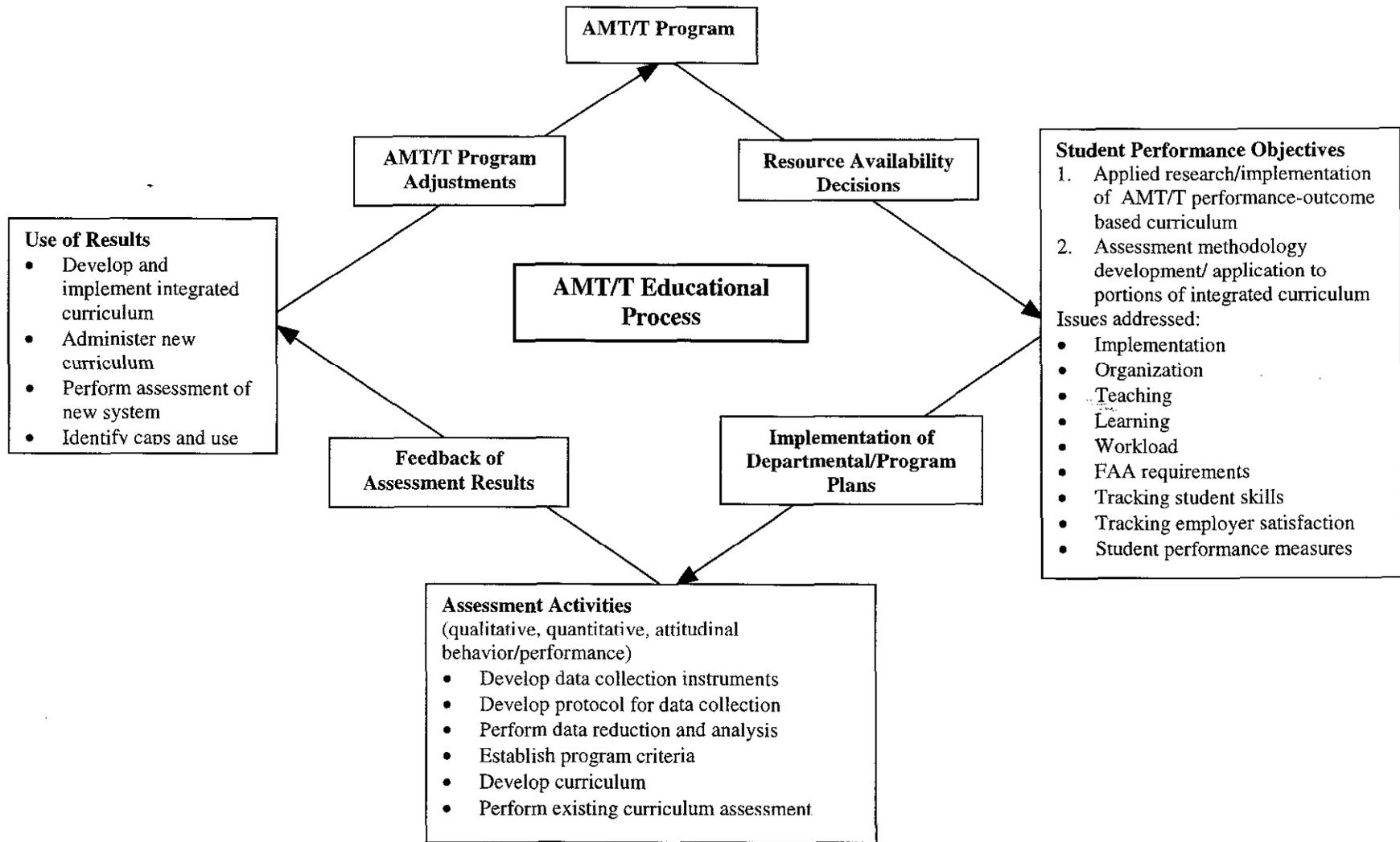


Figure 1: Model for AMT/T and New Far Part 66 Curriculum

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