DOCUMENT RESUME

ED 133 016 JC 770 057

AUTHOR Stoehr, Keith; And Others
TITLE Airframe and Powerplant Mechanics Curriculum Study. Final Report.
INSTITUTION Gateway Technical Inst., Kenosha, Wis.
SPONS AGENCY Wisconsin State Board of Vocational, Technical, and Adult Education, Madison.
BUREAU NO 164-151-226
PUB DATE Jul 76
NOTE 122p.

EDRS PRICE MF-$0.83 HC-$6.01 Plus Postage.
DESCRIPTORS *Aviation Mechanics; *Curriculum Evaluation; *Employer Attitudes; Graduate Surveys; Job Skills; Junior Colleges; *Program Evaluation; Questionnaires; *Technical Education; *Technical Institutes; Vocational Adjustment; Vocational Education
IDENTIFIERS Wisconsin

ABSTRACT

A study was conducted to assess the relationship between the competencies taught in the Wisconsin Vocational-Technical and Adult Education system Airframe and Powerplant (A & P) Mechanics programs and the competencies actually needed on the job. Both A & P graduates and their employers were surveyed and asked to rate the relative job importance and school preparation for fifty competencies. Additionally, graduates were asked to evaluate the adequacy of the schools' instructional equipment. Results indicated: (1) there was general agreement between graduates and employers regarding competencies important to the A & P mechanic's job; (2) there was more agreement between graduates and employers regarding the areas of least adequate preparation than the areas of best preparation; (3) employers viewed the A & P mechanic's school preparation more positively than did the graduates; (4) graduates expressed a need for more practical experience and more training in A & P related areas while employers expressed a need for improved work attitudes; and (5) graduates tended to discount the value of courses not directly related to their mechanic's training. Recommendations were made for curricular revision to provide additional practical experience and to gear the program more directly to employers' needs. Study related material, tabulated data, and the survey instrument are appended. (JDS)

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Final Report
Project No. 06-164-151-226

AIRFRAME AND POWERPLANT MECHANICS

CURRICULUM STUDY

Keith Stoehr
District Director

William Becker
Assistant Director, Research and Planning

Lauren DeVuyst
Research Assistant

July, 1976

GATEWAY TECHNICAL INSTITUTE
Kenosha, Wisconsin

WISCONSIN BOARD OF VOCATIONAL,
TECHNICAL AND ADULT EDUCATION
Madison, Wisconsin

The project was funded pursuant to a grant with the Wisconsin Board of Vocational, Technical and Adult Education, through use of federal funds from the U.S. Office of Education and by matching funds provided by Gateway Technical Institute. The views or opinions stated in this report are those representing the professional judgment of the investigators and do not necessarily reflect the views of the participating agencies.

ED 133016

Acknowledgements

Appreciation is extended to the following people or groups who have helped to make this study possible:

The Airframe and Powerplant Mechanics' instructors from the participating institutions. Special appreciation goes to Arch Henkelmann and Frank Trafford of Blackhawk Technical Institute; Phil Atlas and Tom Bailey of Gateway Technical Institute and Harry Pokorny of Milwaukee Area Technical Institute; whose assistance in the development of the survey instrument is much appreciated.

Mr. Roland Krogstad and Mr. Otis Mehlberg, Wisconsin Board of Vocational, Technical and Adult Education and Mr. Carl Guell, Department of Transportation, for their technical advice and assistance.

Specific individuals at Gateway Technical Institute include Ms. Lauren DeVuyst, Research Assistant; Mr. Randy Schaeffer, Project Interviewer and Ms. Terry Strash, Research Secretary.

Special gratitude is expressed to the many Airframe and Powerplant Mechanics' graduates and their employers who responded with willingness and sincerity to the survey and made completion of this project possible.

Keith W. Stoehr
District Director

William J. Becker
Assistant Director
Research and Planning

Table of Contents

	Page
Acknowledgements	i
Table of Contents	ii
List of Tables	iii
Foreword	v
Chapter I - Introduction	1
Chapter II - Methodology	3
Chapter III - Graduate Research Findings	6
Chapter IV - Employer Research Findings	20
Chapter V - Comparison of Graduate and Employer Research Findings	31
Chapter VI - Conclusions and Recommendations	45

Appendix

A - Minutes of A & P Mechanic's Curriculum Study Meeting
B - Survey Cover Letters
C - Survey Instruments
D - Interview Procedure
E - A & P Mechanic Competency Ranks
F - A & P Mechanic Rank Correlations
G - Areas of Most and Least Adequate Preparation
H - Mean Rank of General Education Courses
I - Graduate Response Regarding an A & P Mechanic Associate Degree Program
J - Summary of Respondent Survey Comments

List of Tables

Table		Page
1	A & P Mechanic Curriculum Survey Response: Graduates	4
2	A & P Mechanic Curriculum Survey Response: Employers	4
3	A & P Mechanic Graduates - Year A & P Licenses Were Received	6
4	A & P Mechanic Graduates - Employment Profile	7
5	A & P Mechanic Graduates - Rank of Competencies	8
6	A & P Mechanic Graduates - Competencies With a Difference in Rank of 15 or More Between Importance on Job and Preparation at School	13
7	A & P Mechanic Graduates - Competencies With a Difference in Rank of 5 or More Between Preparation at School and Adequacy of Instructional Equipment	15
8	A & P Mechanic Graduates - Rank Correlations by Category	17
9	A & P Mechanic Graduates - Areas in Which Respondents Felt Most Adequately Prepared	17
10	A & P Mechanic Graduates - Areas in Which Respondents Felt Least Adequately Prepared	18
11	A & P Mechanic Graduates - Mean Average of General Education Course Rank	18
12	A & P Mechanic Graduates - Restructuring the A & P Mechanic Program Into an Associate Degree Program	19
13	A & P Mechanic Graduates - Summary of Comments	19
14	A & P Mechanic Employers - Rank of Competencies	20
15	A & P Mechanic Employers - Competencies With a Difference in Rank of 15 or More Between Importance on Job and Preparation at School	25
16	A & P Mechanic Employers - Number of A & P Mechanics and Wisconsin Vocational-Technical A & P Mechanics Employed	26

List of Tables (Cont.)

Table		Page
17	A & P Mechanic Employers - Qualification of Wisconsin Vocational-Technical A & P Mechanics at Job Entry Level	27
18	A & P Mechanic Employers - Comparison of Wisconsin Vocational-Technical Graduates With Graduates From Other Schools	28
19	A & P Mechanic Employers - Areas in Which Respondents Felt Graduate to be Most Adequately Prepared	28
20	A & P Mechanic Employers - Areas in Which Respondent Felt Graduates to be Least Adequately Prepared	29
21	A & P Mechanic Employers - Mean Average of General Education Course Ranks	29
22	A & P Mechanic Employers - Summary of Comments	30
23	A & P Mechanic Graduate and Employer - Comparison of Ranks on Importance on Job	31
24	A & P Mechanic Graduate and Employer - Comparison of Ranks on Preparation at School	36
25	A & P Mechanic Graduates and Employers - Competencies with a Difference in Rank of 1.5 or More on Prepatation at School	41
26	A & P Mechanic Graduate and Employer - Rank Correlations Between Graduate and Employer	42
27	A & P Mechanic Graduate and Employer - Comparison of Mean Average of General Education Course Ranks	43

FOREWORD

This study was conducted with the intent that the information obtained could be used by Wisconsin Airframe and Powerplant Mechanic Programs to provide contact with graduates and their employers in an effort to validate the competencies needed in the Airframe and Powerplant Mechanics' field.

In general, it is constructive to look at what we are doing for our graduates and the people that employ them. This research effort is an attempt to obtain input from these groups and to incorporate the findings of this research into the Airframe and Powerplant Mechanic's curricula. To evaluate the effectiveness of the existing Airf.ame and Powerplant Mechanic programs, a special effort was made to compare the required competencies as perceived by the employers and by the graduate-employees from this program.

CHAPTER I

INTRODUCTION

The Problem

The Airframe and Powerplant Mechanic two-year diploma program is one of the newer programs offered within the Wisconsin System of Vocational, Technical and Adult Education. Presently, the program is available at three institutions: Blackhawk Technical Institute, Milwaukee Area Technical College and Gateway Technical Institute.

The Federal Aviation Administration has established clearly defined minimum standards for this program. However, their standards are generally minimal and tend to be behind the technology of the field. It is reasonable to assume that all three Airframe and Powerplant Mechanic programs within the state exceed the Federal Aviation Administration standards and offer technology more advanced than required by these standards.

A review of literature revealed a national aviation mechanics' occupational survey completed by the Division of Vocational Education, University of California, which was sponsored by the Department of Transportation, Federal Aviation Administration. This study, completed in January, 1974, covered a task analysis of the Airframe and Powerplant Mechanic field. The purpose of the study was to provide guidelines to the Federal Aviation Administration for determining certification requirements for Airframe and Powerplant Mechanics. It was not felt that the California study provided information regarding the effectiveness of Wisconsin Vocational, Technical and Adult Education Airframe and Powerplant Mechanic programs, and that therefore, an additional study was indicated to provide this information.

The institutions offering the Airframe and Powerplant Mechanic programs are interested in providing the most effective program possible to best meet the needs of students enrolled and the industry the program is designed to serve. There has been no previous statewide evaluation of the curricula for this program. Little is known about the effectiveness of this program in preparing competent employees for entry in the world of work.

Objective

The major objective of this study is to assess the effect of competencies taught in the Wisconsin Vocational, Technical and Adult Education System. The specific objectives of the study will be:

1. To develop a series of instruments to evaluate the Airframe and Powerplant Mechanic program.

2. To interview a random sample of former students of the Airframe and Powerplant Mechanic programs from the three institutions and their respective employers to determine the strengths and limitations of the present curriculum.

3. To survey a larger sample of the former students, via mail questionnaires, and their respective employers to determine the strengths and limitations of the present program.

4. To analyze the results of these interviews and surveys to determine the findings of the study.

5. To determine the feasibility of changing the Airframe and Powerplant Mechanic program to an Associate Degree program.

6. To reach conclusions, give directions and recommendations for the improvement of the Airframe and Powerplant curriculum at the three institutions.

CHAPTER II

METHODOLOGY

The survey was constructed following a review of the Airframe and Powerplant (A & P) Mechanic program curriculum provided by the three Wisconsin Vocational, Technical and Adult Education institutions presently offering this program. A competency list and preliminary draft of the survey instrument was developed. The survey instrument was finalized following a meeting of state staff consultants and instructors from the three Airframe and Powerplant Mechanic programs at Blackhawk Technical Institute (BTI), Gateway Technical Institute (GTI) and Milwaukee Area Technical College (MATC). See Appendix A.

A mailing list was obtained of the 1972, 1973, 1974 and 1975 graduates from the A & P Mechanic programs. It was recognized that not all of the graduates or their employers would participate in the study; therefore, the actual number of respondents would represent some undetermined fraction of the total survey population and would not represent a true random sampling.

Each graduate was mailed a survey instrument on which he was asked to identify his employer. The first mailing to graduates was sent December 5, 1975 with two follow-up mailings. The employer's first mailing was sent February 16, 1976 with one follow-up mailing. Copies of the survey cover letters may be found in Appendix B.

The survey instrument consisted of a listing of fifty competencies on which both graduates and employers were requested to react on a Likert-type scale regarding Importance on Job and Preparation at School. Graduates were also asked to react on the Adequacy of Instructional Equipment for the A & P Mechanic program at the technical institute they attended. In addition to the competencies, several face data information and opinion questions were asked. Copies of the survey instrument may be found in Appendix C.

Interviews were conducted with non-respondents to the mailed survey instrument, using the same survey instrument for the interview guide. A total of 28 graduates and 19 employers were interviewed. Interviewing was restricted by the availability of graduates and employers within a reasonable travel area. A full report on the interviewing procedure may be found in Appendix D.

Of the 130 graduates identified by the participating districts, a total of 83 (63.8%) were contacted either by mail or by personal interview; while 35 employers were contacted by mail or personal interview. Tables 1 and 2 give a breakdown of responses.

Table 1

A & P Mechanic Curriculum Survey Response: Graduates

N=83

School	No. of Graduates	Graduate Response	No. of Graduates Interviewed	Total Graduate Response
BTI	34	14	15	29 - 85.3%
GTI	47	19	[illegible]	27 - 57.4%
MATC	49	22	[illegible]	27 - 55.1%
Total	130	55	28	83 - 63.8%

Table 2

A & P Mechanic Curriculum Survey Response: Employers

N=35

School	Employer Response	No. Employer Interviews	Total
BTI	6	8	14
GTI	5	6	11
MATC	5	5	10
Total	16	19	35

When the data had been collected, it was tabulated, analyzed and reviewed for purposes of evaluation. Statistical tabulations consisted of computing a mean and standard deviation for each competency. The competencies were then ranked according to mean. Correlations between areas of evaluation

(e.g., Preparation at School and Importance on Job); and between groups of respondents. (e.g., Graduates and Employers) were run using Spearman's Rank Correlation Coefficient adjusting for tied ranks.[1] All correlations were tested at the .01 level of significance. This gives assurance of 99 percent certainty that those correlations meeting this level of significance show true agreement and are not chance correlations. Tabulation of the face data information and opinion questions consisted of simple descriptive statistics. Conclusions and recommendations were developed through a review of this data.

[1] N. M. Downie and R. W. Heath, Basic Statistical Methods, (New York: Harper & Row, 1965), P. 207

CHAPTER III

GRADUATE RESPONSE

RESEARCH FINDINGS AND ANALYSIS

Respondent Characteristics

The graduate survey instrument begins with several identification type questions. Graduates were first asked what school they had attended and the year their license was received. Table 1 in the previous chapter gives a breakdown of respondents by school. Table 3 below shows respondents by year of receiving license. Most of the graduates contacted had received their license within the past two years. This is partly because these are the people most easily identified and contacted. Because it is possible to receive the Airframe and Powerplant licenses separately, the year the license was received was tabulated separately, and, therefore, most respondents are represented twice on the table.

Table 3

A & P Mechanic Graduates
Year A & P Licenses Were Received

Licenses	1972	1973	1974	1975	Total
Airframe	19	9	21	11	60
Powerplant	14	9	22	20	55

Graduates were asked their employment status to determine if they were working as A & P Mechanics or in a related field. Table 4 shows 61.4 percent of the respondents working as A & P Mechanics and another 10.8 percent working in a related field. The students shown in Milwaukee Area Technical College reflect that institution's policy to graduate Airframe Mechanics and Powerplant Mechanics separately. Therefore, either an Airframe or Powerplant graduate could respond and still be attending school.

Table 4

A & P Mechanic Graduates

Employment Profile

N=83

School	Employment			
	A & P Mechanic	Related Field	Unrelated Field	Student
BTI	26	2	1	-
GTI	17	4	6	-
MATC	8	3	8	8
Total	51 (61.4%)	9 (10.8%)	15 (18.1%)	8 (9.6%)

Airframe and Powerplant Mechanic Competencies

In completing the competency list, graduates were requested to respond to three different questions for each competency:

1. The importance of this competency on the job.

2. The adequacy of preparation for this competency at school.

3. The adequacy of the instructional equipment for learning this competency.

Items were ranked on a Likert-type scale. Importance on Job was ranked from 1, no knowledge necessary, to 5, knowledge essential; Preparation at School was ranked from 1, unprepared, to 5, excellent preparation; and Adequacy of Instructional Equipment was ranked from 1, poor, to 3, excellent. Table 5 shows a comparison between these three categories. A full breakdown by technical institute is given in Appendix E.

Table 5

A & P Mechanic Graduates

Rank of Competencies[1]

N=73

Competency	Importance on Job Rank	Importance on Job Mean S.D.[2]	Preparation at School Rank	Preparation at School Mean S.D.	Adequacy of Instructional Equipment Rank	Adequacy of Instructional Equipment Mean S.D.
Troubleshoot aircraft electrical problems	1	4.32 1.25	31	2.89 1.16	26	2.01 0.78
Service and maintain engine ignition systems	2	4.15 1.33	5	3.67 0.81	5	2.40 0.57
Select and install safety wire and securing devices	3.5	4.07 1.38	4	3.79 0.86	8	2.36 0.56
Perform 100 HR and progressive inspections	3.5	4.07 1.59	16	3.29 1.25	17	2.26 0.75
Identify, check and service lubrication systems and components	5	4.06 1.32	10	3.49 0.95	9	2.32 0.53
Taxi aircraft and use ground power units (gpu's)	6	3.95 1.43	29	2.97 1.06	28	2.01 0.68
Maintain required records and technical reports (log books, parts inventory and ordering, job estimates, work orders, repair forms)	7	3.92 1.31	30	2.96 1.11	32	1.88 0.62
Inspect, service and repair landing gear, brake, wheel and tire systems	8	3.92 1.53	19	3.23 1.09	19	2.15 0.64

[1]Some items may appear to have the same mean and different ranks due to rounding the means to two decimal places after ranking.

[2]S.D. = Standard Deviation. A low standard deviation indicates a high consistency in the responses.

Table 5

A & P Mechanic Graduates

Rank of Competencies
(Cont.)

Competency	Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
	Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Troubleshoot, service and repair pneumatic and hydraulic systems	9	3.91 1.34	27.5	3.01 0.92	30	2.00 0.64
Fabricate lines and tubing in aircraft plumbing systems	10	3.89 1.29	14	3.30 0.98	13	2.29 0.58
Perform airworthy sheet metal repairs	11	3.88 1.53	7	3.65 1.22	7	2.39 0.64
Use precision measuring instruments	12	3.86 1.29	2	4.08 0.87	1	2.64 0.48
Maintain, test and service lead-acid storage batteries	13	3.85 1.33	6	3.65 1.03	6	2.39 0.54
Troubleshoot, service and repair fuel systems	14	3.84 1.34	26	3.03 1.03	34	1.86 0.54
Fabricate, install, and rig cables and control surfaces	15	3.77 1.52	32	2.88 1.10	23.5	2.08 0.69
Remove and treat rust and corrosion	16	3.76 1.29	18	3.26 1.14	30	2.00 0.63
Use and apply FAR and related material (AD, service letters, aircraft specifications, TSO's and STC's)	17	3.74 1.47	11	3.38 1.03	15	2.27 0.55

Table 5

A & P Mechanic Graduates

Rank of Competencies
(Cont.)

Competency	Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
	Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Inspect for conformation to type certificate, general document conformity, and legality for flight	18	3.69 1.52	12	3.37 1.09	11.5	2.29 0.59
Tie down and secure aircraft	19	3.60 1.44	24	3.05 1.09	27	2.01 0.69
Service and repair alternators, generators and associated equipment	20	3.58 1.30	25	3.05 1.08	16	2.27 0.75
Line service aircraft	21	3.57 1.56	33	2.85 1.09	36	1.82 0.73
Maintain, repair and install flight instrument systems	22	3.48 1.33	38	2.52 1.18	38	1.65 0.65
Remove and install reciprocating engines	23	3.47 1.50	21	3.17 1.22	21	2.12 0.65
Assemble, rig, balance and adjust fixed and movable control surfaces	24	3.47 1.52	36	2.71 0.94	35	1.83 0.61
Solder and braze	25	3.46 1.34	17	3.27 1.09	14	2.28 0.66
Use and interpret blueprints, make shop sketches and working drawings	26	3.37 1.35	13	3.32 0.91	20	2.13 0.58

Table 5

A & P Mechanic Graduates

Rank of Competencies
(Cont.)

Competency	Importance on Job Rank	Importance on Job Mean S.D.	Preparation at School Rank	Preparation at School Mean S.D.	Adequacy of Instructional Equipment Rank	Adequacy of Instructional Equipment Mean S.D.
Prepare and paint aircraft	27	3.36 1.40	37	2.70 1.21	33	1.88 0.78
Use non-destructive testing techniques	28	3.34 1.41	9	3.53 1.03	4	2.42 0.62
Service propeller and propeller systems	29	3.28 1.57	20	3.18 1.00	18	2.24 0.59
Do weight and balance computations	30	3.27 1.45	1	4.29 0.81	2	2.54 0.50
Inspect and repair plexi-glass surfaces	31	3.21 1.37	27.5	3.01 0.99	30	2.00 0.54
Overhaul reciprocating engines	32	3.14 1.42	3	3.90 1.08	3	2.46 0.66
Operate and functionally check avionic equipment	33	3.13 1.41	50	1.86 1.03	46	1.41 0.67
Maintain, test and service Nicad storage batteries	34	3.11 1.54	35	2.72 1.14	37	1.79 0.70
Install avionic equipment	35	3.10 1.42	49	1.92 1.11	42	1.44 0.63
Service and repair ice and rain control systems	36.5	3.00 1.43	41	2.21 0.83	43	1.43 0.58
Inspect, maintain and repair aircraft fabric covering	36.5	3.00 1.54	8	3.64 1.07	10	2.30 0.60
Inspect and test aircraft welded joints	38	2.99 1.36	22	3.11 1.16	22	2.11 0.69

Table 5

A & P Mechanic Graduates

Rank of Competencies
(Cont.)

Competency	Importance on Job Rank	Importance on Job Mean S.D.	Preparation at Schc l Rank	Preparation at Schc l Mean S.D.	Adequacy of Instructional Equipment Rank	Adequacy of Instructional Equipment Mean S.D.
Troubleshoot and repair air conditioning systems	39	2.94 1.55	42.5	2.18 1.01	44	1.42 0.60
Fabricate aircraft welded joints	40	2.90 1.31	15	3.30 1.15	11.5	2.29 0.74
Troubleshoot, service and maintain superchargers	41	2.89 1.48	46	2.05 0.99	50	1.32 0.52
Troubleshoot, service and maintain turbine engines	42	2.89 1.76	39	2.39 1.13	39.5	1.61 0.64
Troubleshoot and repair pressurization systems	43	2.87 1.58	42.5	2.18 1.00	48	1.36 0.54
Use line and taxi hand signals	44	2.86 1.33	34	2.84 1.03	23.5	2.08 0.55
Troubleshoot, service and repair oxygen systems	45	2.86 1.48	40	2.30 0.91	45	1.42 0.52
Remove and install turbine engines	46	2.70 1.65	47	2.01 1.03	47	1.40 0.55
Remove and install superchargers	47	2.67 1.44	44	2.09 0.98	49	1.33 0.53
Inspect, maintain and repair wooden aircraft structures	48	2.45 1.31	23	3.06 1.11	25	2.04 0.64
Hot form metal	49	2.20 1.40	45	2.05 1.25	41	1.52 0.69
Service and maintain rotary winged aircraft	50	2.10 1.43	48	1.97 0.96	39.5	1.61 0.73

A review of the competencies reveals certain areas which show a wide discrepancy between Importance on Job and Preparation at School. These areas are listed in Table 6. Those competencies with a negative difference in rank indicate areas of possible under-training, while those competencies with a positive difference indicate areas of possible over-training. These areas may differ significantly among the institutions. A review of the competency ranks in Appendix D will show difference in ranks by institution.

Table 6

A & P Mechanic Graduates

Competencies With a Difference in Rank of 15 or More Between Importance on Job and Preparation at School

N=73

Competency	Rank Importance on Job	Rank Preparation at School	Difference in Rank
Troubleshoot aircraft electrical problems	1	31	-30
Taxi aircraft and use ground power units	6	29	-23
Maintain required records and technical reports	7	30	-23
Troubleshoot, service and repair pneumatic and hydraulic systems	9	27.5	-18.5
Fabricate, install and rig cables and control surfaces	15	32	-17
Operate and functionly check avionic equipment	33	50	-17
Maintain, repair and install flight instrument systems	22	38	-16
Inspect aircraft welded joints	38	22	+16

Table 6

A & P Mechanic Graduates

Competencies With a Difference in Rank of 15 or

More Between Importance on Job and Preparation at School
(Cont.)

Competency	Importance on Job	Preparation at School	Difference in Rank
Use non-destructive testing techniques	28	9	+19
Fabricate aircraft welded joints	40	15	+25
Inspect, maintain and repair wooden aircraft structures	48	23	+25
Do weight and balance computations	30	1	+29
Overhaul reciprocating engines	32	3	+29
Inspect, maintain and repair aircraft fabric covering	36.5	8	+29.5

In reviewing competency ranks between Preparation at School and Adequacy of Instructional Equipment, much closer agreement is found. There are no differences in rank greater than 15, therefore, a difference in rank of 5 or more is used. Table 7 lists these areas.

Table 7

A & P Mechanic Graduates

Competencies With a Difference in Rank of 5 or More

Between Preparation at School and Adequacy of Instructional Equipment

N=73

Competency	Rank Preparation at School	Rank Adequacy of Instructional Equipment	Difference in Rank
Remove and treat rust and corrosion	18	30	-12
Troubleshoot, service and repair fuel systems	26	34	-8
Use and interpret blueprints, make shop sketches and working drawings	13	20	-7
Troubleshoot and repair pressurization systems	42.5	48	-5.5
Troubleshoot, service and repair oxygen systems	40	45	-5
Remove and install superchargers	44	49	-5
Use non-destructive testing techniques	9	4	+5
Troubleshoot aircraft electrical problems	31	26	+5
Install avionic equipment	49	42	+7
Fabricate, install and rig cables and control surfaces	32	23.5	+8.5
Service and maintain rotary winged aircraft	48	39.5	+8.5
Service and repair alternators, generators and associated equipment	25	16	+9
Use line and taxi hand signals	34	23.5	+10.5

Within the list of competencies, the respondent was given the opportunity to write in competencies not included in the list. Several respondents did write in additional competencies which they felt were important. Following is a list of these competencies:

General

Use of electrical testing equipment
Identification of various parts of a hydraulic system on a "mock-up"
Stainless steel
Welding (3)
Supercharger systems
Familarization with aircraft systems and actual use of systems
Hand propping engines

Airframe

Inspect and repair aircraft combustion heaters
To perform instrument static checks
Structural repair and non-structural repair
Install wind shields
Inspection of airframe at critical points and identification of corrosion and cracks
Reading and understanding wiring diagrams
Care and use of plexi-glass

Powerplant

Inspect turbine engines hot section
Troubleshoot and adjust Bendix and Continental injection systems
Overhaul, install and adjust magnetos and carburetors
Lubrication systems, types and maintenance
General troubleshooting
Remove cylinder for valve job and ring replacement
Inspection and overhaul of turbine engines and gear reduction system
Remove, install, maintain and service turbocharges
Assemble and test run engine

A rank correlation was computed between Importance on Job, Preparation at School and Instructional Equipment using Spearman's Rank Correlation Coefficient, adjusting for tied ranks. Table 8 shows correlations between the three categories.

Table 8

A & P Mechanic Graduates

Rank Correlations by Catetory

N=73

Category	Correlation
Importance on Job / Preparation at School	0.55
Preparation at School / Instructional Equipment	0.95
Importance on Job / Instructional Equipment	0.52

All correlations were significant at the .01 level of significance. A complete breakdown of correlations by employers and graduates by school, is given in Appendix F.

Open Ended Responses

The concluding portion of the survey instrument consisted of opinion and open ended questions. Graduates were asked in what two areas they felt most adequately and least adequately prepared. Tables 9 and 10 give the response to these questions.

Table 9

A & P Mechanic Graduates

Areas in Which Respondents Felt Most Adequately Prepared

(Areas of 3 or more responses)

N=73

No. of Responses	Area of Competence
20	Engines, general
20	Sheet metal
13	Reciprocating engine
9	Weight and Balance
8	Airframe
8	Dope and Fabric
8	Electrical
6	Powerplant
6	Hydraulics
5	Paperwork
4	Turbine engines
3	Inspections
3	Ignition systems
3	Fuel systems

Table 10

A & P Mechanic Graduates

Areas in Which Respondents Felt Least Adequately Prepared

(Areas of 3 or more responses)

N=73

No. of Responses	Area of Competence
29	Electrical
29	Turbines
16	Rotary wing
13	Avionics
11	Pressurization and air conditioning
5	Paperwork
5	Troubleshooting
4	Welding
4	Sheet Metal
3	Airframe
3	Inspections
3	Painting
3	Log books

The two major areas graduates feel most adequately prepared are in general engine ability and sheet metal repairs. Again, two areas stand out in which graduates feel least adequately prepared. These are electrical and turbine engines. It should be noted that these areas of least adequate preparation may also be areas ranked of low importance on the job. For example, graduate respondents rank turbine engines 46 on Importance on Job. Troubleshooting aircraft electrical problems, however, is ranked 1 on Importance on Job. A full breakdown of responses by school is in Appendix G.

Graduates were then asked the value of general education courses from 1, most valuable, to 5, least valuable. A mean average of the rank was then computed for each general education area. Table 11 gives the **rank mean** of the courses. This information indicates a preference for job related general education skills over social skills. A further breakdown by school may be found in Appendix H.

Table 11

A & P Mechanic Graduates

Mean Average of General Education Course Rank

N=78

General Education Course	Rank Mean
Electricity	1.37
Mathematics	2.47
Physics	2.91
Communications	3.74
Social Behavior/Human Relations	4.42

The next question dealt with restructuring the A & P Mechanic program to an Associate Degree program. The response shows a majority favoring making the program an Associate Degree. There seems to be, however, a significant number of opposing viewpoints. This is amplified further in the graduates' comments. Appendix I gives response by school.

Table 12

A & P Mechanic Graduates

Restructuring the A & P Mechanic Program

Into an Associate Degree Program

N=82

Response	Number	Percent
Yes	44	54%
No	19	23%
Not Sure	19	23%

The final item on the survey instrument solicited comments regarding the A & P Mechanic program. Table 13 lists comments made by two or more respondents. The one most significant comment is that respondents feel the need for more practical experience. A summary of graduate response is in Appendix J.

Table 13

A & P Mechanic Graduates

Summary of Comments (3 or more respondents)

N=57

No.	Comment
9	More practical experience needed
8	Good program
7	Should be an Associate Degree program
7	**Need better instructors**
6	**Program needs updating**
5	**Should not be an Associate Degree program**
3	**General education courses are unnecessary**
3	**Good instructors**
3	**Program should be longer**
3	**Program should be shorter**
	Need more emphasis on:
5	**Troubleshooting**
4	**Electrical**
4	**Turbines**
3	**Rigging**
3	**Welding**

CHAPTER IV

EMPLOYER RESPONSE

RESEARCH FINDINGS AND ANALYSIS

Employers were requested to complete the same competency list given to graduates, and were to rate each competency according to Importance on Job and Preparation at School. In addition to the competencies, several open ended questions were asked. Most of these questions correspond to the graduate questions to allow for comparison. A copy of the survey instrument may be found in Appendix C.

A & P Mechanic Competencies

Table 14 shows a comparison between the employers rating of each item according to importance of the competency on the job and preparation of the employee at school.

Table 14

A & P Mechanic Employers

Rank of Competencies[1]

N=32

Competency	Importance on Job Rank	Importance on Job Mean S.D.[2]	Preparation at School Rank	Preparation at School Mean S.D.
Perform 100 HR and progressive inspections	1	4.72 0.63	11	3.23 1.14
Inspect, service and repair landing gear, brake, wheel and tire systems	2	4.68 0.60	3	3.45 1.06
Perform airworthy sheet metal repairs	3	4.63 0.67	13	3.21 1.01

[1]Some items may appear to have the same mean and different ranks due to rounding the means to two decimal places after ranking.

[2]S.D. = Standard Deviation. A low standard deviation indicates a high consistency in the responses.

Table 14

A & P Mechanic Employers

Rank of Competencies
(Cont.)

	Importance on Job		Preparation at School	
	Rank	Mean S.D.	Rank	Mean S.D.
Select and install safety wire and securing devices	4	4.63 0.75	2	3.53 0.90
Troubleshoot aircraft electrical problems	5	4.59 0.80	41	2.50 1.14
Troubleshoot, service and repair fuel systems	6	4.58 0.72	10	3.24 1.06
Service and maintain engine ignition systems	7	4.53 0.80	14.5	3.13 1.07
Troubleshoot, service and repair pneumatic and hydraulic systems	8.5	4.48 0.77	9	3.25 1.08
Identify, check and service lubrication systems and components	8.5	4.48 0.77	1	3.57 0.88
Assemble, rig, balance and adjust fixed and movable control surfaces	10	4.42 0.99	16	3.10 0.82
Service propeller and propeller systems	11	4.41 0.87	17	3.07 0.80
Use precision measuring instruments	12	4.38 0.83	6	3.33 0.84
Use and apply FAR and related material (AD, service letters, aircraft specifications, TSO's and STC's).	13.5	4.34 0.87	25.5	2.90 0.92
Fabricate, install and rig cables and control surfaces	13.5	4.34 0.87	19.5	3.00 0.96
Maintain, test and service lead-acid storage batteries	15	4.28 0.85	21	2.97 0.87

Table 14

A & P Mechanic Employers

Rank of Competencies
(Cont.)

	Importance on Job		Preparation at School	
	Rank	Mean S.D.	Rank	Mean S.D.
Inspect for conformation to type certificate, general document conformity and legality for flight	16	4.25 0.88	30.5	2.83 1.15
Remove and treat rust and corrosion	17	4.22 0.94	14.5	3.13 1.04
Maintain, repair and install flight instrument systems	18	4.19 1.01	27	2.89 1.03
Maintain required records and technical reports (log books, parts inventory and ordering, job estimates, work orders, repair forms)	20	4.16 0.99	35	2.73 0.98
Taxi aircraft and use ground power units (gpu's)	20	4.16 1.11	30.5	2.83 1.02
Remove and install reciprocating engines	20	4.16 1.17	7	3.32 0.98
Do weight and balance computations	22.5	4.09 0.93	25.5	2.90 0.71
Fabricate lines and tubing in aircraft plumbing systems	22.5	4.09 0.93	5	3.34 1.20
Tie down and secure aircraft	24	4.03 1.09	8	3.30 0.88
Line service aircarft	25	4.00 0.97	4	3.36 0.83
Use non-destructive testing techniques	26	3.91 1.09	12	3.21 0.88
Solder and braze	27	3.90 1.08	18	3.04 0.69

Table 14

A & P Mechanic Employers

Rank of Competencies
(Cont.)

	Importance on Job		Preparation at School	
	Rank	Mean S.D.	Rank	Mean S.D.
Service and repair alternators, generators and associated equipment	28	3.88 1.07	39	2.62 0.82
Use and interpret blueprints, make shop sketches and working drawings	29	3.84 1.17	34	2.76 0.95
Inspect and repair plexi-glass surfaces	30	3.81 0.97	22	2.96 0.88
Inspect and test aircraft welded joints	31	3.80 0.96	28	2.88 0.59
Service and repair ice and rain control systems	32	3.77 1.06	19.5	3.00 0.49
Fabricate aircraft welded joints	33	3.77 1.01	32.5	2.77 1.03
Troubleshoot, service and repair oxygen systems	34	3.74 1.32	32.5	2.77 0.86
Maintain, test and service Nicad storage batteries	35	3.69 1.45	46	2.36 1.11
Troubleshoot, service and maintain superchargers	36	3.68 1.47	43	2.42 0.97
Install avionic equipment	37	3.66 1.14	45	2.38 0.94
Prepare and paint aircraft	38	3.56 1.16	24	2.93 1.08
Troubleshoot, service and maintain turbine engines	39	3.43 1.62	42	2.44 1.25
Troubleshoot and repair air conditioning systems	40	3.42 1.50	49	2.04 0.93

Table 14

A & P Mechanic Employers

Rank of Competencies
(Cont.)

	Importance on Job		Preparation at School	
	Rank	Mean S.D.	Rank	Mean S.D.
Inspect, maintain and repair aircraft fabric covering	41	3.35 1.23	23	2.96 1.20
Overhaul reciprocating engines	42	3.34 1.38	36	2.70 1.11
Remove and install superchargers	43	3.29 1.40	38	2.63 0.92
Troubleshoot and repair pressurization systems	44	3.26 1.63	48	2.05 0.95
Operate and functionally check avionic equipment	45	3.21 1.37	47	2.08 0.89
Use line and taxi hand signals	46	3.16 1.30	29	2.86 0.79
Remove and install turbine engines	47	2.97 1.61	44	2.39 1.09
Inspect, maintain and repair wooden aircraft structures	48	2.81 1.30	37	2.67 1.02
Hot form metal	49	2.68 1.19	40	2.55 1.00
Service and maintain rotary winged aircraft	50	2.48 1.45	50	1.89 0.96

Several competencies show a wide discrepancy between Importance on Job and Preparation at School. These areas are listed in Table 15. This shows the major area of concern to be troubleshooting aircraft electrical problems.

Table 15

A & P Mechanic Employers

Competencies With a Difference in Rank of 15 or

More Between Importance on Job and Preparation at School

Competency	Rank Importance on Job	Rank Preparation at School	Difference In Rank
Troubleshoot aircraft electrical problems	5	41	-36
Maintain required records and technical reports	20	35	-15
Tie down and secure aircraft	24	8	+16
Use line and taxi hand signals	46	29	+17
Fabricate lines and tubing in aircraft plumbing system	22.5	5	+17.5
Inspect, maintain and repair fabric covering	41	23	+18
Line service aircraft	25	4	+21

As with the graduate, the employer was given an opportunity to write in competencies not included in the list. Following is a list of those competencies written in by responding employers:

General

Obtain taxi clearance from tower, engine performance run up, towing and fire fighting
Welding (2)
Self organization-use of check lists, write it down, planning

Electrical troubleshooting
Find new mechanics to be very slow
Most new mechanics are extremely lacking in confidence
Self starter

Airframe

All aircraft windows
Fiberglass

Powerplant

Fuel systems, engine electrical (power generator)
Service, maintain, troubleshoot turbo props/engine systems
Particulary weak on Magnetos

A rank correlation was computed between Importance on Job and Preparation at School, using Spearman's Rank Correlation Coefficient, adjusting for tied ranks. This correlation was computed to be 0.72, and is significant at the .01 level. Note that this correlation is higher than the graduate correlation between these areas, and would seem to indicate that employers view the employee's preparation at the technical institute more positively than do graduates.

Open Ended Responses

The final portion of the employer's survey instrument consisted of open ended questions. The first three questions dealt with the employer's general conception of Wisconsin Vocational-Technical A & P Mechanic graduates. Tables 16-18 give the responses to these questions.

Table 16

A & P Mechanic Employers

Number of A & P Mechanics and

Wisconsin Vocational-Technical A & P Mechanics Employed

N=30

No. Employees per Company	No. of Companies	Total Employees	WVTAE A & P Mech. Grads.
1	2	2	2
2	6	12	11
3	5	15	8
4	3	12	6
5	3	15	7
6	3	18	9
7	0	0	0
8	0	0	0
9	2	18	8
10	1	10	2
15	1	15	5
16	1	16	1
23	1	23	3
25	1	25	1
28	1	28	6
N=	30	209	69 (33.0%)

Of the businesses employing Wisconsin Vocational-Technical A & P Mechanic graduates, 33% of the employees are graduates of Wisconsin Vocational-Technical Institutes. The smaller businesses, six or less employees, tend to have a larger proportion of A & P Mechanic graduates from the three Vocational, Technical and Adult Education Technical Institutes working for them.

Table 17

A & P Mechanic Employers

Qualification of Wisconsin Vocational-Technical

A & P Mechanics at Job Entry Level

N=35

Degree of Qualifications	No.	Percent
Well Qualified	10	29%
Qualified	20	57%
Unqualified	4	11%
No Answer	1	3%

Employers are generally satisfied with the job entry level skills of Wisconsin Vocational-Technical A & P Mechanic graduates. Eighty-six percent of the employers stated that they felt graduates are either qualified or well qualified at entry level.

Table 18

A & P Mechanic Employers

Comparison of Wisconsin Vocational-Technical Graduates With Graduates From Other Schools

N=29

Rating	No.	Percent
Above average	7	24%
Average	17	59%
Below average	3	10%
No answer	2	7%

Most employers seem to feel that Wisconsin Vocational-Technical A & P Mechanic graduates are comparable to graduates of other schools. Ten percent of the employers stated that they felt Wisconsin Vocational-Technical graduates were below average, while 24 percent stated they felt Wisconsin Vocational-Technical graduates were above average.

The employers were asked which areas Wisconsin Vocational-Technical graduates were most adequately and least adequately prepared. Tables 19 and 20 list the responses to these questions.

Table 19

A & P Mechanic Employers

Areas in Which Respondents Felt Graduate to be Most Adequately Prepared

(Two or more responses)

N=29

No. Responses	Areas of Competence
6	Sheet Metal
3	Basic Airframe Maintenance
3	Perform Inspections
3	Good in Basic Knowledge of FAR's
2	Weight and Balance
2	Powerplants
2	Engine Section-Entire System, as Fuel Systems and Ignition
2	Flat Piston Engines Small Aircraft Powerplants
2	Electricity
2	Reciprocating Engines

Table 20

A & P Mechanic Employers

Areas in Which Respondent Felt Graduates

to be Least Adequately Prepared

(Two or more responses)

N-29

No. Responses	Area of Competence
13	Electrical
5	Turbine engines
3	Welding-poor on welding-need more practice to develop skills
2	Troubleshooting in all areas, general groubleshooting
2	Fabric work and rib stitching
2	Helicopters
2	Components; as landing gear system

Employers were asked to rank the value of general education courses from 1, most valuable, to 5, least valuable. A mean average of the rank was then computed for each general education area. Table 21 gives the rank mean for each course.

Table 21

A & P Mechanic Employers

Mean Average of General Education Course Ranks

General Education Course	Rank Mean
Electricity	2.00
Human Relations	2.84
Mathematics	2.89
Communications	3.42
Physics	3.74

The final item on the survey instrument solicited comments regarding the A & P Mechanic program. Table 22 lists comments made by three or more respondents. A summary of employer response is given in Appendix J.

Table 22

A & P Mechanic Employers

Summary of Comments

(Three or more respondents)

No.	Comment
5	Mechanical aptitude test should be given to screen students
4	Graduates lack practical experience
4	Graduates show poor attitude
3	Poor organization of work
3	Lack of ability to troubleshoot
3	Have no idea of time allowed on a job
3	Don't know how to use manuals

CHAPTER V

COMPARISON OF GRADUATE AND EMPLOYER RESPONSE

In an effort to determine the degree of agreement between A & P Mechanic graduates and employers, a comparison of responses was made. It was felt that this would give an indication of the direction and areas of emphasis of Wisconsin Vocational-Technical A & P Mechanic programs.

Airframe and Powerplant Mechanic Competencies

A & P Mechanic graduate and employer competency ranks were compared both in Importance on Job and Preparation at School. Table 23 compares competency ranks on Importance on Job.

Table 23

A & P Mechanic Graduate and Employer

Comparison of Ranks on Importance on Job (Tables 5 and 14)[1]

N=105

	Graduate		Employer	
Competency	Rank	Mean S.D.[2]	Rank	Mean S.D.
Troubleshoot aircraft electrical problems	1	4.32 1.25	5	4.59 0.80
Service and maintain engine ignition systems	2	4.15 1.33	7	4.53 0.80
Select and install safety wire and securing devices	3.5	4.07 1.38	4	4.63 0.75
Perform 100 HR and progressive inspections	3.5	4.07 1.59	1	4.72 0.63

[1]Some items may appear to have the same mean and different ranks due to rounding the means to two decimal places after ranking.

[2]S.D. = Standard Deviation. A low standard deviation indicates a high consistency in the responses.

Table 23

A & P Mechanic Graduate and Employer

Comparison of Ranks on Importance on Job (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean S.D.	Employer Rank	Employer Mean S.D.
Identify, check and service lubrication systems and components	5	4.06 1.32	8.5	4.48 0.77
Taxi aircraft and use ground power units (gpu's)	6	3.95 1.43	20	4.16 1.11
Maintain required records and technical reports (log books, parts inventory and ordering, job estimates, work orders, repair forms)	7	3.92 1.31	20	4.16 0.99
Inspect, service and repair landing gear, brake, wheel and tire systems	8	3.92 1.53	2	4.68 0.60
Troubleshoot, service and repair pneumatic and hydraulic systems	9	3.91 1.34	8.5	4.48 0.77
Fabricate lines and tubing in aircraft plumbing systems	10	3.89 1.29	22.5	4.09 0.93
Perform airworthy sheet metal repairs	11	3.88 1.53	3	4.63 0.67
Use precision measuring instruments	12	3.86 1.29	12	4.38 0.83
Maintain, test and service lead-acid storage batteries	13	3.85 1.33	15	4.28 0.85
Troubleshoot, service and repair fuel systems	14	3.84 1.34	6	4.58 0.72
Fabricate, install and rig cables and control surfaces	15	3.77 1.52	13.5	4.34 0.87
Remove and treat rust and corrosion	16	3.76 1.29	17	4.22 0.94

Table 23

A & P Mechanic Graduate and Employer

Comparison of Ranks on Importance on Job (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean S.D.	Employer Rank	Employer Mean S.D.
Use and apply FAR and related material (AD, service letters, aircraft specifications, TSO's, and STC's).	17	3.74 1.47	13.5	4.34 0.87
Inspect for conformation to type certificate, general document conformity and legality for flight	18	3.69 1.52	16	4.25 0.88
Tie down and secure aircraft	19	3.60 1.44	24	4.03 1.09
Service and repair alternators, generators and associated equipment	20	3.58 1.30	28	3.88 1.07
Line service aircraft	21	3.57 1.56	25	4.00 0.97
Maintain, repair and install flight instrument systems	22	3.48 1.33	18	4.19 1.01
Remove and install reciprocating engines	23	3.47 1.50	20	4.16 1.17
Assemble, rig balance and adjust fixed and movable control surfaces	24	3.47 1.52	10	4.42 0.99
Solder and braze	25	3.46 1.34	27	3.90 1.08
Use and interpret blueprints, make shop sketches and working drawings	26	3.37 1.35	29	3.84 1.17
Prepare and paint aircraft	27	3.36 1.40	38	3.56 1.16
Use non-destructive testing techniques	28	3.34 1.14	26	3.91 1.09

Table 23

A & P Mechanic Graduate and Employer

Comparison of Ranks on Importance on Job (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean S.D.	Employer Rank	Employer Mean S.D.
Service propeller and propeller systems	29	3.28 1.57	11	4.41 0.87
Do weight and balance computations	30	3.27 1.45	22.5	4.09 0.93
Inspect and repair plexi-glass surfaces	31	3.21 1.37	30	3.81 0.97
Overhaul reciprocating engines	32	3.14 1.42	42	3.34 1.38
Operate and functionally check avionic equipment	33	3.13 1.14	45	3.21 1.37
Maintain, test and service Nicad storage batteries	34	3.11 1.54	35	3.69 1.45
Install avionic equipment	35	3.10 1.42	37	3.66 1.14
Service and repair ice and rain control systems	36.5	3.00 1.43	32	3.77 1.06
Inspect, maintain and repair aircraft fabric covering	36.5	3.00 1.54	41	3.35 1.23
Inspect and test aircraft welded joints	38	2.99 1.36	31	3.80 0.96
Troubleshoot and repair air conditioning systems	39	2.94 1.55	40	3.42 1.50
Fabricate aircraft welded joints	40	2.90 1.31	33	3.77 1.01

Table 23

A & P Mechanic Graduate and Employer

Comparison of Ranks on Importance on Job (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean S.D.	Employer Rank	Employer Mean S.D.
Troubleshoot, service and maintain superchargers	41	2.89 1.48	36	3.68 1.47
Troubleshoot, service and maintain turbine engines	42	2.89 1.76	39	3.43 1.62
Troubleshoot and repair pressurization systems	43	2.87 1.58	44	3.26 1.63
Use line and taxi hand signals	44	2.86 1.33	46	3.16 1.30
Troubleshoot, service and repair oxygen systems	45	2.86 1.48	34	3.74 1.32
Remove and install turbine engines	46	2.70 1.65	47	2.97 1.61
Remove and install superchargers	47	2.67 1.44	43	3.29 1.40
Inspect, maintain and repair wooden aircraft structures	48	2.45 1.31	43	2.81 1.30
Hot form metal	49	2.20 1.40	49	2.68 1.19
Service and maintain rotary winged aircraft	50	2.10 1.43	50	2.48 1.45

Generally, there is good agreement between graduates and employees regarding which competencies they feel are important on the job. A review of the competencies reveals only one area with a difference in rank of 15 or more. This is "service propeller and propeller systems" which graduates rank 29 while employers tend to feel it is more important, ranking it 11.

A comparison was also made between graduates and employers in the area of Preparation at School. Table 24 compares these competency ranks.

Table 24

A & P Mechanic Graduate and Employer

Comparison of Ranks on Preparation at School (Tables 5 and 14)[1]

N=105

Competency	Graduate Rank	Graduate Mean S.D.[2]	Employer Rank	Employer Mean S.D.
Do weight and balance computations	1	4.29 0.81	25.5	2.90 0.71
Use precision measuring instruments	2	4.08 0.87	6	3.33 0.84
Overhaul reciprocating engines	3	3.90 1.08	36	2.70 1.11
Select and install safety wire and securing devices	4	3.79 0.86	2	3.53 0.90
Service and maintain engine ignition systems	5	3.67 0.81	14.5	3.13 1.07
Maintain, test and service lead-acid storage batteries	6	3.65 1.03	21	2.97 0.87
Perform airworthy sheet metal repairs	7	3.65 1.22	13	3.21 1.01
Inspect, maintain and repair aircraft fabric covering	8	3.64 1.07	23	2.96 1.20
Use non-destructive testing techniques	9	3.53 1.03	12	3.21 0.88

[1]Some items may appear to have the same mean and different ranks due to rounding the means to two decimal places after ranking.

[2]S.D. = Standard Deviation. A low standard deviation indicates a high consistency in the responses.

Table 24

A & P Mechanic Graduate and Employer

Comparison of Ranks on Preparation at School (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean	Graduate S.D.	Employer Rank	Employer Mean	Employer S.D.
Identify, check and service lubrication systems and components	10	3.49	0.95	1	3.57	0.88
Use and apply FAR and related material (AD, service letters, aircraft specifications, TSO's and STC's)	11	3.38	1.03	25.5	2.90	0.92
Inspect for conformation to type certificate, general document conformity, and legality for flight	12	3.37	1.09	30.5	2.83	1.15
Use and interpret blueprints, make shop sketches and working drawings	13	3.32	0.91	34	2.76	0.95
Fabricate lines and tubing in aircraft plumbing systems	14	3.30	0.98	5	3.34	1.20
Fabricate aircraft welded joints	15	3.30	1.15	32.5	2.77	1.03
Perform 100 HR and progressive inspections	16	3.29	1.25	11	3.23	1.14
Solder and braze	17	3.27	1.09	18	3.04	0.69
Remove and treat rust and corrosion	18	3.26	1.14	14.5	3.13	1.04
Inspect, service and repair landing gear, brake, wheel and tire systems	19	3.23	1.09	3	3.45	1.06
Service propeller and propeller systems	20	3.18	1.00	17	3.07	0.80

Table 24

A & P Mechanic Graduate and Employer

Comparison of Ranks on Preparation at School (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean	Graduate S.D.	Employer Rank	Employer Mean	Employer S.D.
Remove and install reciprocating engines	21	3.17	1.22	7	3.32	0.98
Inspect and test aircraft welded joints	22	3.11	1.16	28	2.88	0.59
Inspect, maintain and repair wooden aircraft structures	23	3.06	1.11	37	2.67	1.02
Tie down and secure aircraft	24	3.05	1.09	8	3.30	0.88
Service and repair alternators, generators and associated equipment	25	3.05	1.08	39	2.62	0.82
Troubleshoot, service and repair fuel systems	26	3.03	1.03	10	3.24	1.06
Troubleshoot, service and repair pneumatic and hydraulic systems	27.5	3.01	0.92	9	3.25	1.08
Inspect and repair plexi-glass surfaces	27.5	3.01	0.99	22	2.96	0.88
Taxi aircraft and use ground power units (gpu's)	29	2.97	1.06	30.5	2.83	1.02
Maintain required records and technical reports (log books, parts inventory and ordering, job estimates, work orders, repair forms)	30	2.96	1.11	35	2.73	0.98
Troubleshoot aircraft electrical problems	31	2.89	1.16	41	2.50	1.14

Table 24

A & P Mechanic Graduate and Employer

Comparison of Ranks on Preparation at School (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean S.D.	Employer Rank	Employer Mean S.D.
Fabricate, install and rig cables and control surfaces	32	2.88 1.10	19.5	3.00 0.96
Line service aircraft	33	2.85 1.09	4	3.36 0.83
Use line and taxi hand signals	34	2.84 1.03	29	2.86 0.79
Maintain, test and service Nicad storage batteries	35	2.72 1.14	46	2.36 1.11
Assemble, rig, balance and adjust fixed and movable control surfaces	36	2.71 0.94	16	3.10 0.82
Prepare and paint aircraft	37	2.70 1.21	24	2.93 1.08
Maintain, repair and install flight instrument systems	38	2.52 1.18	27	2.89 1.03
Troubleshoot, service and maintain turbine engines	39	2.39 1.13	42	2.44 1.25
Troubleshoot, service and repair oxygen systems	40	2.30 C 91	32.5	2.77 0.86
Service and repair ice and rain control systems	41	2.21 0.83	19.5	3.00 0.49
Troubleshoot and repair pressurization systems	42.5	2.18 1.00	48	2.05 0.95
Troubleshoot and repair air conditioning systems	42.5	2.18 1.01	49	2.04 0.93

Table 24

A & P Mechanic Graduate and Employer

Comparison of Ranks on Preparation at School (Tables 5 and 14)

(Cont.)

Competency	Graduate Rank	Graduate Mean	Graduate S.D.	Employer Rank	Employer Mean	Employer S.D.
Remove and install superchargers	44	2.09	0.98	38	2.63	0.92
Hot form metal	45	2.05	1.25	40	2.55	1.00
Troubleshoot, service and maintain superchargers	46	2.05	0.99	43	2.42	0.97
Remove and install turbine engines	47	2.01	1.03	44	2.39	1.09
Service and maintain rotary engines	48	1.97	0.96	50	1.89	0.96
Install avionic equipment	49	1.92	1.11	45	2.38	0.94
Operate and functionally check avionic equipment	50	1.86	1.03	47	2.08	0.89

There were several areas which showed a difference in rank of ten or more regarding Preparation at School. There are two major areas of concern as shown on Table 26. The first of these is the competency "Overhaul reciprocating engines", which graduates feel much better prepared for than the employers feel they are. The other competency, "Line service aircraft", is just the opposite, with employers viewing employees well prepared in this area, while graduates ranked it as an area of poor preparation.

Table 25

A & P Mechanic Graduates and Employers Competencies with a Difference in Rank of 15 or More on Preparation at School

N=105

Competency	Graduate Rank	Employer Rank	Difference in Rank
Overhaul reciprocating engines	3	36	-33
Do weight and balance computations	1	25.5	-24.5
Use and interpret blueprints, make shop sketches and working drawings	13	34	-21
Inspect for conformation to type certificate, general document conformity, and legality for flight	12	30.5	-18.5
Fabricate aircraft welded joints	15	32.5	-17.5
Maintain, test and service lead-acid storage batteries	6	21	-15
Inspect, maintain and repair aircraft fabric covering	8	23	-15
Tie down and secure aircraft	24	8	+16
Troubleshoot, service and repair fuel systems	26	10	+16
Inspect, service and repair landing gear, brake, wheel and tire systems	19	3	+16
Troubleshoot, service and repair pneumatic and hydraulic system	27.5	9	+18.5
Assemble, rig, balance and adjust fixed and movable control surfaces	36	16	+20
Service and repair ice and rain control systems	41	19.5	+21.5
Line service aircraft	33	4	+29

A comparison of the write-in competencies, (Tables 6 and 15), shows general agreement between graduate and employer. There is a difference, however, in emphasis. The A & P Mechanic graduate tends to stress specific skills and practical experience while the A & P Mechanic employer tends to stress general know how and work attitudes.

Rank Correlations were computed between A & P Mechanic graduates and employers, again using Spearman's Rank Correlation Coefficient, adjusting for tied ranks. Table 26 shows these correlations.

Table 26

A & P Mechanic Graduate and Employer

Rank Correlations Between Graduate and Employer

N=105

Category	Correlation Between Graduate and Employer
Importance on Job	0.90
Preparation at School	0.60

This shows a very high degree of agreement between A & P Mechanic graduates and employers regarding Importance on Job. This is also reflected in the comparison of competency rankings. Although the correlation on Preparation at School is lower, it does show significant agreement between graduates and employers. Both correlations are significant at the .01 level.

Open Ended Response

In comparing areas graduates were most adequately prepared, (Tables 9 and 19), there were seven areas in which both the graduate and the employer felt the Wisconsin Vocational-Technical A & P Mechanic graduate was most adequately prepared. All but one of these seven areas (FAR's) were within the ten most mentioned items in both the graduate and employer responses. These areas of agreement are:

Sheet metal repairs
Reciprocating engines
Airframe
Weight and Balance
Electricity
Inspections
FAR's

In comparing items which graduates and employers felt the Wisconsin Vocational-Technical A & P Mechanic graduate was least adequately prepared, (Tables 10 and 20), there was little agreement between graduate and employer. Following is a list of those areas mentioned by both graduate and employer:

Electrical
Turbine engines
Helicopters
Welding
Troubleshooting

In addition to these, graduates listed both Avionics and Pressurization as being areas of concern, while these were not mentioned by employers. The two areas of high agreement were Electrical and Turbine Engines. Other than these, graduates and employers seem to have differing ideas as to areas graduates were least adequately prepared in.

Both A & P Mechanic graduates and employers were asked to rank the value of general education courses. Table 27 shows the comparison between the means of these rankings. Both graduates and employers ranked Electricity the highest. However, employers ranked Social Behavior/Human Relations second highest, while graduates ranked it last. It appears that employers value social skills more than do graduates. This is also reflected in the write-in competencies and comments made by employers.

Table 27

A & P Mechanic Graduate and Employer

Comparison of Mean Average of General Education

Course Ranks (Tables 11 and 21)

Course	Graduate Mean	Graduate Rank	Employer Mean	Employer Rank
Electricity	1.37	1	2.00	1
Mathematics	2.47	2	2.89	3
Physics	2.91	3	3.74	5
Communication	3.74	4	3.42	4
Social Behavior/Human Relations	4.42	5	2.84	2

In comparing the comments made by A & P Mechanic graduates and employers, (Tables 13 and 22), the one major area of agreement is that Wisconsin Vocational-Technical A & P Mechanic graduates need more practical experience. This is the single largest area of concern of graduates, and is reflected in many of the comments of employers. Many of the employers'comments also deal with the general attitude of the graduate and with the organization of his work. Graduates' comments tend to deal more with specific job skills and course requirements.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to assess the relationship between the competencies taught in the Wisconsin Vocational-Technical Airframe and Powerplant Mechanic programs and the competencies needed on the job.

It was felt that the best source of information regarding the effectiveness of the Airframe and Powerplant Mechanic program curriculum would be graduates of the program and employers of graduates. Therefore, the findings of the study are based on data received from these two sources. To meet the purpose of the study, both groups were asked to react to a competency list and to answer questions regarding the Airframe and Powerplant Mechanic program. Because it was felt that a totally objective survey instrument would not give a complete picture of the Airframe and Powerplant Mechanics' responsibilities, the survey population was encouraged to give their comments and opinions regarding the Airframe and Powerplant Mechanic program.

Conclusions

In reviewing the findings with respect to the objectives of the study, the following conclusions are made. These conclusions are based on the cumulative responses of graduates from the Airframe and Powerplant Mechanic programs at Blackhawk Technical Institute, Gateway Technical Institute and Milwaukee Area Technical College. Closer inspection of the appendices will show that all of these conclusions may not be appropriate for a specific institution.

1. There is general agreement between graduates and employers regarding which competencies are important to the Airframe and Powerplant Mechanic's job. (Table 23) Of the 10 most important competencies ranked by graduates, there are seven which employers also rank among the most important competencies:

   Troubleshoot aircraft electrical problems
   Perform 100 HR and progressive inspections
   Select and install safety wire and securing devices
   Service and maintain engine ignition systems
   Inspect, service and repair landing gear, brake, wheel and tire systems
   Identify, check and service lubrication systems and components
   Troubleshoot, service and repair pneumatic and hydraulic systems

Again, there are seven competencies which both graduates and employers rank among the 10 least important competencies:

Service and maintain rotary winged aircraft
Hot form metal
Inspect, maintain and repair wooden aircraft structure
Remove and install turbine engines
Remove and install superchargers
Use line and taxi hand signals
Troubleshoot and repair pressurization systems

2. There is more agreement between graduates and employers regarding those areas in which the graduate is less adequately prepared than those areas in which the graduate is well prepared. (Table 25) There are only three competencies which both graduates and employers agree are among the ten areas of most adequate preparation at school:

Use precision measuring instruments
Select and install safety wire and securing devices
Identify, check and service lubrication systems and components

The areas of least adequate preparation at school as ranked by both graduates and employers are:

Service and maintain rotary winged aircraft
Operate and functionally check avionic equipment
Troubleshoot and repair air conditioning systems
Troubleshoot and repair pressurization systems
Install avionic equipment
Remove and install turbine engines
Troubleshoot, service and maintain superchargers

It should again be noted that these areas of least adequate preparation may also be ranked low on importance on job and therefore should receive less emphasis than those areas ranked high on importance on job.

3. A review of the competencies reveals the following areas which may be of concern. A difference in rank of 15 or more between Importance on Job and Preparation at School and between graduates and employers was arbitrarily considered a significant difference. The following competencies were identified using this criteria.

There are several competencies which were ranked higher on Importance on Job than Preparation at School. The one major area of concern is the competency "Troubleshoot aircraft electrical problems", which was ranked very high in importance

by both employers and graduates and ranked very low in preparation by both groups. Competencies which were ranked high on Importance on Job and low on Preparation at School are listed below. Further instruction in these areas appears to be indicated:

Troubleshoot aircraft electrical problems
Maintain required records and technical reports
Taxi aircraft and use ground power units
Maintain, repair and install flight instrument systems.

There are also several competencies which were ranked lower on Importance on Job than on Preparation at School. Possible overtraining would be indicated in these areas.

Inspect, maintain and repair aircraft fabric covering
Inspect, maintain and repair wooden aircraft structures
Use line and taxi hand signals

In ranking competencies on Preparation at School, there were several areas of disagreement between graduates and employers, again using a difference in rank of 15 or more as a criteria. The following competencies are areas which graduates ranked higher in Preparation at School than employers, indicating that graduates felt better prepared in these areas than employers felt graduates were.

Overhaul reciprocating engines
Do weight and balance computations
Fabricate aircraft welded joints
Inspect for conformation to type certificate, general document conformity and legality for flight

There were also competencies which employers felt the graduates were better prepared in than the graduates felt prepared in themselves. These competencies are listed below.

Line service aircraft
Tie down and secure aircraft
Troubleshoot, service and repair pneumatic and hydraulic systems
Fabricate, install and rig cables and control surfaces

4. A comparison of rank correlations reveals that employers appear to have a more positive feeling towards the Airframe and Powerplant Mechanic graduates' preparation at school than do the graduates. (Appendix F)

5. Graduate respondents express a need for more practical experience on flightworthy aircraft and more training in areas directly applicable to the Airframe and Powerplant Mechanic field. Whereas, employers express the need for improved work attitudes by Airframe and Powerplant Mechanic graduates. (Tables 13 and 22)

6. In ranking the importance of general education courses graduates tend to stress those courses directly applicable to Airframe and Powerplant Mechanics while employers tend to stress human relations and communication skills. (Tables 11 and 21)

7. While graduates tended to approve of restructuring the Airframe and Powerplant Mechanic program to an Associate Degree program, the importance of the Airframe and Powerplant Mechanics' license was stressed rather than a diploma or degree. (Tables 12 and 13)

Recommendations

Based on the results of the study, the following recommendations are made:

1. That the curriculum be reviewed to change areas of emphasis, so that more training can be given in those competencies which require increased instructional emphasis and less training in those competencies which require less instructional emphasis, as identified in conclusion 3.

2. That because of the importance placed on troubleshooting aircraft electrical problems, an effort should be made to structure this instructional area to directly relate to aircraft electrical systems.

3. That there be greater communication between Airframe and Powerplant Mechanic instructors and employers, in an effort to gear the program directly to employers' needs.

4. That the Airframe and Powerplant Mechanic program offer more practical experience to students by:

   Working on airworthy aircraft whenever possible

   Assigning a total project to one or more students to carry out to completion

   Implementing on-the-job criteria such as time factors and organization of work

5. That the Airframe and Powerplant Mechanic program student be made aware of the importance employers place on human relations and communication skills as well as work attitudes and organization.

6. That there appears to be little reason for changing the Airframe and Powerplant Mechanic program to an Associate Degree program at this time. While Table 12 shows a majority of graduates favoring an Associate Degree program. General comments and responses both by graduates and employers indicate the need for practical hands on experience with little or no emphasis on the theory which would be indicated by an Associate Degree related program.

APPENDIX A

MINUTES OF A & P CURRICULUM STUDY MEETING

Minutes of Ad Hoc A & P Curriculum Committee Meeting

2:30 P.M., October 29, 1976 at GTI, Kenosha

In attendance: Carl Guell (Department of Transportation), Frank Trafford (Blackhawk), Harry Pokorny (MATC), Arch Henkelmann (Blackhawk), Ivan Eckholm (Blackhawk), Roland Krogstad (WBVTAE), Tom Bailey, Bob Clark, William Becker, Laurie DeVuyst and Jack Banerdt (Gateway).

The meeting was chaired by Laurie DeVuyst. After welcome by the chairperson, the meeting started off with discussio of the draft of the A & P Curriculum Study.

A question was raised about a statement in the introduction relative to minimal standards established by the F.A.A. and also that the two-year airframe and powerplant programs within the State of Wisconsin exceed the F.A.A. standards. It appeared that the committee was unanimous in their concurrence with the statement.

Several questions were raised to the chairperson concerning specific tables and clearer meaning of the data. Suggestions were accepted and noted by the chairperson and will be included in the corrected copy of the study.

There was considerable discussion and apparent agreement with the conclusions and recommendations of the study.

The first recommendation revealed the sensitivity of the group for it was mentioned several times that the Allen Report developed by the F.A.A. and the 1974 update report resulted in little or no change in the A & P curriculum standards. Several committee members emphasized that this study substantiated the previous study by the F.A.A., and appeared concerned as how to best influence the F.A.A. to change its regulations.

Carl Guell had several suggestions, namely:

1. That two copies of the corrected study be sent to Mr. Wilde in the G.A.D.O. office in Milwaukee for the express purpose of making him aware of the conclusions and recommendations.

2. That this ad hoc committee identify their immediate concern resulting from the study and draft a letter to both Eugene Lehrmann, State Director, Wisconsin Board of Vocational, Technical and Adult Education; and Fritz Wolfe, Chief Aeronautics Division, Department of Transportation; requesting that they identify concerns and ask that the proper authority in the F.A.A. be notified of the need for updating standards resulting from both the Allen Report and the Wisconsin Board of Vocational, Technical and Adult Education study. Gateway will take the responsibility of drafting the letter and concerns for the committee's consideration.

3. Send an abstract of the final study, along with the study and the minutes to Dr. William Ransey, Director of MATC for his consideration. It was mentioned that Dr. Ransey is chairperson of a National Aviation Education Committee.

It was further suggested that Gateway send ten copies of the final draft to Blackhawk and MATC for advisory committee use. Dr. Becker suggested that the faculties of the three schools involved in the study, need to review the data, conclusions and recommendations for possible curriculum value.

The concensus of the committee was that the study was well done and would be meaningful if the F.A.A. would take some appropriate action in changing their regulations relating to curriculum standards.

Respectfully submitted,

Jack Banerdt
Supervisor of Research
Research and Planning

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MINUTES OF A & P CURRICULUM MEETING

2:30 P.M., NOVEMBER 13, 1975 AT G.T.I., KENOSHA

In Attendance: Carl Guell (Department of Transportation), Phil Atlas (G.T.T.), Frank Trafford (Blackhawk), Harry Pokorny (MATC), Arch Henkelmann (Blackhawk), Otis Mehlberg (WBVTAE), R. Krogstad (WBVTAE), Dr. Nevala (G.T.I.), Tom Bailey (G.T.I.) and Laurie DeVuyst (G.T.I.)

The meeting was chaired by Laurie DeVuyst.

The meeting started off with a general discussion of the formats of the questionnaires to go to the graduates and the employers. Several suggestions were made for inclusion in the revision. It was discussed whether or not to substitute a frequency rating of the tasks for the facilities rating. It was felt that equipment should be substituted for facilities and that this was of more interest than a frequency rating.

The discussion shifted to reviewing the specific tasks to be included in the questionnaire. Harry Pokorny cautioned the group that the questions shouldn't be too academic for it may confuse the respondents. In reviewing the listed tasks, emphasis was directed to simplifying the questions and still keeping the original idea in the question.

It was decided that each question should be prefaced with "How well are you prepared to"

Several questions were deleted because of duplication and several questions were divided to give more meaning.

The result of the review increased the number of questions to fifty. Whether or not to categorize the tasks was discussed and it was decided that this should be done.

Laurie DeVuyst asked the aviation mechanic teacher to encourage graduates and employers to respond to the survey.

A review of the time frame of the project was discussed. It was suggested that the revised questionnaire be field tested on graduates at the Kenosha Airport and that a revised copy be sent to those present for further input. The meeting was adjourned at 5:00 P.M.

Respectively submitted,

Jack Banerdt

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APPENDIX B

SURVEY COVER LETTERS

First Mailing Graduates

GATEWAY TECHNICAL INSTITUTE

Kenosha Campus
District Office:
3520 - 30th Avenue
Kenosha, Wi. 53140
Phone: (414) 658-4371

Racine Campus
1001 South Main Street
Racine, Wi. 53403
Phone: (414) 637-9881

Elkhorn Campus
E. Centralia St. & Hwy. 11
Elkhorn, Wi. 53121
Phone: (414) 723-5490

Keith W. Stoehr
District Director

December 5, 1975

Dear Graduate:

Gateway Technical Institute is conducting a statewide curriculum research study of the Airframe and Powerplant Mechanics Programs, in cooperation with Blackhawk Technical Institute and Milwaukee Area Technical College. The purpose of this study is to determine if the present programs are fulfilling the needs of industry in preparing people for employment in the Aviation Mechanic Industry.

As a graduate of an A & P Program, your assistance would be of great value. We would appreciate it if you would take a few minutes to complete the enclosed questionnaire. By doing so, you would be helping your school to keep in touch with the actual work experience of A & P Mechanics. Enclosed is a self-addressed, stamped envelope for your convenience.

We need your help to make this a valid, worthwhile study. Please return the enclosed questionnaire today.

Sincerely,

Lauren DeVuyst
Research Assistant
Research and Planning Services

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Enclosures

Second Mailing Graduate

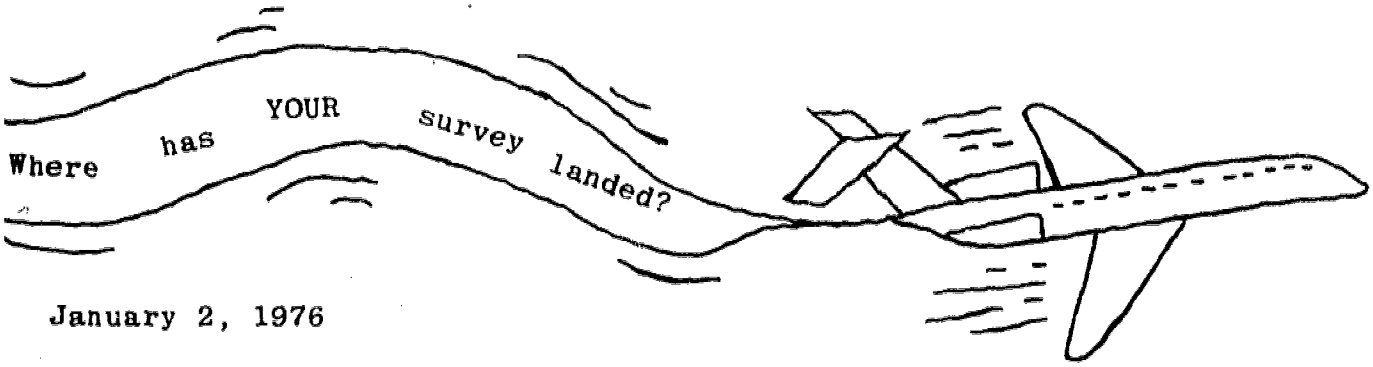
GATEWAY TECHNICAL INSTITUTE

Kenosha Campus
District Office
1520 - 30th Avenue
Kenosha, Wi. 53140
Phone: (414) 658-4371

Racine Campus
1001 South Main Street
Racine, Wi. 53403
Phone: (414) 637-9881

Elkhorn Campus
E. Centralia St. & Hwy. 11
Elkhorn, Wi. 53121
Phone: (414) 723-5320

Keith W. Stoehr
District Director



January 2, 1976

Dear Graduate:

We missed your response to our Airframe and Powerplant Mechanics Curriculum Evaluation. The results of this survey will be used to determine the relevancy of Wisconsin Vocational Technical Schools' Airframe and Powerplant Mechanics Programs. It is only through your cooperation that we will be able to draw valid conclusions from the results of this survey.

All information will be treated confidentially. No individual or company names will be disclosed.

Please take a few minutes to complete the enclosed questionnaire. A stamped, self-addressed envelope is enclosed for your convenience.

Thank you for your time and assistance.

Sincerely,

Lauren DeVuyst

Lauren DeVuyst
Research Assistant
Research and Planning Services

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Enclosures

Third Mailing Graduate

GATEWAY TECHNICAL INSTITUTE

Kenosha Campus
District Offices
3520 - 30th Avenue
Kenosha, Wi. 53140
Phone: (414) 658-4121

Racine Campus
1001 South Main Street
Racine, Wi. 53403
Phone: (414) 637-9581

Elkhorn Campus
E. Centralia St. & Hwy. H
Elkhorn, Wi. 53121
Phone: (414) 723-9390

Keith W. Stoehr
District Director

January 16, 1976

Dear Graduate:

We're still waiting for your completed Airframe and Powerplant Mechanics Curriculum Study questionnaire. It is only through your cooperation that we can keep in touch with the work experiences of our graduates.

Please take a few minutes today to complete the enclosed questionnaire and return it in the stamped, self-addressed envelope provided.

If you do not wish to take part in this study, please so indicate on the questionnaire and return it, as this will take your name off our mailing list.

Thank you for your time and cooperation.

Sincerely,

Lauren DeVuyst
Research Assistant
Research and Planning Services

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Enclosures

First and Second Mailing Employers

GATEWAY TECHNICAL INSTITUTE

Kenosha Campus
District Office
3520 - 30th Avenue
Kenosha, Wi. 53140
Phone: (414) 658-4371

Racine Campus
1001 South Main Street
Racine, Wi. 53403
Phone: (414) 637-9881

Elkhorn Campus
E. Centralia St. & Hwy. H
Elkhorn, Wi. 53121
Phone: (414) 723-5390

Keith W. Stoehr
District Director

February 16, 1976

Gateway Technical Institute is presently conducting a statewide curriculum study of the Wisconsin Vocational Technical Airframe and Powerplant Mechanics Programs. As an employer of A & P Mechanics, your participation in this study would be of great value in determining the job requirements of the A & P Mechanic.

We would appreciate it if you would take a few minutes of your time to complete the enclosed questionnaire. A stamped, self-addressed envelope is enclosed for your convenience. All information will be treated confidentially; no individual or company names will be disclosed.

Thank you for your time and your assistance.

Sincerely,

Lauren DeVuyst
Research Assistant
Research and Planning Services

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Enclosure

APPENDIX C

SURVEY INSTRUMENTS

A & P Mechanic School attended:

/___/ Blackhawk T. I. /___/ Gateway T. I. /___/ M.A.T.C.

Year Licence Received:

Airframe _____

Powerplant _____

Are you now working as an A & P Mechanic /___/ Yes /___/ No

If not, is your job related to your

A & P Training /___/ Yes /___/ No

Present job title _____

Briefly list duties _____

_____

Supervisor's Name _____

Employer's Name _____

Employer's Address _____

_____

Following is a list of job skills used by A & P Mechanics. There are three different categories for each task listed:

1) How important is this skill in the performance of your job?

2) How well do you feel your school prepared you to perform this task?

3) Was the equipment at your school adequate to train you in this area?

Please circle the number in each category, for each task listed, which best expressed your opinion.

If you are not working as an A & P Mechanic, please complete the following as it best applies to your job.

How important is this skill in the performance of your job?						How well do you feel your school prepared you to perform this task?					Was the equipment at your school adequate to train you in this area?		
No knowledge necessary		Some knowledge needed		Knowledge essential	General	Unprepared		Adequate preparation		Excellent preparation	Poor	Satisfactory	Excellent
1	2	3	4	5	Use and apply FAR and related material (AD, service letters, aircraft specifications, TSO's, and STC's).	1	2	3	4	5	1	2	3
1	2	3	4	5	Maintain required records and technical reports (log books, parts inventory and ordering, job estimates, work orders, repair forms)	1	2	3	4	5	1	2	3
1	2	3	4	5	Use and interpret blueprints, make shop sketches and working drawings.	1	2	3	4	5	1	2	3
1	2	3	4	5	Do weight and balance computations.	1	2	3	4	5	1	2	3
1	2	3	4	5	Remove and treat rust and corrosion.	1	2	3	4	5	1	2	3
1	2	3	4	5	Select and install safety wire and securing devices.	1	2	3	4	5	1	2	3

How important is this skill in the performance of your job?						How well do you feel your school prepared you to perform this task?					Was the equipment at your school adequate train you in this area?		
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation	Poor	Satisfactory	Excellent
1	2	3	4	5	Taxi aircraft and use ground power units (gpu's).	1	2	3	4	5	1	2	3
1	2	3	4	5	Use line and taxi hand signals.	1	2	3	4	5	1	2	3
1	2	3	4	5	Tie down and secure aircraft.	1	2	3	4	5	1	2	3
1	2	3	4	5	Perform 100 HR and progressive inspections.	1	2	3	4	5	1	2	3
1	2	3	4	5	Use precision measuring instruments.	1	2	3	4	5	1	2	3
1	2	3	4	5	Use non-destructive testing techniques.	1	2	3	4	5	1	2	3
1	2	3	4	5	Fabricate lines and tubing in aircraft plumbing systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Service and repair alternators, generators and associated equipment.	1	2	3	4	5	1	2	3
1	2	3	4	5	Solder and braze.	1	2	3	4	5	1	2	3
1	2	3	4	5	Hot form metal.	1	2	3	4	5	1	2	3
1	2	3	4	5	Other _____	1	2	3	4	5	1	2	3
					_____								
					Airframe								
1	2	3	4	5	Prepare and paint aircraft.	1	2	3	4	5	1	2	3
1	2	3	4	5	Line service aircraft.	1	2	3	4	5	1	2	3

How important is this skill in the performance of your job?						How well do you feel your school prepared you to perform this task?					Was the equipment at your school adequate to train you in this area?		
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation	Poor	Satisfactory	Excellent
1	2	3	4	5	Inspect for conformation to type certificate, general document conformity, and legality for flight.	1	2	3	4	5	1	2	3
1	2	3	4	5	Fabricate, install, and rig cables and control surfaces..	1	2	3	4	5	1	2	3
1	2	3	4	5	Troubleshoot aircraft electrical problems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Maintain, test and service lead-acid storage batteries.	1	2	3	4	5	1	2	3
1	2	3	4	5	Maintain, test and service Nicad storage batteries.	1	2	3	4	5	1	2	3
1	2	3	4	5	Service and repair ice and rain control systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Maintain, repair and install flight instrument systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Operate and functionally check avionic equipment.	1	2	3	4	5	1	2	3
1	2	3	4	5	Install avionic equipment.	1	2	3	4	5	1	2	3
1	2	3	4	5	Troubleshoot and repair pressurization systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Troubleshoot and repair air conditioning systems.	1	2	3	4	5	1	2	3

How important is this skill in the performance of your job?						How well do you feel your school prepared you to perform this task?					Was the equipment at your school adequate to train you in this area		
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation	Poor	Satisfactory	Excellent
1	2	3	4	5	Troubleshoot, service and repair oxygen systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Troubleshoot, service and repair fuel systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Troubleshoot, service and repair pneumatic and hydraulic systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Inspect, service and repair landing gear, brake, wheel and tire systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Assemble, rig balance and adjust fixed and movable control surfaces.	1	2	3	4	5	1	2	3
1	2	3	4	5	Fabricate aircraft welded joints.	1	2	3	4	5	1	2	3
1	2	3	4	5	Inspect and test aircraft welded joints.	1	2	3	4	5	1	2	3
1	2	3	4	5	Identify, check and service lubrication systems and components.	1	2	3	4	5	1	2	3
1	2	3	4	5	Perform airworthy sheet metal repairs.	1	2	3	4	5	1	2	3
1	2	3	4	5	Inspect, maintain and repair aircraft fabric covering.	1	2	3	4	5	1	2	3
1	2	3	4	5	Inspect, maintain and repair wooded aircraft structures.	1	2	3	4	5	1	2	3
1	2	3	4	5	Service and maintain rotary winged aircraft.	1	2	3	4	5	1	2	3

How important is this skill in the performance of your job?						How well do you feel your school prepared you to perform this task?					Was the equipment at your school adequate to train you in this area?		
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation	Poor	Satisfactory	Excellent
1	2	3	4	5	Inspect and repair plexi-glass surfaces.	1	2	3	4	5	1	2	3
1	2	3	4	5	Other _____	1	2	3	4	5	1	2	3
					_____								
					Powerplant								
1	2	3	4	5	Service and maintain engine ignition systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Service propeller and propeller systems.	1	2	3	4	5	1	2	3
1	2	3	4	5	Remove and install reciprocating engines.	1	2	3	4	5	1	2	3
1	2	3	4	5	Overhaul reciprocating engines.	1	2	3	4	5	1	2	3
1	2	3	4	5	Remove and install superchargers.	1	2	3	4	5	1	2	3
1	2	3	4	5	Troubleshoot, service and maintain superchargers.	1	2	3	4	5	1	2	3
1	2	3	4	5	Remove and install turbine engines.	1	2	3	4	5	1	2	3
1	2	3	4	5	Troubleshoot, service and maintain turbine engines.	1	2	3	4	5	1	2	3
1	2	3	4	5	Other _____	1	2	3	4	5	1	2	3
					_____								

In what two areas do you feel you were most adequately prepared?

_____

_____

In what two areas do you feel you were least adequately prepared?

_____

_____

Please rank the value of the following general education course which were part of your Airframe and Powerplant Program. Rank the most valuable course 1, to the least valuable course 5:

____ Communications

____ Electricity

____ Mathematics

____ Physics

____ Social Behavior or Human Relations

Would you recommend restructuring the A & P Mechanics Program to make it an Associate Degree Program?

____ Yes ____ Not Sure ____ No

Comments: _____

_____

_____

A & P CURRICULUM EVALUATION

Following is a list of job skills used by A & P Mechanics. There are two different categories for each task listed:

1) How important is th[illegible] in the performance of the A & P Mechanic's job?

2) How well do you f[illegible]ne employee was prepared to perform this task?

Please circle the number in each category, for each task listed, which best expresses your opinion.

How important is this skill in the performance of the A & P Mechanic's job?						How well do you feel the employee was prepared to perform this task?				
No knowledge necessary		Some knowledge needed		Knowledge essential	General	Unprepared		Adequate preparation		Excellent preparation
1	2	3	4	5	Use and apply FAR and related material (AD, service letters, aircraft specifications, TSO's, and STC's).	1	2	3	4	5
1	2	3	4	5	Maintain required records and technical reports (log books, parts inventory and ordering, job estimates, work orders, repair forms).	1	2	3	4	5
1	2	3	4	5	Use and interpret blueprints, make shop sketches and working drawing[illegible]	1	2	3	4	5
1	2	3	4	5	Do weight and balance comp[illegible]	1	2	3	4	5
1	2	3	4	5	Remove and treat rust and corrosion.	1	2	3	4	5
1	2	3	4	5	Select and install safety wire and securing devices.	1	2	3	4	5

How important is this skill in the performance of the A & P Mechanic's job?						How well do you feel the employee was prepared to perform this task?				
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation
1	2	3	4	5	Taxi aircraft and use ground power units (gpu's).	1	2	3	4	5
1	2	3	4	5	Use line and taxi hand signals.	1	2	3	4	5
1	2	3	4	5	Tie down and secure aircraft.	1	2	3	4	5
1	2	3	4	5	Perform 100 HR and progressive inspections.	1	2	3	4	5
1	2	3	4	5	Use precision measuring instruments.	1	2	3	4	5
1	2	3	4	5	Use non-destructive testing techniques.	1	2	3	4	5
1	2	3	4	5	Fabricate lines and tubing in aircraft plumbing systems.	1	2	3	4	5
1	2	3	4	5	Service and repair alternators, generator and associated equipment.	1	2	3	4	5
1	2	3	4	5	Solder and braze.	1	2	3	4	5
1	2	3	4	5	Hot form metal.	1	2	3	4	5
1	2	3	4	5	Other _____	1	2	3	4	5
					_____					
					Airframe					
1	2	3	4	5	Prepare and paint aircraft.	1	2	3	4	5
1	2	3	4	5	Line service aircraft.	1	2	3	4	5

How important is this skill in the performance of the A & P Mechanic's job?						How well do you feel the employee was prepared to perform this task?				
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation
1	2	3	4	5	Inspect for conformation to type certificate, general document conformity, and legality for flight.	1	2	3	4	5
1	2	3	4	5	Fabricate, install, and rig cables and control surfaces.	1	2	3	4	5
1	2	3	4	5	Troubleshoot aircraft electrical problems.	1	2	3	4	5
1	2	3	4	5	Maintain, test and service lead-acid storage batteries.	1	2	3	4	5
1	2	3	4	5	Maintain, test and service Nicad storage batteries.	1	2	3	4	5
1	2	3	4	5	Service and repair ice and rain control systems.	1	2	3	4	5
1	2	3	4	5	Maintain, repair and install flight instrument systems.	1	2	3	4	5
1	2	3	4	5	Operate and functionally check avionic equipment.	1	2	3	4	5
1	2	3	4	5	Install avionic equipment.	1	2	3	4	5
1	2	3	4	5	Troubleshoot and repair pressurization systems.	1	2	3	4	5
1	2	3	4	5	Troubleshoot and repair air conditioning systems.	1	2	3	4	5

How important is this skill in the performance of the A & P Mechanic's job?						How well do you feel the employee was prepared to perform this task?				
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation
1	2	3	4	5	Troubleshoot, service and repair oxygen systems.	1	2	3	4	5
1	2	3	4	5	Troubleshoot, service and repair fuel systems.	1	2	3	4	5
1	2	3	4	5	Troubleshoot, service and repair pneumatic and hydraulic systems.	1	2	3	4	5
1	2	3	4	5	Inspect, service and repair landing gear, brake wheel and tire systems.	1	2	3	4	5
1	2	3	4	5	Assemble, rig balance and adjust fixed and movable control surfaces.	1	2	3	4	5
1	2	3	4	5	Fabricate aircraft welded joints.	1	2	3	4	5
1	2	3	4	5	Inspect and test aircraft welded joints.	1	2	3	4	5
1	2	3	4	5	Identify, check and service lubrication systems and components.	1	2	3	4	5
1	2	3	4	5	Perform airworthy sheet metal repairs.	1	2	3	4	5
1	2	3	4	5	Inspect, maintain and repair aircraft fabric covering.	1	2	3	4	5
1	2	3	4	5	Inspect, maintain and repair wooded aircraft structures.	1	2	3	4	5
1	2	3	4	5	Service and maintain rotary winged aircraft.	1	2	3	4	5

How important is this skill in the performance of the A & P Mechanic's job?						How well do you feel the employee was prepared to perform this task?				
No knowledge necessary		Some knowledge needed		Knowledge essential		Unprepared		Adequate preparation		Excellent preparation
1	2	3	4	5	Inspect and repair plexi-glass surfaces.	1	2	3	4	5
1	2	3	4	5	Other _____	1	2	3	4	5
					_____					
					Powerplant					
1	2	3	4	5	Service and maintain engine ignition systems.	1	2	3	4	5
1	2	3	4	5	Service propeller and propeller systems.	1	2	3	4	5
1	2	3	4	5	Remove and install reciprocating engines.	1	2	3	4	5
1	2	3	4	5	Overhaul reciprocating engines.	1	2	3	4	5
1	2	3	4	5	Remove and install superchargers.	1	2	3	4	5
1	2	3	4	5	Troubleshoot, service and maintain superchargers.	1	2	3	4	5
1	2	3	4	5	Remove and install turbine engines.	1	2	3	4	
1	2	3	4	5	Troubleshoot, service and maintain turbine engines.	1	2	3		
1	2	3	4	5	Other _____	1	2	3	4	5
					_____					

Number of A & P Mechanics employed by your company_____

Number of A & P Mechanics trained at a Wisconsin Vocational-Technical School_____

Overall, how qualified were the Wisconsin Vocational-Technical trained people in the area of job-entry skills:

Well qualified_____ Qualified_____ Unqualified_____

How do Wisconsin Vocational-Technical graduates generally compare with graduates from other schools:

Above average_____ Average_____ Below Average_____

In what two areas do you feel the Wisconsin Vocational-Technical Airframe and Powerplant Mechanic was best prepared?

_____

_____

In what two areas do you feel he was least adequately prepared?

_____

_____

Please rank the value of the following general education courses. Rank the most valuable course 1, the least valuable course 5:

_____ Communications

_____ Electricity

_____ Mathematics

_____ Physics

_____ Social Behavior or Human Relations

Comments: _____

_____

_____

APPENDIX D

INTERVIEW PROCEDURE

March 1, 1976

Dear Sir:

Gateway Technical Institute, in cooperation with Milwaukee Area Technical College and Blackhawk Technical Institute, is conducting a statewide study of the Airframe and Powerplant Mechanics Programs. The purpose of this study is to determine the relevancy of the Wisconsin Vocational Technical Adult Education Airframe and Powerplant Mechanics Programs to actual work experiences of graduates of the programs.

As an integral part of this study, Gateway is conducting interviews of graduates and their immediate supervisors/employers. Mr. Randall Schaeffer, as the principal interviewer for this project, would appreciate having a few minutes of your time to assist him in determining the educational needs of students enrolled in Airframe and Powerplant Programs.

Sincerely,

William J. Becker
Assistant Director
Research and Planning

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AIRFRAME & POWERPLANT MECHANICS

INTERVIEW REPORT
Randall Schaeffer

The interviewing was initiated by checking the class graduation list with the Airframe and Powerplant instructors at the three technical schools to find the latest information of the graduate. This procedure was very helpful and saved considerable time on locating graduates and their employers. Graduates whose employers were unknown were contacted by telephone to set up an appointment.

Contacting the graduate's employer and setting up an appointment with the supervisor prior to speaking with the graduate worked the best. The supervisor would then in many cases allow the graduate to take time during normal working hours to complete the interview instead of using up the employees dinner hour, which in most cases didn't leave enough time for the interview, especially those who had a thirty minute lunch break.

Employers and supervisors of larger aircraft repair facilities were more receptive to the personal interview than the smaller fixed base operators. However, once the interview began the employer of the smaller operations became more responsive.

Setting up interviews with supervisors and graduates at airports within close proximity to each other to cut down on travel was a problem.

Individual personality played a part in it, but overall the graduate was willing to complete the instrument and provide his comments in the interview. The graduate preferred to use his lunch time to complete the interview in preference to spending time after work, which would have alloted more time for the interview. The lunch time interviews, which in a few cases were thirty minutes didn't give the graduate, I feel, enough time to think of and comment on all the areas he could have.

I feel that the graduate who received the instrument through the mail had a more detailed comment sheet because he would complete it in his spare time, which would allow him more time for recall and placing his ideas on paper. On the other hand the employer had more comments to add in the personal interview as compered to the mail survey. One reason was probably because we took time to see him personally and he knew we were really interested in his comments. Through the mail he might have felt nobody will look at the comments anyway.

When the employer and the graduate in particular found that the interviewer was an A & P mechanic, he appeared to be more at ease and willing to speak of aviation.

APPENDIX E

A & P MECHANIC COMPETENCY RANKS

A & P Mechanic Competency Ranks

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Troubleshoot aircraft electrical problems	Total		4.32		2.89		2.01
	Graduates	1	1.25	31	1.16	26	0.78
			4.68		3.46		2.40
	Blackhawk	1	0.69	12.5	1.24	9	0.71
			4.06		2.70		1.80
	Gateway	1	1.46	36	1.02	32.5	0.76
			4.27		2.35		1.82
	Milwaukee	1	1.44	36.5	0.93	29	0.73
			4.59		2.50		
	Employers	5	0.80	41	1.14	NA	
Service and maintain engine ignition systems	Total		4.15		3.67		2.40
	Graduates	2	1.33	5	0.81	5	0.57
			4.36		3.52		2.31
	Blackhawk	5.5	0.95	9	0.85	12	0.55
			3.97		3.77		2.50
	Gateway	3	1.58	6	0.73	5	0.57
			4.17		3.73		2.36
	Milwaukee	3	1.34	6	0.88	9	0.58
			4.53		3.13		
	Employers	7	0.80	14.5	1.07	NA	
Select and install safety wire and securing devices	Total		4.07		3.79		2.36
	Graduates	3.5	1.38	4	0.86	8	0.56
			4.48		3.96		2.44
	Blackhawk	2	1.00	2	0.85	6	0.51
			3.90		3.62		2.18
	Gateway	6	1.49	9	0.94	20	0.61
			3.78		3.82		2.50
	Milwaukee	13	1.56	5	0.73	4.5	0.51
			4.63		3.53		
	Employers	4	0.75	2	0.90	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Perform 100 HR and progressive inspections	Total		4.07		3.29		2.26
	Graduates	3.5	1.59	16	1.25	17	0.75
			4.42		3.81		2.52
	Blackhawk	4	1.28	5	1.30	3	0.70
			3.90		3.11		2.07
	Gateway	5	1.76	24.5	1.17	25	0.81
			3.89		2.86		2.19
	Milwaukee	9	1.68	21	1.11	13	0.68
			4.72		3.23		
	Employers	1	0.63	11	1.14	NA	
Identify, check and service lubrication systems and components	Total		4.06		3.49		2.32
	Graduates	5	1.32	10	0.95	9	0.53
			4.24		3.59		2.23
	Blackhawk	9	1.13	8	0.89	17	0.51
			3.84		3.40		2.33
	Gateway	8.5	1.51	17.5	0.86	10	0.48
			4.20		3.50		2.44
	Milwaukee	2	1.21	9	1.20	6	0.62
			4.48		3.57		
	Employers	8.5	0.77	1	0.88	NA	
Taxi aircraft and use ground power units (gpu's)	Total		3.95		2.97		2.01
	Graduates	6	1.43	29	1.06	28	0.68
			4.28		3.07		2.11
	Blackhawk	7.5	0.98	28	1.17	25	0.70
			3.94		2.86		1.93
	Gateway	4	1.61	29.5	1.01	29	0.66
			3.50		3.00		2.00
	Milwaukee	19.5	1.58	17.5	1.00	26	0.70
			4.16		2.83		
	Employers	20	1.11	30.5	1.02	NA	
Maintain required records and technical reports (log books, parts inventory and ordering, job estimates, work orders, repair forms)	Total		3.92		2.96		1.88
	Graduates	7	1.31	30	1.11	32	0.62
			4.28		3.22		2.07
	Blackhawk	7.5	1.06	23	1.19	28	0.62
			3.50		3.07		1.83
	Gateway	20	1.53	26	1.19	31	0.66
			4.11		2.50		1.73
	Milwaukee	6	1.08	30	0.74	34	0.55
			4.16		2.73		
	Employers	20	0.99	35	0.98	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Inspect, service and repair landing gear, brake, wheel and tire systems	Total Graduates	8	3.92 1.53	19	3.23 1.09	19	2.15 0.64
	Blackhawk	13.5	4.08 1.38	17	3.37 1.01	17	2.23 0.65
	Gateway	12.5	3.68 1.68	23	3.14 1.06	27	2.00 0.60
	Milwaukee	5	4.13 1.46	13	3.18 1.29	11	2.29 0.69
	Employers	2	4.68 0.60	3	3.45 1.06	NA	
Troubleshoot, service and repair pneumatic and hydraulic systems	Total Graduates	9	3.91 1.34	27.5	3.01 0.92	30	2.00 0.64
	Blackhawk	19	3.92 1.25	20	3.33 0.87	21	2.17 0.49
	Gateway	7	3.87 1.41	31	2.83 0.95	32.5	1.80 0.66
	Milwaukee	7	4.00 1.41	20	2.88 0.86	21	2.12 0.70
	Employers	8.5	4.48 0.77	9	3.25 1.08	NA	
Fabricate lines and tubing in aircraft plumbing systems	Total Graduates	10	3.89 1.29	14	3.30 0.98	13	2.29 0.58
	Blackhawk	11.5	4.12 0.88	17	3.37 0.97	11	2.33 0.59
	Gateway	12.5	3.68 1.42	27	3.04 0.88	20	2.18 0.61
	Milwaukee	8	3.94 1.51	7	3.57 1.08	7.5	2.38 0.59
	Employers	22.5	4.09 0.93	5	3.34 1.20	NA	
Perform airworthy sheet metal repairs	Total Graduates	11	3.88 1.53	7	3.65 1.22	7	2.39 0.64
	Blackhawk	3	4.44 1.12	4	3.89 1.15	4	2.50 0.65
	Gateway	26	3.32 1.72	7	3.75 1.14	6.5	2.43 0.57
	Milwaukee	4	4.15 1.34	16	3.06 1.34	20	2.13 0.72
	Employers	3	4.63 0.67	13	3.23 1.01	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Use precision measuring instruments	Total		3.86		4.08		2.64
	Graduates	12	1.29	2	0.87	1	0.48
			3.72		3.93		2.69
	Blackhawk	25	1.24	3	0.96	1	0.47
			4.00		4.30		2.67
	Gateway	2	1.32	2	0.79	1	0.48
			3.83		3.95		2.55
	Milwaukee	12	1.34	2	0.84	3	0.51
			4.38		3.33		
	Employers	12	0.83	6	0.84	NA	
Maintain, test and service lead-acid storage batteries	Total		3.85		3.65		2.39
	Graduates	13	1.33	6	1.03	6	0.54
			4.16		3.74		2.56
	Blackhawk	10	1.07	6	0.94	5	0.51
			3.58		3.63		2.27
	Gateway	16.5	1.50	8	1.16	15	0.58
			3.87		3.56		2.50
	Milwaukee	10.5	1.30	8	0.98	4.5	0.51
			4.28		2.97		
	Employers	15	0.85	21	0.87	NA	
Troubleshoot, service and repair fuel systems	Total		3.84		3.03		1.86
	Graduates	14	1.31	26	1.03	34	0.54
			3.63		3.35		2.00
	Blackhawk	20	1.24	19	0.98	31.5	0.50
			3.84		2.93		1.83
	Gateway	8.5	1.42	28	0.94	30	0.53
			3.87		2.71		1.71
	Milwaukee	10.5	1.41	27	1.16	36	0.59
			4.5		3.24		0.59
	Employers	6	0.72	10	1.06	NA	
Fabricate, install, and rig cables and control surfaces	Total		3.77		2.88		2.08
	Graduates	15	1.52	32	1.10	23.5	0.69
			4.08		3.30		2.23
	Blackhawk	13.5	1.26	21	1.17	17	0.65
			3.65		2.76		1.97
	Gateway	14	1.70	33	0.87	28	0.68
			3.53		2.41		2.06
	Milwaukee	17.5	1.55	35	1.18	23.5	0.75
			4.34		3.00		
	Employers	13.5	0.87	19.5	0.96	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Remove and treat rust and corrosion	Total Graduates	16	3.76 1.29	18	3.26 1.14	30	2.00 0.63
	Blackhawk	15	4.00 0.93	10	3.50 0.95	24	2.12 0.65
	Gateway	11	2.76 1.53	14	3.50 1.14	26	2.03 0.63
	Milwaukee	21	3.44 1.29	28	2.68 1.17	30	1.82 0.59
	Employers	17	4.22 0.94	14.5	3.13 1.04	NA	
Use and apply FAR and related material (AD, service letters, aircraft spedifications, TSO's and STC's)	Total Graduates	17	3.74 1.47	11	3.38 1.03	15	2.27 0.55
	Blackhawk	5.5	4.36 0.86	17	3.37 1.04	13	2.30 0.54
	Gateway	23	3.37 1.75	11.5	3.57 1.17	9	2.34 0.55
	Milwaukee	19.5	3.50 1.42	14	3.14 0.79	17	2.14 0.57
	Employers	13.5	4.34 0.87	25.5	2.90 0.92	NA	
Inspect for conformation to type certificate, general document conformity, and legality for flight	Total Graduates	18	3.69 1.52	12	3.37 1.09	11.5	2.29 0.59
	Blackhawk	11.5	4.12 1.17	7	3.70 1.03	7	2.42 0.58
	Gateway	18	3.52 1.69	19	3.39 0.99	14	2.29 0.53
	Milwaukee	26.5	3.38 1.59	22	2.83 1.15	22	2.11 0.68
	Employers	16	4.25 0.88	30.5	2.83 1.15	NA	
Tie down and secure aircraft	Total Graduates	19	3.60 1.44	24	3.05 1.09	27	2.01 0.69
	Blackhawk	16	3.96 1.16	12.5	3.46 0.90	23	2.15 0.61
	Gateway	10	3.77 1.59	24.5	3.11 1.10	23	2.14 0.65
	Milwaukee	41	2.83 1.29	31	2.48 1.08	38	1.67 0.73
	Employers	24	4.03 1.09	8	3.30 0.88	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Service and repair alternators, generators and associated equipment	Total Graduates	20	3.58 1.30	25	3.05 1.08	16	2.27 0.75
	Blackhawk	23	3.76 1.16	24.5	3.15 1.13	14	2.26 0.71
	Gateway	24	3.35 1.43	22	3.17 0.87	8	2.37 0.72
	Milwaukee	14	3.72 1.27	24	2.77 1.27	19	2.14 0.83
	Employers	28	3.88 1.07	39	2.62 0.82	NA	
Line service aircraft	Total Graduates	21	3.57 1.56	33	2.85 1.09	36	1.82 0.73
	Blackhawk	27	3.52 1.58	26.5	3.11 1.09	35	1.89 0.70
	Gateway	15	3.61 1.67	29.5	2.86 1.18	35	1.75 0.75
	Milwaukee	16	3.56 1.41	33.5	2.44 0.86	28	1.83 0.79
	Employers	25	4.00 0.97	4	3.36 0.83	NA	
Maintain, repair and install flight instrument systems	Total Graduates	22	3.48 1.33	38	2.52 1.18	38	1.65 0.65
	Blackhawk	23	3.76 1.09	35	2.89 1.25	37	1.88 0.59
	Gateway	26	3.32 1.51	41	2.31 1.07	41	1.41 0.63
	Milwaukee	29	3.33 1.29	38	2.29 1.16	36	1.71 0.69
	Employers	18	4.19 1.01	27	2.89 1.03	NA	
Remove and install reciprocating engines	Total Graduates	33	3.47 1.50	21	3.17 1.22	21	2.12 0.65
	Blackhawk	17.5	3.92 1.35	37	2.81 1.18	37	1.88 0.59
	Gateway	28	3.26 1.61	20	3.33 1.21	22	2.17 0.65
	Milwaukee	33	3.22 1.44	10	3.40 1.23	10	2.35 0.67
	Employers	20	4.16 1.17	7	3.32 0.98	NA	

Competency		Importance on Job		Preparation at School		Use of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Assemble, rig balance and adjust fixed and movable control surfaces	Total		3.47		2.71		1.83
	Graduates	24	1.52	36	0.94	35	0.61
	Blackhawk	23	3.76 1.30	30.5	2.96 0.94	33.5	2.00 0.57
	Gateway	20	3.50 1.76	37	2.62 0.90	36	1.71 0.60
	Milwaukee	40	2.93 1.28	32	2.47 0.94	33	1.76 0.66
	Employers	10	4.42 0.99	16	3.10 0.82	NA	
Solder and braze	Total		3.46		3.27		2.28
	Graduates	25	1.34	17	1.09	14	0.66
	Blackhawk	28.5	3.48 1.19	30.5	2.96 1.22	31.5	2.00 0.80
	Gateway	22	3.48 1.55	10	3.60 1.07	3	2.57 0.50
	Milwaukee	24.5	3.39 1.20	12	3.18 0.85	12	2.23 0.53
	Employers	27	3.90 1.08	18	3.04 0.69	NA	
Use and interpret blueprints, make shop sketches and working drawings	Total		3.37		3.32		2.13
	Graduates	26	1.35	13	0.91	20	0.58
	Blackhawk	30.5	3.44 1.23	15	3.44 1.08	22	2.16 0.55
	Gateway	20	3.50 1.43	17.5	3.40 0.86	18	2.21 0.62
	Milwaukee	37.5	3.06 1.39	15	3.09 0.75	26	2.00 0.55
	Employers	29	3.84 1.17	34	2.76 0.96	NA	
Prepare and paint aircraft	Total		3.36		2.70		1.88
	Graduates	27	1.40	37	1.21	33	0.78
	Blackhawk	32.5	3.40 1.32	33	2.93 1.23	20	2.19 0.79
	Gateway	26	3.32 1.51	32	2.83 1.17	34	1.76 0.74
	Milwaukee	26.5	3.38 1.36	39	2.17 0.99	40	1.61 0.70
	Employers	38	3.56 1.16	24	2.93 1.08	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Use non-destructive testing techniques	Total		3.34		3.53		2.42
	Graduates	28	1.41	9	1.03	4	0.62
	Blackhawk	40	3.04 1.14	22	3.26 1.10	8	2.41 0.64
	Gateway	16.5	3.58 1.52	15	3.46 1.00	12	2.32 0.55
	Milwaukee	29	3.33 1.53	3.5	3.95 0.86	2	2.57 0.68
	Employers	26	3.91 1.09	12	3.21 0.88		NA
Service propeller and propeller systems	Total		3.28		3.18		2.24
	Graduates	29	1.57	20	1.00	18	0.59
	Blackhawk	17.5	3.92 1.22	24.5	3.15 0.86	17	2.23 0.59
	Gateway	31	2.90 1.68	11.5	3.57 0.96	11	2.32 0.61
	Milwaukee	37.5	3.06 1.63	26	2.71 1.06	17	2.14 0.57
	Employers	11	4.41 0.87	17	3.07 0.80		NA
Do weight and balance computations	Total		3.27		4.29		2.54
	Graduates	30	1.45	1	0.81	2	0.50
	Blackhawk	21	3.80 1.12	1	4.22 0.85	2	2.56 0.51
	Gateway	32	2.90 1.42	1	4.60 0.62	2	2.64 0.49
	Milwaukee	35	3.17 1.72	3.5	3.95 0.86	7.5	2.38 0.50
	Employers	22.5	4.09 0.93	25.5	2.90 0.71		NA
Inspect and repair plexi-glass surfaces	Total		3.21		3.01		2.00
	Graduates	31	1.37	27.5	0.99	30	0.54
	Blackhawk	28.5	3.48 1.33	36	2.88 0.95	39	1.88 0.44
	Gateway	37	2.80 1.47	13	3.52 0.94	16	2.26 0.53
	Milwaukee	15	3.60 1.06	33.5	2.44 0.78	32	1.78 0.55
	Employers	30	3.81 0.97	22	2.96 0.88		NA

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Overhaul reciprocating engines	Total		3.14		3.90		2.46
	Graduates	32	1.42	3	1.08	3	0.66
	Blackhawk	34	3.33 1.49	14	3.44 1.25	10	2.35 0.75
	Gateway	36	2.84 1.44	5	3.86 0.93	12	2.32 0.67
	Milwaukee	24.5	3.39 1.24	1	4.50 0.74	1	2.77 0.43
	Employers	42	3.34 1.38	36	2.70 1.11	NA	
Operate and functionally check avionic equipment	Total		3.13		1.86		1.41
	Graduates	33	1.41	50	1.03	46	0.67
	Blackhawk	32.5	3.40 1.32	48.5	2.22 1.12	42	1.69 0.72
	Gateway	34	2.87 1.59	48	1.82 0.98	46	1.29 0.60
	Milwaukee	34	3.20 1.15	47	1.35 0.70	45.5	1.18 0.39
	Employers	45	3.21 1.37	47	2.08 0.89	NA	
Maintain, test and service Nicad storage batteries	Total		3.11		2.72		1.79
	Graduates	34	1.54	35	1.14	37	0.70
	Blackhawk	38.5	3.12 1.62	33	2.93 1.00	34	1.92 0.63
	Gateway	29	2.97 1.52	35	2.74 1.26	37	1.70 0.72
	Milwaukee	22.5	3.40 1.50	36.5	2.35 1.11	36	1.71 0.77
	Employers	35	3.69 1.45	46	2.36 1.11	NA	
Install avionic equipment	Total		3.10		1.92		1.44
	Graduates	35	1.42	49	1.11	42	0.63
	Blackhawk	30.5	3.44 1.33	48.5	2.22 1.28	41	1.72 0.74
	Gateway	34	2.87 1.59	47	2.00 1.07	41	1.41 0.57
	Milwaukee	39	3.00 1.13	49	1.29 0.59	48	1.06 0.24
	Employers	37	3.66 1.14	45	2.38 0.94	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Service and repair ice and rain control systems	Total Graduates	36.5	3.00 1.43	41	2.21 0.83	43	1.43 0.58
	Blackhawk	37	3.16 1.40	40.5	2.56 0.97	45.5	1.58 0.64
	Gateway	42	2.71 1.49	45	2.03 0.73	45	1.31 0.47
	Milwaukee	29	3.33 1.35	41	1.94 0.56	41	1.41 0.62
	Employers	32	3.77 1.06	19.5	3.00 0.49	NA	
Inspect, maintain and repair aircraft fabric covering	Total Graduates	36.5	3.00 1.54	8	3.64 1.07	10	2.30 0.60
	Blackhawk	26	3.64 1.35	11	3.48 1.01	17	2.23 0.59
	Gateway	47	2.58 1.61	3	3.96 1.00	6.5	2.43 0.57
	Milwaukee	43	2.80 1.42	11	3.35 1.17	14.5	2.18 0.64
	Employers	41	3.80 1.23	23	2.88 1.20	NA	
Inspect and test aircraft welded joints	Total Graduates	38	2.99 1.36	22	3.11 1.16	22	2.11 0.69
	Blackhawk	36	3.20 1.12	29	3.00 1.18	29	2.04 0.66
	Gateway	39	2.77 1.45	16	3.43 1.20	17	2.25 0.65
	Milwaukee	36	3.07 1.53	25	2.76 0.97	26	2.00 0.79
	Employers	31	3.80 0.96	28	2.88 0.59	NA	
Troubleshoot and repair air conditioning systems	Total Graduates	39	2.9 1.55	42.5	2.18 1.01	44	1.42 0.60
	Blackhawk	44	2.80 1.63	46.5	2.26 1.02	50	1.46 0.58
	Gateway	38	2.77 1.48	38	2.57 0.97	38	1.63 0.67
	Milwaukee	17.5	3.53 1.51	47	1.35 0.49	49.5	1.00 0.0
	Employers	40	3.42 1.50	49	2.04 0.93	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Fabricate aircraft welded joints	Total Graduates	40	2.90 1.31	15	3.30 1.15	11.5	2.29 0.74
	Blackhawk	35	3.32 1.11	26.5	3.11 1.16	27	2.08 0.80
	Gateway	42	2.71 1.42	4	3.86 0.88	4	2.55 0.57
	Milwaukee	46	2.60 1.30	29	2.69 1.17	4.5	2.18 0.81
	Employers	33	3.77 1.01	32.5	2.77 1.03		NA
Troubleshoot, service and maintain superchargers	Total Graduates	41	2.89 1.48	46	2.05 0.99	50	1.32 0.52
	Blackhawk	38.5	3.12 1.42	46.5	2.26 1.06	48	1.50 0.58
	Gateway	34	2.87 1.65	46	2.03 1.03	48.5	1.27 0.52
	Milwaukee	45	2.61 1.24	42	1.81 0.81	44	1.19 0.40
	Employers	36	3.68 1.47	43	2.42 0.97		NA
Troubleshoot, service and maintain turbine engines	Total Graduates	42	2.89 1.76	39	2.39 1.13	39.5	1.61 0.64
	Blackhawk	42	2.88 1.75	43	2.33 1.07	40	1.77 0.65
	Gateway	44	2.78 1.78	44	2.12 1.27	47	1.28 0.54
	Milwaukee	32	3.24 1.79	23	2.80 0.95	31	1.80 0.62
	Employers	39	3.43 1.62	42	2.44 1.25		NA
Troubleshoot and repair pressurization systems	Total Graduates	43	2.87 1.58	42.5	2.18 1.00	48	1.36 0.54
	Blackhawk	45.5	2.76 1.56	40.5	2.56 0.93	47	1.54 0.58
	Gateway	42	2.71 1.64	42	2.30 0.99	43	1.40 0.56
	Milwaukee	22.5	3.40 1.45	47	1.35 0.61	49.5	1.00 0.0
	Employers	44	3.26 1.63	48	2.05 0.95		NA

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Use line and taxi hand signals	Total Graduates	44	2.86 1.33	34	2.84 1.03	23.5	2.08 0.55
	Blackhawk	41	2.88 1.05	38	2.81 0.90	31.5	2.00 0.59
	Gateway	30	2.94 1 50	34	2.75 1.27	24	2.11 0.58
	Milwaukee	44	2.72 1.41	17.5	3.00 0.84	17	2.14 0.48
	Employers	46	3.16 1.30	29	2.86 0.79	NA	
Troubleshoot service and repair oxygen systems	Total Graduates	45	2.86 1.48	40	2.30 0.91	45	1.42 0.52
	Blackhawk	45.5	2.76 1.51	39	2.63 0.97	45.5	1.58 0.58
	Gateway	40	2.74 1.53	39	2.38 0.73	41	1.41 0.50
	Milwaukee	31	3.27 1.33	45	1.65 0.79	45.5	1.18 0.39
	Employers	34	3.74 1.32	32.5	3.77 0.86	NA	
Remove and install turbine engines	Total Graduates	46	2.70 1.65	47	2.01 1.03	47	1.40 0.55
	Blackhawk	47	2.68 1.65	50	2.19 1.14	44	1.62 0.57
	Gateway	45	2.66 1.78	49	1.81 1.04	44	1.33 0.55
	Milwaukee	42	2.82 1.51	40	2.05 0.83	43	1.20 0.41
	Employers	47	2.97 1.61	44	2.39 1.09	NA	
Remove and install superchargers	Total Graduates	47	2.67 1.44	44	2.09 0.98	49	1.33 0.53
	Blackhawk	43	2.84 1.43	45	2.31 1.01	49	1.48 0.51
	Gateway	46	2.60 1.59	43	2.13 1.04	48.5	1.27 0.58
	Milwaukee	47	2.56 1.25	44	1.75 0.79	42	1.25 0.44
	Employers	43	3.29 1.40	38	2.63 0.98	NA	

Competency		Importance on Job		Preparation at School		Adequacy of Instructional Equipment	
		Rank	Mean S.D.	Rank	Mean S.D.	Rank	Mean S.D.
Inspect, maintain and repair wooded aircraft structures	Total		2.45		3.06		2.04
	Graduates	48	1.31	23	1.11	25	0.64
	Blackhawk	49	2.60 1.32	33	2.93 1.11	37	1.88 0.52
	Gateway	48	2.35 1.38	21	3.25 1.17	20	2.18 0.67
	Milwaukee	48	2.40 1.16	19	2.94 1.03	23.4	2.06 0.75
	Employers	48	2.81 1.30	37	2.67 1.02	NA	
Hot form metal	Total		2.20		2.05		1.52
	Graduates	49	1.40	45	1.25	41	0.69
	Blackhawk	48	2.61 1.59	44	2.32 1.38	43	1.68 0.77
	Gateway	49	2.20 1.40	40	2.34 1.11	39	1.62 0.68
	Milwaukee	50	1.67 0.97	50	1.26 0.93	47	1.68 0.90
	Employers	49	2.68 1.19	40	2.55 1.00	NA	
Service and maintain rotary winged aircraft	Total		2.10		1.97		1.61
	Graduates	50	1.43	48	0.96	39.5	0.73
	Blackhawk	50	2.12 1.42	42	2.54 1.07	26	2.08 0.79
	Gateway	50	2.00 1.53	50	1.59 0.78	50	1.17 0.38
	Milwaukee	49	2.27 1.28	43	1.76 0.66	39	1.69 0.79
	Employers	50	2.48 1.45	50	1.89 0.96	NA	

APPENDIX F

A & P MECHANIC RANK CORRELATIONS

A & P Mechanic Competency Rank Correlations

	Graduate/Employer	BT/GTI	GTI/MATC	BTI/MATC
Importance on Job	0.90	0.80	0.70	0.73
Preparation at School	0.60	0.78	0.74	0.80
Instructional Equipment	NA	0.72	0.79	0.81

	Employer	Total Graduate	BTI	GTI	MATC
Importance on Job/ Preparation at School	0.72	0.55	0.75	0.33	0.36
Preparation at School/ Instructional Equipment	NA	0.95	0.90	0.95	0.94
Importance on Job/ Instructional Equipment	NA	0.52	0.69	0.34	0.37

All correlations are significant at the .01 level.

APPENDIX G

AREAS OF MOST AND LEAST ADEQUATE PREPARATION

Areas of Most and Least Adequate Preparation

Graduate

Most		Least	
No.	Area	No.	Area
20	Engines, general	29	Electrical
20	Sheet metal	29	Turbines
13	Reciprocating engine	16	Rotary wing
9	Weight and Balance	13	Avionics
8	Airframe	11	Pressurization and air conditioning
8	Dope and Fabric	5	Trouble shooting
8	Electrical	5	Paperwork
6	Powerplant	4	Welding
6	Hydraulics	4	Sheet metal
5	Paperwork	3	Airframe
4	Turbine engines	3	Inspections
3	Inspections	3	Painting
3	Ignition system	3	Logbooks
3	Fuel systems	2	Systems
2	General aviation	2	Hydraulics
2	Piston engines	2	Oxygen systems
2	Welding	2	Dope and Fabric
2	Propeller	2	Engines
1	Troubleshooting	2	Super chargers
1	Math	2	Props
1	Brakes	1	Throttle rigging
1	Engine Accessories	1	Heavy piston
1	Aircraft controls	1	Old type aircraft
1	General maintenance	1	Tire changing
1	Small gas engines	1	Hardware usage
1	Starters & generators	1	Hand signals
1	Systems repair	1	Powerplant
1	Theory	1	Rigging surfaces
1	Instruments	1	Gas heaters
1	Non-destructive testing	1	Ni-Cad storage batteries
1	Corrosion	1	Ignition systems
1	Lubricating systems	1	Line maintenance
1	Tech manual		

Areas of Most and Least Adequate Preparation

Blackhawk Technical Institute

Most		Least	
No.	Area	No.	Area
9	Sheet metal	9	Turbines
7	Engine	8	Electrical
5	Electrical	8	Paper work
3	Airframe	4	Rotary wing
3	Powerplant	3	Welding
2	General Aviation	2	Dope & Fabric
2	Inspections	2	Pressurization
1	Brakes	1	Trouble shooting
1	Fabric	1	Avionics
1	Weight & Balance	1	Systems
1	Reciprocating engine	1	Throttle rigging
1	Turbine engines	1	Hydraulic systems
1	Engine accessories	1	Oxygen systems
1	Piston engines	1	Inspections
1	Hydraulics	1	Heavy piston
	Aircraft controls	1	Airframe
		1	Painting
		1	Old type aircraft
		1	Logbooks

Areas of Most and Least Adequate Preparation

Gateway Technical Institute

Most		Least	
No.	Area	No.	Area
8	Sheet metal	14	Turbines
7	Weight & Balance	11	Electrical
6	Dope & Fabric	9	Rotary wing
5	Reciprocating engines	6	Avionics
5	Airframe	3	Pressurization
4	Engines	2	Troubleshooting
4	Paperwork	2	Painting
2	Electrical	2	Paperwork
2	Welding	2	Engines
2	Propellers	2	Jet Engines
2	Ignition systems	1	Tire changing
1	General maintenance	1	Hardware usage
1	Hydraulic	1	Hand signals
1	Small gas engine	1	Powerplant
1	Starters & generators	1	Systems
1	Systems repair	1	Superchargers
1	Powerplant	1	Logbooks
1	Math		

Areas of Most and Least Adequate Preparation

Milwaukee Area Technical College

Most		Least	
No.	Area	No.	Area
9	Engine	10	Electrical
6	Reciprocating	6	Pressurization
4	Hydraulics	5	Avionics
3	Turbine	4	Sheet metal
3	Sheet metal	3	Turbine
3	Fuel systems	2	Trouble shooting
2	Powerplant	2	Inspections
1	General aviation	2	Rotary wing
1	Theory	2	Airframe
1	Instrument	2	Props
1	Weight & balance	1	Rigging surfaces
1	Trouble shooting	1	Gas heaters
1	Non-destructive testing	1	Hydraulics
1	Dope & fabric	1	Ni-Cad storage batteries
1	Fuel systems	1	Jet engines
1	Inspections	1	Ignition systems
1	Electrical	1	Line maintenance
1	Corrosion	1	Logbooks
1	Lubricating systems	1	Life support systems
1	Ignition systems	1	Welding
1	Piston engines	1	Super charges

Areas of Most and Least Adequate Preparation

Employers

Most		Least	
No.	Area	No.	Area
6	Sheet metal	13	Electrical
4	Engines	5	Turbine
3	Airframe	3	Welding
3	Inspections	2	Organization of work
3	FAR's	2	Hydraulics
2	Reciprocating	2	Ignition systems
2	Powerplant	2	Trouble shooting
2	Electrical	2	Rotary wing
2	Weight & balance	2	Dope and fabric
2	Light aircraft repair	1	Large aircraft
1	Rotary wing	1	FAR's
1	Turbine	1	Fiberglass
1	Theory	1	Props
1	Systems	1	Sheet metal
1	Hydraulics	1	Technical manuals
1	Piston	1	General aircraft knowledge
1	Generating systems	1	Public Relations
1	Hardware usage	1	Fuel Systems
1	Hand tools	1	Superchargers
1	Fuel system		
1	Ignition system		
1	Record keeping		

APPENDIX H

MEAN RANK OF GENERAL EDUCATION COURSES

Mean Rank of General Education Courses

	Communications	Electricity	Mathematics	Physics	Human Relations/ Social Behavior
Employers	3.42	2.00	2.89	3.74	2.84
Total Graduates	3.74	1.37	2.47	2.91	4.42
BTI	4.19	1.22	2.26	2.85	4.59
GTI	3.43	1.33	2.60	3.13	4.27
MATC	3.62	1.62	2.57	2.67	4.43

(Ranked from 1, most important, to 5, less important)

APPENDIX I

GRADUATE RESPONSE REGARDING AN A & P MECHANIC'S ASSOCIATE DEGREE PROGRAM

Restructuring the A & P Mechanics'

Program to an Associate Degree Program

	Yes	No	Not Sure	Total
Total Graduates	44	19	19	82
BTI	9	9	9	27
GTI	22	5	3	30
MATC	13	5	7	25

APPENDIX J

SUMMARY OF RESPONDENT SURVEY COMMENTS

Summary of Comments

Graduate Response

9	More practical experience needed
8	Good program
7	Should be an Associate Degree Program
7	Need better instructors
6	Program needs updating
5	Should not be an Associate Degree Program
3	General education courses are unnecessary
3	Good instructors
3	Program should be longer
3	Program should be shorter
2	A & P Mechanics have great responsibility in their work
2	More basics should be taught
2	Apprenticeship would be a more practical method of teaching
2	Jobs in the field are hard to find
1	Associate Degree should be optional
1	Class on customer relations would be helpful
1	The school is two easy going
1	Need more of a variety of equipment
1	Should teach in smaller groups
1	Current manuals should be used for instruction
1	A business related course would be helpful
1	Public relations is important
1	Dissatisfied with program

Need more emphasis on:

5	Troubleshooting
4	Electrical
4	Turbines
3	Rigging
3	Welding
2	General systems
1	Avionics
1	Painting
1	Paper work
1	Inspections
1	Servicing tires
1	General aviation aircraft
1	Rotary wing
1	Ice and rain control systems
1	Pressurization and air conditioning
1	Oxygen systems
1	Sheet metal

Need less emphasis on:

1	Carberators
1	Propellers
1	Dope and fabric
1	Hand tools
1	Woodworking

Summary of Comments

Employer Response

3	Students should be screened for mechanical aptitude
3	Graduates lack common sense
3	Graduates have poor organization of work
3	Mechanic must learn to work against time
3	Students need more practical experience
2	Graduates have a poor work attitude
2	Good grades do not necessarily make good mechanics
1	Prefer to hire a man with experience
1	Instructors should be aware of what is required in the field
1	Impressed with school and instructors
1	Should be a one-year program
1	One-year program was too short
1	Schools should have more money
1	Do not get input into the school district
1	Too much emphasis on large aircraft
1	Need a good knowledge of the metric system

Need more emphasis on:

4	Troubleshooting
4	Use of manuals
1	Electrical
1	Engines
1	Small engines
1	Weight and balance
1	Corrosion
1	Pressurization
1	Painting
1	Inspections
1	Plastic lines
1	Generators

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