How Training Devices Are Actually Being Used By General Aviation Flight Training Organizations

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A Study of Training Devices Used by Flight Training Organizations

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EXECUTIVE SUMMARY

The purpose of this study was to reveal the types of training devices in use, how they are being used to enhance skill and proficiency, which tasks are being taught in these devices, whether or not the devices are appropriately certified and being used in accordance with National Simulator Program (NSP) guidelines, and if they are being used to augment training outside of approved training curricula.

This study targeted 184 schools that had indicated use of at least one training device in the study by Wiggins, Hampton, Morin, Larssen, & Troncoso (2002). Of the 184 schools targeted, 70 (38%) responded: 35 universities, 22 Part 141 schools, and 13 Part 61 schools. The study targeted training curricula for private pilot and commercial pilot certification and instrument and multiengine ratings. A survey was used to collect data in three primary areas: school demographics, device information, and tasks taught in training devices. In an attempt to standardize terminology, the Practical Test Standards (PTS) were used as the primary reference for the tasks taught. Common or similar Areas of Operations (AOO) from the four PTSs were combined in an attempt to have tasks listed only once. This resulted in 15 AOOs on the survey. Tasks from each PTS were placed under the most appropriate AOO. For each task, data were collected on the type of device used, for which certification level that task was taught, and on which learning domain the training was focused; knowledge, skill, or attitude (KSA).

Many schools, especially those in university environments and FAA approved schools appear to be using both FTDs and PCATDs a significant amount. Part 61 schools do not seem to use these devices as much. The data suggest that training devices are used primarily in instrument training, but certainly not limited to that course. The data cannot address the question of whether or not the use of these devices reduces overall flight training time significantly. There appears to be some confusion about training device certification, both for initial certification and continuing use. Most schools felt their FSDO was helpful with the certification of their devices. The data suggest that some schools and/or instructors are experimenting with ways to gain more training value from these devices in courses other than instrument training. It might be helpful if some simple guidelines for device certification could be developed and distributed to all flight schools.

With respect to which tasks are being taught in FTDs, the majority seem to be in the area of instrument training. In most of the AOOs, instrument students show the highest use. A fairly sizable number of tasks were also being taught at the private pilot level. Slow Flight and Stalls is an example of an Area of Operation where private students outnumber students in all other courses. The task Steep Turns, in the Performance Maneuvers Area of Operation, is another. In the Ground Reference Maneuvers Area of Operation, there is some indication of use for private pilot training and, to a much lesser degree, in commercial pilot training. Whether or not the increasing number of high quality visual displays that are on newer FTDs is contributing to this is not known. But it is likely that as newer FTDs with better visual displays are used, training in visual flight maneuvers is likely to increase. This is a potential area for further research. FTDs do not

appear to be used as much in commercial and multiengine training as they are in private and instrument training, with the exception of those tasks specific to multiengine training.

Looking at the data on KSAs taught in FTDs, there seems to be more emphasis on skills than on knowledge, and very little emphasis on attitudes or decision-making. It is possible that these devices may be unsuitable for attitude or decision-making training or that this area is overlooked or misunderstood by instructors. Since the focus of most training is on the accumulation of knowledge and the development of skills, it may be assumed that decision-making is simply part of those skills and is not looked upon as a separate issue. Airline training in the past decade has evolved to include decision-making and resource management as an integral part of their programs. While it is true that airline training is different from general aviation certification training, it might be worth exploring whether or not some concepts or techniques from airline training can be applied to general aviation.

The use of PCATDs tends to mirror FTD use in most of the AOOs. However, there are some notable exceptions. Takeoffs, Landings, and Go-Arounds is one such AOO. PCATDs are used more for private pilot training than for instrument training, whereas FTDs are used about the same for both courses. There are a small number of students who train the task Rectangular Courses in PCATDs. While this may seem meaningless on the surface, apparently at least one school believes that this training may be of some value. There are even a small number of students who train for multiengine tasks in PCATDs. In the teaching of KSAs in PCATDs, the data show similar trends as with FTD use, with the exception that in some instrument tasks, skills seemed to be emphasized more than knowledge.

Training aids show very little use in most Areas of Operations, with most of that use focusing on knowledge. However, the data show that some flight schools use these devices, so there may be some real value in their use. One factor that may be limiting the use of these devices by schools is that time in such devices cannot be used toward certification. It is not currently known how much students use programs such as Microsoft’s Flight Simulator on their own and whether or not this contributes to success in training.

In summary, the data show that use of training devices are mostly in the instrument and private pilot training programs. The tasks are those involving airplane systems, navigation procedures and instrument flying. Some use is indicated in other tasks but to a much lesser degree. However, the fact that instructors are training students in tasks that are not related to instrument flying warrants attention and further investigation. Further controlled experiments are needed to address the question of whether or not flight training hours, and thereby costs, can be reduced by the use of FTDs and PCATDs in courses other than instrument training.

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BACKGROUND

Many general aviation flight training organizations are relying more and more on the use of flight training devices (FTDs) and Personal Computer-Based Aviation Training Devices (PCATDs). A combination of advances in computer technology and lower costs allow training organizations to utilize various training devices more than ever before. This is becoming more important considering the increased costs of flying airplanes, the complexity of the National Airspace System, and more emphasis that is now being placed on human factors in training. Flight training devices and PCATDs provide a venue for very effective training in areas that are difficult or unsafe in actual flight. Also, these devices can provide in-depth training and provide a very positive transfer of learning (Lintern, Roscoe, Koonce, & Segal, 1990; Hampton, Monroney, Kirton, & Biers, 1994; Taylor, Lintern, Hulin, Talleur, Emanuel, & Phillips, 1997). A study by the Government Accounting Office (1999) supports the use of PCATDs in flight training programs. In addition to training traditional maneuvers and procedures, these devices are being used in experiments to investigate the effects of other factors, such as decision-making and situational awareness (Craig, 1999; Wilt, 1997).

The Federal Aviation Administration (FAA) has long recognized the value of training devices in both airline and general aviation training (Code of Federal Regulations, 2002). For example, CFR 14 Part 61 (Part 61) allows up to 20 of the 40 hours of flight training required for an instrument rating and up to 50 hours of the 250 hours of flight experience required for a commercial certificate to be done in an approved FTD. Training for a commercial certificate conducted under 14 CFR Part 142 (Part 142) can include up to 100 hours in approved FTDs. The training hours that can be approved for a course conducted under 14 CFR 141 (Part 141) varies as a percentage of the approved course hours and is also based on the type and approval level of the device being used.

There are seven levels of FTDs and all have to be approved by the administrator under FAA Advisory Circular No. 120-45A. The FAA's National Simulator Program (NSP) is charged with the responsibility of certification of Level 6 and Level 7 FTDs whereas the FAA, through the appropriate district office, has the responsibility for certifying Level 2 through Level 5 FTDs (FAA, 1992). Level 1 is currently reserved for devices having what is known as "conferred status," meaning they were in operation prior to August 1, 1996 and can continue to be used provided that there is a letter of authorization issued prior to that date (8700.1, 2001). Guidance for the authorization of conferred status training devices is found in Chapter 34 of the General Aviation Operations Inspectors Handbook (FAA, 2001). The rules governing training devices

have been consolidated into a proposal to create a Notice of Proposed Rulemaking (NPRM) for 14 CFR Part 60, Flight Simulation Device Initial and Continuing Qualification and Use (Federal Register, 2002). This proposed regulation would cover simulation devices ranging from Level 2 FTDs through full flight simulators.

Currently, the number of devices in use, the types of these devices, and how these devices are integrated into training programs is unknown. There is no central repository of information regarding the make and models of training devices currently being used. Therefore, no data exists about the number of devices in use, the makes and models of these devices, or for what level of pilot certification they are being used. Without these data it is difficult to determine the extent to which these types of training devices are being used and what credit can be awarded based on rapid advances in fidelity and sophistication. In addition, little is known about how these devices are actually used by training organizations. What is needed is an understanding of how users of these devices actually incorporate them into their programs and perceptions of their effectiveness as training aids. Also, the possibility exists that some flight schools or individual instructors have found innovative and creative methods for using training devices that enhance or enrich the flight training experience in ways that have not been considered before.

In an attempt to gain an understanding of the number of training devices in use and how they are employed in flight training programs, a study of collegiate flight programs was recently conducted (Hampton, Wiggins, Larssen, & Troncoso, 2002). That study, which was the first stage of an effort that will continue to non-academic training organizations and programs, revealed 86 collegiate institutions reporting the use of some sort of training device in their programs. A total of 244 FTDs, 115 PCATDs, and 79 other simulation programs, such as Microsoft's Flight Simulator 2000, were being used. These devices and programs were being used in some fashion in training for private and commercial pilot certificates and for instrument and multiengine ratings. The current study includes flight schools operating under 14 CFR Part 141(Part 141) and Part 61 (Wiggins, Hampton, Morin, Larssen, & Troncoso, 2002), and captures data from a total of 354 flight schools, including those collegiate programs included in the first study. This study has been extended once again to continue to capture data on the devices that are in use in programs across the country. Results from this follow up study are included in Part II of this report.

It was discovered that 197 of the 244 FTDs in use in collegiate flight programs are certified as Level 1 devices (Hampton, Wiggins, Larssen, & Troncoso, 2002). None of the responding schools reported the level of FTD certification as unknown. In the expanded study (Wiggins, Hampton, Morin, Larssen, & Troncoso, 2002), a total of 381 FTDs were reported, with 209 reported with Level 1 certification and 63 reporting some other level of certification. What was interesting is that the certification level of 109 FTDs were reported as "unknown." This leads to the question of how well smaller flight schools understand the certification requirements of FTDs.

In a meeting with the FAA on April 23, 2002, it was stated that less than 45 letters of authorization exist, yet 272 devices were reported as having some level of

certification. Two FAA Flight Standards Handbook Bulletins, HBGA 99-06 and HBGA 99-15 (FAA 1999) provide an indication that some confusion may exist among inspectors regarding the requirements for these letters. Considering this, and the large number of schools who reported an unknown level of certification for their FTDs, it is likely that confusion exists among operators about the exact requirements for gaining the appropriate authorization for continuing use of Level 1 FTDs. The current proposed NPRM for 14 CFR Part 60, of which there are 228 pages, may add to this confusion as many of the schools are small operations, do not have fully dedicated simulator specialists in their organizations and are likely to depend upon the device manufacturer or their local Flight Standards District Office (FSDO) for guidance and support in gaining certification for their devices. It is yet unclear how this new regulation will impact general aviation. There may be minimal impact, as most organizations will continue to use Level 1 FTDs or may increase their use of PCATDs.

Problem Statement

Currently, there are no data available concerning the actual types of maneuvers, procedures, or tasks that are being taught in various training devices. There is no central repository of data for the types of hardware and software being used, the efficacy of these devices, and whether or not these devices are used to enhance training or are being used to fill time. It is not known how many devices are in use that are actually being operated with proper authorization and if these devices are being used appropriately considering the criteria for such use as defined by the National Simulator Program. In addition, there are little data available to evaluate the efficacy or appropriateness of the current regulations regarding the use of FTDs and PCATDs. It is possible that increases in training device technology will make modifications of present regulations both necessary and desirable. This study represents a requisite step for further studies aimed at evaluating the efficacy of the training devices and adjusting the regulations accordingly.

Research Questions

1. How are FTDs and PCATDs being used by general aviation training organizations to train pilots seeking certification as a private or commercial pilot, or to add instrument or multiengine class ratings to their certificate?

2. Which FTDs are in use, including make, model, date of manufacture, and certification level?

3. Which PCATD devices are being used, including software and hardware packages?

4. Which tasks are being taught in each type of device?

5. How are devices being used to enhance training and skill proficiency?

6. Are devices being used appropriately according to NSP guidelines and criteria?

7. Are all devices (FTDs) appropriately certified?

8. How much are the devices being used to augment training in an “unofficial” manner (for example, unlogged time spent to familiarize students with IFR tasks)?

METHODS

Participants

The participants for this study were purposely selected from those who participated in the 2002 UAA study of flight training organizations (Wiggins, Hampton, Morin, Larssen, & Troncoso, 2002). In that study, 354 flight training schools reported data on their training devices and use. Of these, 149 schools were selected based on data that showed they either owned or used some sort of training devices. These 149 schools included 65 universities, 41 Part 141 approved flight schools, and 43 schools operating under Part 61. All of these schools had reported owning or using some sort of training device, had a minimum enrollment of 25 students or more, and some percentage of their students used these devices in their training programs. One exception to this was the Part 61 schools. All Part 61 schools were included, regardless of enrollment data, if they had previously indicated their students used a training device in their programs. This was done to increase the number of data points, as the total number of these schools using training devices was low.

Concurrent to this study, a continuation of the study by Wiggins, Hampton, Morin, Larssen, and Troncoso, in 2002 was authorized as part of this study. As data were gathered from this effort, schools that seemed likely to contribute to this effort were added and sent surveys. A total of 35 schools were added to the targeted schools, bringing the total to 184 (see Part II).

Instrument

The instrument consisted of three parts. The first part was designed to collect demographic data pertaining to the makes and models of devices used, the number of students in the program, the number of students who use these devices, and the number of hours these devices are used. The second part was designed to gather data about which devices are included in any approved training curriculums, the type of authorization the devices have, and descriptions of any hardware and software used. The third part was designed to gather data about the maneuvers and procedures being taught or practiced in these devices.

In an attempt to standardize the terminology, the maneuvers and procedures were referenced to the tasks as outlined in the various practical test standards (PTS) for the targeted levels of training. The tasks contained in four PTSs (private, instrument, commercial, multiengine) were grouped according to similar areas of operation. For example, all tasks relating to take-off and landing were in one list. This eliminated the need for the responding individual to duplicate efforts when completing the instrument. In one case, Flight By Reference to Instruments and Basic Instrument Maneuvers were kept separate. Tasks such as Fly Straight and Level can be found in both. It was felt there was enough of a difference between the way these two areas of operation were stated to warrant the distinction. Also, the instrument was constructed so that wrong answers

would be minimized. Definitions were provided in the instructions, along with examples, in an attempt to eliminate misunderstandings or multiple interpretations by the person completing the instrument. The instrument was also designed to gather data regarding what type of learning is targeted; knowledge, skills, or attitudes (KSA). These data help to provide an understanding of what type of learning may be best suited for each type of device.

A cover letter was sent explaining the purpose of the study, the data that were desired, and that confidentiality of responding organizations and individuals were guaranteed. This letter emphasized that any responses made to the survey would not be used for enforcement of violations of regulations pertaining to the school's use of the training devices. As part of the follow-up effort, a separate cover letter from AFS-800 was attached to the second round of surveys. A draft of the survey instrument and cover letters are included in Appendix A.

A representative of the National Simulator Program Office reviewed the instrument to insure their issues were addressed. Also, a representative from the Civil Aerospace Medical Institute reviewed the survey. Minor changes were made based on input from these reviews. The survey was then subjected to a small pilot test using three individuals knowledgeable in flight training. Two were from university schools and one was from a Part 141 school. It was determined the survey would take approximately one hour to complete. The instrument and cover letters were ready for distribution by mid-November.

Data from the instrument were collected in a database using Microsoft Access. This database was designed to allow for flexible access to the data to generate various reports for analysis.

Procedures

The instrument and cover letter were developed, reviewed, and tested during the fall of 2002. It was deemed ready for distribution by mid-November. Also, during November, the targeted schools were identified and entered into a spreadsheet for tracking purposes. In early December, the surveys were printed and made ready for distribution. The surveys were distributed by mail during mid-December of 2002.

Follow-up efforts began during mid-January of 2003. Telephone calls were made to establish contacts with participants who had failed to return the survey. The second follow-up contacts began in early February. Similar to the first attempt, the follow-up effort was concentrated on those institutions which did not return the survey. During these two follow-up attempts, several institutions requested additional surveys. As a result, 54 additional surveys were sent or faxed upon request. This effort yielded a total of 45 schools responding by late February. The follow-up continued through early March. During this time, each of the non-responding schools was called at least one more time, for a total of three follow-up telephone calls for each non-responding school.

Due to the slow rate of returns and participation rate, (the number of returned surveys had reached 49), a decision was made to re-distribute the survey in March 2003. Additional copies of the survey were sent to those schools that had not responded. Approximately 100 surveys were mailed during this attempt. Furthermore, 20 additional Part 141 and Part 61 schools were added during mid March and mailed surveys during this second mailing. A letter from Mike Henry of AFS-800 was attached. Following this mailing, two more follow–up telephone calls were made to each school. In many cases, the school never answered or returned the calls. In some cases, the "right" person could not be located. Data collection stopped on May 16, 2003.

RESULTS

This survey gathered data in three primary areas: demographic, training device information, and which flight training tasks are being taught in these devices and the intent of that training. The intent of the training was expressed as whether the training was done for knowledge, skills, and/or attitudes.

Demographic Data

A total of 70 schools responded to this survey. Of these, 35 were university programs, 22 were Part 141 programs, and 13 were Part 61. Table 1 shows the response rates, who responded and who did not. A total of 26 schools, half of which were Part 61 schools, indicated during the telephone follow-up efforts that they did not intend to reply. Some schools were hesitant to respond, citing the proprietary nature of the information requested. This may be because of a fear of competition or simply a desire to keep their data confidential.

Table 1

Response Data

	Targeted*	Responded	No desire to respond	No-response	Response Rate
Universities	65	35	5	25	53.8%
Part 141	61	22	8	31	36.1%
Part 61	58	13	13	32	22.4%
Total	**184**	**70**	**26**	**88**	**38.0%**

The survey gathered current enrollment data from each of the schools. A total of 9258 students were enrolled at schools that responded. The maximum current enrollment reported was 1125 students and the minimum current enrollment reported was 4. A total of 69 schools reported these data. Table 2 shows the data broken down by flight course and average enrollments per course. Data were not collected regarding the number of

Table 2

Current Enrollment by Flight Course

	Private	Commercial	Instrument	Multiengine	**Total**
Annual Enrollments	3630	2188	2465	975	**9258**
Avg. Enrollment Per School	52.6	34.7	35.7	19.1	**134.2**

Schools reporting zero hours or not reporting any data are not included in these averages.

students enrolled in Part 141 programs vs. Part 61 programs at individual schools. Several schools reported training under both regulations. Therefore, it is not possible to determine the average enrollments using the regulations by which they operate as a factor.

Data were collected regarding the use of various training devices, including airplanes. All data reported were calculated on a per week basis. These figures are included in Table 3. Not all schools reported data for each type of device, some claiming that they don't keep those figures on record. Enrollment figures include only those schools who reported use in the respective device. Enrollment data for schools who did not report use in a particular device were not included in this table. This will account for any discrepancy between the data in Table 2 and Table 3.

Table 3

Flight training hours per week

	In Airplanes	In FTDs	In PCATDs	In Training Aids
No. of Schools Reporting Data	65	69	64	6
No. of Schools reporting use	65	47	33	6
Weekly Avg. (Hours)	442.8	71.1	35.9	51.5
Avg. enrollment per school reporting use	138.4	165.9	110.4	23.7
Avg. hours/ week/students	3.1	0.4	0.3	2.2

Schools reporting zero hours or not reporting any data are not included in these averages.

Schools were asked to provide the average hours their students have when they complete their course. Table 4 depicts these data. Because a large number of schools train in both Part 141 and Part 61 programs, it is not possible to isolate enough data by program to be meaningful. The minimum hours reported are, in some cases, below the minimum required for certification. It is not clear whether the respondents did not understand the question or the data was reported in error. In either case, the data is presented as reported.

Table 4

Student Training Hours to Certification

	Private	Commercial	Instrument	Multiengine
No. of Schools Reporting Data	52	44	49	41
Avg. training hours to certification	54.4	104.8	47.0	17.9
Maximum hours reported	75	250*	148	87**
Minimum hours reported	31	10	12	7

Schools reporting zero hours or not reporting any data are not included in these averages.

*One school reported 710 hours as their average time for a commercial pilot. This number seems out of line and may have been an error on the part of the person completing the survey. The next highest figure of 250 is included in the table as this number is more reasonable. The average figure includes the 710-hour figure.

**This school may have a program that utilizes multiengine airplanes as part of their core commercial or instrument program and is not a typical multiengine rating course.

Schools were asked to provide information about under which regulation they conduct their training. Four schools reported operating solely under Part 141, 16 reported operating solely under Part 61 and 48 reported operating under both parts. Two schools did not indicate under which regulation they conduct training. Schools who conduct training under both Parts 141 and 61 were asked to specify which percentage of their training was conducted under Part 141. These schools reported that an average of 74.3% of their training is done in their 141 programs.

Training Device Data

Schools were asked to indicate which devices they use in their programs. Schools were grouped by the regulation under which they operate when they use a device. Table 5 shows the breakdown of the data. Since several schools operate under both regulations, and because the data refer to programs, the total number exceeds the number of schools.

Table 5

Type of Device Used in Programs

	FTD Only	PCATD Only	BOTH
Part 141	26	11	14
Part 61	29	15	10

Schools were asked if students and instructors use training devices outside their specified curricula. This is time that cannot be used for certification requirements. The question asked if these devices were used for familiarization or extra training. These data are in Table 6. One column indicates use initiated by students and the other is use initiated by the instructor.

Table 6

Device Use Outside Curricula

	Student initiated use	Instructor initiated use
Average hours per student per course	5.9	6.2
No. of Schools reporting	18	15

Schools reporting zero hours or not reporting any data are not included in these averages.

Device Certification

Schools were asked to provide data on the types of devices they use in their training programs. The schools were not asked how many devices they owned. A school reporting the use of a particular type of device may have more than one in their inventory, meaning the total number of devices in use is most likely higher than the numbers reported here. The labels FTD, PCATD, or Training Aid are reported here as they were reported on the surveys. A list of approved Level 1 FTDs and PCATDS was obtained from AFS 800 to compare with the survey data to help determine which are approved devices and which are not. A complete listing of types of devices reported is contained in Appendix B and a list of approved devices as supplied by AFS 800 is contained in Appendix C.

The data contained information on 99 types of FTDs. Of these, 52 were reported as being certified as Level 1 devices or higher. Of the devices that had no certification level reported, 43 were on the list provided by AFS-800 as Level 1 devices. Whether or not these 43 devices are actually approved or not is unknown, but they are capable of being approved as Level 1 FTDs. Four FTDs, 3 helicopter FTDs and one ATC 920 were reported and had no certification level reported and were not on the list provided by AFS-800. Of the 99 FTDs reported, a total of 95 are either certified as a Level 1 or higher FTD

or are capable of being certified as a level 1 FTD. Whether or not the 3 helicopter FTDs are actually certified to some level or are capable of being certified is not known. It is clear that the one ATC 920 is not capable of being certified.

Four questions were asked to help determine the level of understanding of the certification process of their approved FTDs. The first question inquired about the method a school uses to certify their FTD. Table 7 shows the number of schools using each method of approval. Tables 8, 9, and 10 show the number of schools responding to the three remaining questions.

Table 7

Methods of FTD Approval

Method of Approval	No. Of Schools
Letter of authorization (post 8-1-1996)	26
Letter of authorization using conferred status (pre 8-1-1996)	16
Not sure	7
Other means*	4

*Other means include:

"In Part 141 School is approved by instrument course syllabus (CPC-ADT)",
"AFS-800",
"FSDO Approved in TCO",
"Vector Sims were approved by Specific letter of authorization".

Table 8

Question: Do you understand the regulations and requirements for gaining FAA approval for your FTDs?

	No. of Schools
Complete Understanding	26
Some Understanding	30
Not Much Understanding	4
No Understanding	0
Total No. Responding	**60**

These comments were received: "This is a very good question. I feel MOST people cannot understand the regulation and are used incorrectly." "I don't think complete understanding is a correct answer in such a volatile subject, does anyone completely understand AFS-800? AFS-242?"

Table 9

Question: Do you understand the regulation and requirements for continued use of your FTD?

	No. of Schools
Complete Understanding	28
Some Understanding	28
Not Much Understanding	3
No Understanding	0
Total No. Responding	**59**

Table 10

Question: Is your local FSDO helpful in the approval process of your FTDs?

	No. of Schools
Very Helpful	31
Somewhat helpful	18
Not very helpful	0
No help at all	0
Total No. Responding	**49**

A total of 38 types of PCATDs were reported. Of these, 36 are approved devices as indicated on the list of approved devices provided by AFS 800. It cannot be determined if the two remaining devices are approved or not as the make and model information was not provided. The organization that has these two devices also reported another PCATD that is approved, so it is likely that these two devices are also approved.

Eleven training aids were reported. These are devices that are not FTDs or PCATDs, but are software or hardware that are used to support part of a training program. These devices are not approved by the FAA and therefore cannot be used to substitute for flight time required for certification.

In an attempt to see if the use of FTDs by flight schools significantly affected the course completion hours in each of the four courses, some statistical analyses were conducted. The data were divided at the median hour figure and the two groups were compared. The median figure for FTDs hours/week was 10 hours per week with 3 schools reporting 10 hours per week. The data are shown in Table 11.

Table 11

FTD Use Verses Course Completion Mean Hours

	Private	Commercial	Instrument	Multiengine
10 or fewer hours/week N = 33	54.1	94.4	46.90	19.7
More than 10 hours/week N = 36	53.5	111.9	45.5	15.1
t-score	.841	1.274	.480	-1.088
Significance	.404	.210	.634	.238

Schools reporting zero hours or not reporting any hourly data are not included in these averages.

A similar comparison was made based on PCATD use. The median of the hours/week was 1.25 hours/week. Again, a t-test was made comparing those above and those below the median. The data are shown in Table 12

Table 12

PCATD Use Verses Course Completion Mean Hours

	Private	Commercial	Instrument	Multiengine
Less than 1.25 hours/week N = 32	55.0	90.1	45.6	15.7
1.25 or more hours per week. N = 32	54.3	121.7	47.5	21.2
t-score	.109	-.878	-.144	-1.371
Significance	.914	.385	.886	.178

Schools reporting zero hours or not reporting any hourly data are not included in these averages.

Use of Training Devices

In an attempt to determine which tasks show significant use of training devices, the data analysis employed the total number of students trained in devices as a measure of use. This was intended to illustrate the number of students using these devices. If a school indicated they taught a particular task in a device, then the enrollment figures for that course were added to the total. While this measure does not completely and accurately reflect students' actual time in the device, it does represent the potential use by students enrolled in programs at schools who have indicated that they use the device. Because of the disparity in school sizes, with enrollments ranging from 4 to 1125 students, an indication of use by school would not have provided as accurate an indication of the actual use of these devices. Because of the limitations of the survey design, it is not always possible to fully breakdown the data between KSAs and types of training if more than one device type was checked for a task.

The data are presented in graphical form with actual totals at the top of each bar. For graphs depicting task data, each bar represents the student enrollment data for schools teaching in that device at the indicated level of certification. For the purposes of these graphs, the term rating is used to mean the certification course being depicted. The graphs focusing on KSAs use total enrollment data for the school indicating such use. This method may inflate the number of students somewhat, yet it does provide an indication of how much focus is placed on each KSA. A breakdown of certificate level by KSAs would require a very large number of complex graphs. This information however could be recovered from the raw data if needed.

For the purpose of the graphs, 'rating' means the certification level at which the training is conducted. These graphs (over 100 of them) are presented in Appendix D. It would be pointless and tedious to summarize the results shown in each of the data graphs. However, some generalities do emerge. Of particular note is that it seems that training devices are being used in almost all task areas. Although this was to be expected for most of the tasks during instrument training, the use of the devices for a private pilot rating was surprisingly ubiquitous. Some more specific points of interest will be addressed in the Discussion section.

The following comment was received regarding the use of training devices:

> "Comments: MS FS2002 I have a very small flight school, 1 instructor, 2 aircraft. Although I plan to incorporate a PCATD in the future, at this point it would not be cost-effective in my estimation. At present, I have very good results introducing fundamental concepts with less expensive equipment: Pentium-3 Dell 4130, high-end Nvidia 128 MB graphic card, 21 inch Monitor, yoke, rudder pedals, running Win XP Microsoft FS2002 PRO. Although this equipment does not qualify to log for training time, I feel it is very productive, especially with younger and computer-literate students. If students have an adequate computer at home, I encourage them to use FS 2002 there.
>
> Prior to Microsoft FS2002 PRO, I did not find the Microsoft Software very useful. In comparison to FAA approved software such as Elite and On Top (JEPP). Now the panels and flight analysis are in my opinion quite comparable.
>
> In a small flight school, the cost savings of NOT electing to use PCATD can be applied to providing more actual flight time. I expect that at the point when my annual dual given exceeds 1000 hours, or I have additional instructors, the PCATD will be a good investment. If the cost of PCATD would reduce to less than $3K for software and interface hardware, and the FAA would streamline certification, then the investment would make sense for my business immediately."

DISCUSSION

It is interesting to note that university programs had the highest rate of responses and the lowest number of schools indicating no desire to respond. This is opposite of what is found in Part 61 schools, which had the lowest return rate and the largest number of schools indicating no desire to respond. It may be that the larger structure found in university programs contributed to this phenomenon whereas Part 61 schools tend to be smaller operations that may not have the staff or time to complete such a survey.

The data on 'time to complete a course of training' suggest that most students exceed the minimum number of hours required, primarily in the private and instrument courses. Because of the provision in Part 141 for reducing time with special curricula, it is hard to determine if the time for commercial pilot certification exceeds the minimum set forth in each school's approved training course outline. There are no minimum hours for multiengine certification. If the time in excess of minimum training requirements could be accomplished in a training device at a lower cost than flight time, the overall cost of a pilot certificate or rating could be reduced. Also, by moving this extra time from the airplane to a training device, congestion in certain airspace could be reduced.

The results of the t-test for the data in Tables 11 and 12 suggest there is no difference in the amount of time taken to complete the training by those with high use versus low use of FTDs and/or PCATDs. No real conclusions can be made at this point about whether or not increased use of these devices actually reduces flight time because it may be that students who need extra training are getting it in the training devices and therefore their total flight time to certification is similar to those who do not require the extra training.

While several studies have shown that use of FTDs and PCATDs can lower the flight time required for certification, the data here do not support that this is actually happening in the industry. This conclusion is supported by the fact that the required number of flight training hours for an instrument rating is 40 hours, of which 20 hours can be in a flight training device (Code of Federal Regulations, 2002). This means a student could conceivably achieve their instrument rating with 20 hours of actual flight time. Yet, the average number of hours for an instrument rating found in this study is 47 hours. One consideration is that the complexity of today's instrument flying environment may be so complex that 20 hours in actual airplanes supplemented by 20 hours in a FTD may not be a reasonable figure. Another possibility is that FTDs and PCATDs are not being used to their fullest potential by flight instructors or schools. This leads to the issue of effective instructor training on the use of various training devices.

Another possible explanation for the failure to find a decrease in training hours with flight training device use is that many of the students who do not use flight training devices in their curriculum may in fact use home PC-based systems such as MS Flight Simulator. Thus, students may be already receiving the benefits of such training. Additionally, it should be noted that these data are correlational and do not necessarily

imply causality. Thus it is possible that the students that make use of flight training devices do so because they were initially having difficulty with the tasks. A properly designed experimental study rather than a correlational survey would be needed to properly address this point.

Responses to the questions about certification show that less than half of those responding indicate that they have a complete understanding of the regulations and requirements for certification and continuing use. The fact that only 53 of the 70 schools reported data on their method of certification supports the idea that not all schools understand the regulations and requirements for FTD certification.

It does not appear that all devices are appropriately certified or that the person completing the survey knew or understood how their device was certified. It is clear that not all devices are being used in accordance with the guidelines and criteria set forth by the National Simulator Program for general aviation training programs. An example of this is an 'AST 300' built in 1985 being reported at Level B certification (which does not exist, as Level B is a certification level for a full-flight simulator). Also, a large number of devices were reported as FTDs, yet no certification level was given or the device was reported as not being certified. Whether or not the devices that had no certification level reported are really certified and the individual responding either did not know or chose not to indicate is not known.

The lack of certification may mean the devices are being used as training aids and the time in an uncertified device is not be used towards certification. If the devices are actually being used for logging training time, then it is most likely that the schools believe they are certified correctly, despite whether or not they know the exact level or method of certification. This confusion may be worse as the new Part 60 rules become effective. An operator of a new or small flight school may find these new regulations overwhelming and decide not to attempt to use a device. Because the majority of responses indicate their Flight Standards District Office is helpful with the certification process, these offices may be useful in helping schools in their district gain a better understanding of the approval process necessary to gain device certification.

The data collected on device use outside the curriculum suggest that both students and instructors find these devices useful for training that is not part of a set curriculum. This use may be for familiarization or extra-training purposes and may be conducted in non-approved devices. Whereas this time may not be logged for the purpose of meeting minimum time requirements, it does seem to be valuable to some, as 18 schools reported students initiating use on their own and 15 schools reported instructors initiating such use. This type of use may reduce the amount of flight training hours for those students who use the devices in this way. However, this speculation cannot be evaluated from the data collected in the present study.

With respect to which tasks are being taught in FTDs, the majority seems to be in the area of instrument training. In almost all of the Areas of Operation, instrument students show the highest use in most tasks. This can be expected as most of these

devices were designed for instrument training. However, it is interesting to see the number of tasks being taught at the private pilot level. Slow Flight and Stalls is an example of an Area of Operation where private students outnumber students in all other courses. The task Steep Turns, in the Performance Maneuvers Area of Operation, is another. In the Ground Reference Maneuvers Area of Operation, there is some indication of use for private pilot training and, to a much lesser degree, in commercial pilot training. Whether or not the increasing number of high quality visual displays that are on newer FTDs is contributing to this is not known. But it is likely that as newer FTDs with better visual displays are used, training in visual flight maneuvers is likely to increase. This is a potential area for further research, such as is currently ongoing in several places regarding instrument training. FTDs do not appear to be used as much in commercial and multiengine training as they are in private and instrument training, with the exception of those tasks specific to multiengine training.

Looking at the data on KSAs taught in FTDs, there seems to be more emphasis on skills than on knowledge, and very little emphasis on attitudes or decision-making. It is possible that these devices may be unsuitable for attitude or decision-making training or that this area is overlooked or misunderstood by instructors. Since the focus of most training is on the accumulation of knowledge and the development of skills, it may be assumed that decision-making is simply part of those skills and is not looked upon as a separate issue. Airline training in the past decade has evolved to include decision-making and resource management as an integral part of their programs. While it is true that airline training is different from general aviation certification training, it might be worth exploring whether or not some concepts or techniques from airline training can be applied to general aviation.

The use of PCATDs tends to mirror FTD use in most of the Areas of Operation. However, there are some notable exceptions. Takeoffs, Landings, and Go-Arounds is one such Area of Operation. While the total number of students using these devices for this training is rather small, the number of private students is significantly higher than for students training for other ratings or certificates. There is even a small number of students who train the task Rectangular Courses in PCATDs. While this may seem meaningless on the surface, apparently at least one school believes that this training may be of some value. There are even a small number of students who train for multiengine tasks in PCATDs. In the teaching of KSAs in PCATDs, the data show similar trends as with FTD use, with the exception that in some instrument tasks, skills seemed to be emphasized more than knowledge.

Training aids show very little use in most Areas of Operations, with most of that use focusing on knowledge. However, the data show that some flight schools use these devices, so there may be some real value in their use. One factor that may be limiting the use of these devices by schools is the fact that time in such devices cannot be used toward certification. It is not currently known how much students use programs such as Microsoft’s Flight Simulator on their own and whether or not this contributes to success in training.

In summary, the data show that use of training devices are mostly in the instrument and private pilot training programs with emphasis on areas that involve airplane systems and procedures, and in instrument flying tasks. Some use is indicated in other tasks but to a much lesser degree. However, the fact that instructors are training students in tasks that are not related to instrument flying warrants attention and further investigation.

RECOMMENDATIONS

1. Develop a simple and easy to understand guide for schools who are acquiring new or used devices to gain proper certification. This guideline should explain the requirements in plain language requirements and possibly use flow charts and checklists that someone unfamiliar with the process, such as a new chief flight instructor or FBO manager can use when acquiring their first device. Once completed, this information should be disseminated to all flight schools and be accessible on the Internet.

2. Streamline and simplify the FTD certification process to aid in facilitation of recommendation 1 above.

3. Require a sticker or other placard be attached to each device which states the certification method and level. This would be similar in concept to the airworthiness certificate required in an airplane or the certificate of operation we see in the elevators we ride every day. This sticker would let each user know the certification status of the device. This could be easily accomplished by supplying the school with the sticker at the same time the letter of authorization is issued. Since there are now allowances for currency requirements that can be met in approved devices, those using such devices could easily tell if the device they are using is appropriately certified.

4. Develop a set of guidelines that is based on current research, showing that training device time can reduce flight time in such a way that flight instructors, especially those who are new to the profession, can gain insights as to how to take advantage of these devices. These guidelines might be in the form of sample lesson plans that integrate the use of these devices, examples of the time and cost savings to the student by the use of such devices, and how this type of training will benefit the instructor and flight school. Also, it might be advisable to consider increased emphasis on how to properly use training devices during the initial instructor training and certification processes.

5. Design and conduct experiments to see if various training devices can be effectively used in developing decision-making skills and how this use can be accepted and conducted by the average flight instructor. One suggestion is to see if the concepts of Line-Oriented Flight Training, as currently practiced by most airlines, or some other means of scenario-based training can be adapted to general aviation certification training. The results of these experiments could be to design instructor training programs so that best practices can be disseminated among practicing flight instructors and incorporated into new instructor training.

6. Design and conduct experiments to see if training devices with appropriate visual systems can be used to enhance visual flight maneuvers training and reduce the flight time required to achieve certification in private, commercial, and

multiengine courses. The results of these experiments could be used to design instructor training programs so that best practices can be disseminated among practicing flight instructors.

7. Design and conduct experiments to determine if commercially available programs, such as Microsoft's Flight Simulator, have actual training value that either enhances the overall training experience or can effectively substitute for other types of training time or experience. A beginning point for this research could be to conduct a survey of recently certified pilots and compare those who used these types of programs a great deal to those who didn't and see if there is any difference in the time to achieve their certification. While this correlation may not show a cause and effect relationship, it may be a simple starting point for further research in this area.

PART II

A CONTINUATION OF:

A STUDY OF TRAINING DEVICES USED BY FLIGHT TRAINING ORGANIZATIONS

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PURPOSE

The purpose of continuing this study was to increase the number of schools in the database in order to gain more insight into the various training devices used by flight training organizations.

METHOD

Participants

The participants for this continuation effort are those flight schools who were not contacted during prior efforts and no previous data was collected. These schools were located on the Be-A-Pilot Website (GA Team 2000, 2002), which is the most complete listing of flight schools found in any reference. The effort was divided between Embry-Riddle Aeronautical University (RAU) and University of Nevada Reno (UNR). Embry-Riddle Aeronautical University was responsible for surveying schools east of a line beginning with Texas and going north to North Dakota inclusive, while UNR was responsible for surveying schools in states west of this line. The intent was to send surveys to as many schools as possible.

Instrument

The instrument used for this effort is the same one that was developed for the study of collegiate flight training programs (Hampton, S., Wiggins, M. E., Larssen, A., & Troncoso, A. 2002).

Procedures

The distribution of the surveys to schools in the eastern states began in February 2003 whereas the distribution of surveys to the western states was delayed until the latter part of March because of funding issues. The survey was formatted electronically for delivery via e-mail. E-mail addresses were located on the Be-A-Pilot website (GA Team 2000, 2002). Attached to the e-mail was a cover letter and an electronic copy of the survey. A total of 1297 surveys were distributed to schools in all 50 states. Data collection ended at the end of May 2003 for the east coast effort and at the end of August 2003 for the west coast effort.

After an initial negligible response, each school was sent at least one and most were sent two follow-up e-mails containing the survey. Telephone calls were made as well. In many cases up to three calls were made to schools. Fifty-four schools were discovered to have ceased their flight school operations. Often, the “correct person” was not available, several messages were not answered, and several telephone numbers were no longer valid. The data collected from these surveys were added to the data contained in the December 2002 report and are presented in a similar manner.

RESULTS

Respondents

Of the 1297 schools targeted, 95 completed the survey, bringing the total number of schools in the database to 449. Many of these did not complete the entire survey, as the person responding did not know all of the data, the data were not kept on record, or in one case, the data were considered proprietary. In a few cases, duplicate surveys were received from schools surveyed in the previous efforts. The tables contain data from a total of 449 flight-training organizations, including those who responded in the previous efforts to collect these data. The breakdown of schools is: 99 universities, 158 Part 141 schools, and 192 Part 61 schools. This is a net increase of 95 schools. Of these 95 schools, 43 reported having no device in their program. An additional 25 schools responded they had no training devices and did not complete a survey and therefore are not in the database. During follow-up telephone conversations with other schools, a large number mentioned they did not return the survey when they received it via e-mail, as they had no type of training device

Demographic Data

The following demographic data were collected from the five questions in Part 1 of the survey instrument. The data are summarized in Table 1. Several schools reported zeros for Questions 2, 3, and/or 4 on the surveys. Also, during some of the phone surveys, the person responding did not know the figures, in which case the answer was recorded as zero. In the case of Question 5, it makes sense that schools without any device would report a zero. Zeros were not included in the calculation of averages, and/or minimum and maximum figures as they are missing data, and do not reflect true enrollments or usage. Only those schools that reported numbers greater than zero were used to calculate these figures. The totals in Table 1 for the students trained annually and currently enrolled include all schools.

Question 1: What is your type of training environment?

A total of 449 flight schools have responded to this survey: 99 universities, 158 Part 141 schools, and 192 Part 61 schools.

Question 2: How many students do you train yearly?

Of the 449 schools responding to the survey, 422 reported data on the number of students trained annually. The average number of students trained annually reported by universities (n = 98) was 169.7, with a high of 1500 students and a low of 6 students per year. Part 141 schools who reported data (n = 148) trained an average of 156.7 students annually, with a high of 5000 students and a low of 6 students. The school reporting 5000 students trained annually was a helicopter training facility. Part 61 schools who reported

data (n = 176) trained an average of 52.9 students annually, with a high of 400 students and a low of 3 students.

Table 1

Demographic Information of Surveyed Organizations

	Universities	Part 141	Part 61
Number of schools in study	99	159	191
Total students trained annually	16,419	23,196	9,254
Average students trained annually	169.7	156.7	52.9
Highest number of students trained annually	1,500	5,000	400
Lowest number of students trained annually	6	6	3
Total students currently enrolled	16,665	8,862	5,694
Average students currently enrolled	171.8	61.1	32.5
Highest number of students currently enrolled	1,500	400	300
Lowest number of students currently enrolled	10	5	2
Average percentage of students using devices	75.0%	51.4%	35.8%
Highest percentage of students using devices	100%	100%	100%
Lowest percentage of students using devices	1%	1%	3%

Question 3: How many students are currently enrolled in your training program?

Of the 449 schools responding to the survey, 418 reported data on the number of students currently enrolled. The average number of students currently enrolled in universities (n = 98) was 171.8, with a high of 1500 students and a low of 10 students. Part 141 schools (n = 145) had an average current enrollment of 61.1 students, with a high of 400 students and a low of 5 students. Part 61 schools (n = 175) had an average current enrollment of 32.5 students, with a high of 300 students and a low of 2 students.

Question 4: Approximate percentage of your students who use these devices for training?

Of the 449 schools, 286 reported the percentage that their students use training devices in their flight courses. Universities (n = 95) reported that an average of 78.0% of their students use training devices in their programs, with 100% being the highest percentage reported and 1% being the lowest reported. Part 141 schools (n = 112) reported an average of 51.4% of their students use training devices, with 100% being the highest percentage reported and 1% being the lowest percentage reported. Part 61 schools (n =79) reported an average of 35.8% of their students use training devices, with 100% being the highest percentage being reported and 3% being the lowest percentage reported.

Question 5: Do you use any of these devices for check rides or examinations? If so, which check rides or examinations?

A total of 34 schools reported that they use FTDs for check rides: 15 universities and 18 part 141 schools. One Part 61 school reported using them for such purposes. A

total of 29 schools reported using FTDs for some type of examination: 18 universities, 10 Part 141 schools, and 1 Part 61 school. One institution reported using a device as part of a pre-hire screening program for a regional airline. It is assumed this evaluation is not part of any flight-training program. The data did not reveal any clear information regarding which check ride or examination for which the devices are used. It is possible that the schools are reporting the devices that are used for FAA computer written test applications, but the exact use was not revealed. This data is tabulated in Table 8.

Manufacturers and Number of Flight Training Devices

A total of 401 FTDs was reported. These devices were from eleven different manufacturers. Table 2 shows a summary of manufacturers and number of FTDs reported. The largest number by a single manufacturer is 218, which are devices made by Frasca International. The second largest number is 72, which were manufactured by ATC, Inc. The third largest number is 66, which were manufactured by Aviation Simulation Technology, Inc. The largest users of FTDs in this sample were universities, averaging 2.6 devices per school. The Part 141 schools averaged 0.7 devices per school whereas the Part 61 schools averaged 0.2 devices per school.

Table 2

FTD Manufacturers and Number of Devices Reported

	Universities	Part 141	Part 61	Total Devices	Schools Reporting*
AST	43	17	6	66	48
ATC	36	24	12	72	44
CPT	0	1	0	1	1
Emulation Systems	0	0	1	1	1
FlightMatic	0	1	0	1	1
FlightSafety Int.	0	4	0	4	1
FLYIT	0	1	0	1	1
Frasca	155	55	8	218	103
GAT	21	0	3	24	8
Mechtronics	0	2	0	2	2
Mitsubishi	3	3	1	7	6
Pacer Systems	0	0	1	1	1
Vector systems	3	0	0	3	1
TOTALS	261	108	32	401	

* Schools cannot be totaled as some have devices from more than one manufacturer.

One school reported the manufacturer of their device as a “CPT.” While this term is commonly used for a cockpit procedures trainer, it is not known whether or not this is the case or if CPT is the actual name of a particular device. The CPT model reported here is an MU-2B, most likely for a Mitsubishi MU-2B turboprop airplane. This device was reported as an FTD, and therefore is included in the FTD data. One issue that is not clear is the manufacturer of the GAT device. Singer-Link used to manufacture a single-engine

FTD known as the GAT 1 and a multiengine FTD known as the GAT 2. Environmental Techtonics currently manufactures an FTD known as the GAT-II, which can be certified as a Level 2 FTD or Level 3 FTD. No one reported the manufacturer of these devices as anything other than a GAT. It may be possible that the four GAT 2 devices reported are made by Environmental Techtonics, especially considering that the older Singer-Link devices would not likely be certified as anything other than Level 1.

Manufacturers and Number of PC-Aviation Training Devices

A total of 240 PCATDs was reported. Universities reported a total of 133 devices, Part 141 schools reported a total of 63 devices, and Part 61schools reported a total of 44 devices. These PCATDs were from four manufacturers. Table 3 shows a breakdown of manufacturers and number of PCATDs reported. Forty-eight universities, 51 Part 141 schools, and 39 Part 61 schools reported using PCATDs. Universities were the largest users with an average of 1.3 devices per school. Part 141 schools averaged 0.4 devices per school whereas Part 61 schools averaged 0.3 devices per school.

The largest number of PCATDs reported was 101 made by Aviation Teachware Technologies, under the name of Elite Personal Simulators. Jeppesen Sanderson, Inc. was the second largest manufacturer with 80 devices being reported. Aviation Supplies and Academics, Inc. was the third largest manufacturer with 36 being reported.

Table 3

PCATD Manufacturers and Number of Devices Reported

	Universities	Part 141	Part 61	Total Devices	Schools Reporting *
ASA	19	8	9	36	22
ATT	47	28	26	101	74
Jeppesen	58	20	2	80	38
PFC	8	8	7	23	20
TOTAL	132	64	44	240	

* Schools cannot be totaled as some have devices from more than one manufacturer.

Manufacturers and Number of Other Training Aids

A total of 104 OTAs was reported. Eighty-six OTAs were reported in use by universities, ten OTAs were reported in use at Part 141 schools, and eight OTAs were reported in use at Part 61 schools. These devices are from nine manufacturers. The data is contained in Table 4. It should be noted that OTAs include both training devices and training programs run on PC computers. Fourteen universities, eight Part 141 schools, and eight Part 61 schools reported using OTAs. The average number of devices per school is not a good measure of relative use because of the small number of schools using them.

The largest number of this type of device is Microsoft's Flight Simulator program, with 79 being reported in use. The second largest number reported is 8, which is the computer program COMM1 VFR and IFR communications training program published by e-publishing group (sic).

One school reported their OTAs as "American Megatrends." A search on the Internet revealed American Megatrends is a manufacturer of computer components and no reference could be found to any aviation application. The model was reported as a Virtual Pilot Pro, which is the name of a computer program used for aviation training. These two devices are included in the OTA data. One school reported their device as an Aspire ARC 6100. As with American Megatrends, Aspire appears to be the name of a computer made by Acer, Inc., and not a program. A search on the Internet found no aviation training device or program by this name. This device is included in the data. In this case, it is assumed this school uses this computer to run some sort of computer based aviation training program.

Table 4

OTA Manufacturers and Number of Devices Reported

	Universities	Part 141	Part 61	TOTAL	Schools Reporting*
American Megatrends	0	2	1	3	3
ASA	0	2	1	3	3
Aspire	0	1	0	1	1
ATT	6	0	0	6	1
Diamond	1	0	0	1	1
e-group publishing	6	2	0	8	3
Honeywell GPS trnr	0	1	0	1	1
IFT	2	0	0	2	1
Microsoft	71	2	6	79	20
TOTAL	86	10	8	104	

* Schools cannot be totaled as some have devices from more than one manufacturer.

Combination of Devices in Use

The data revealed many schools use more than one type of device. Only seven schools, all universities, reported using all three types of training devices. Of the universities, 43 (43.4%) reported using FTDs as their only training device whereas 52 (32.7%) of the Part 141 schools indicated FTDs were their sole type of device. Only 30 (15.7%) of the Part 61 schools reported using only FTDs.

With respect to PCATDs, only 9 (9.1%) of the universities reported using them as their sole training device, whereas 42 (26.4%) of the Part 141 and 48 (25.1%) of the Part 61 schools use them exclusively. The various combinations in which training organizations use training devices and aids are depicted in Table 5.

Table 5

Combinations of Devices in Use

	Universities	Part 141	Part 61
FTDs only	43	52	30
PCATDs only	9	42	48
OTAs only	0	4	8
FTDs and PCATDs	30	10	2
FTDs and OTAs	5	2	0
PCATDs and OTAs	2	1	0
FTDs, PCATDs, and OTAs	7	1	1

Flight Training Device Certification Levels

Advisory Circular AC120-45A, Airplane Flight Training Device Qualification, (1992) specifies the requirements for certification of FTDs at seven levels. The data revealed that the levels of certifications for the FTDs in use range from Level 0 to Level 6. Table 6 shows the number of FTDs reported for each level of certification. Only the levels of certification that were reported are shown. There were many cases in which the person making the report was uncertain of the certification level. Most of these data resulted from the telephone call efforts and the person responding either was not sure or simply did not know. If the level was not certain, it was reported as unknown.

Table 6

Level of Certification for FTDs Reported

	Number of Devices
Level 0	3
Level 1	211
Level 2	18
Level 3	35
Level 4	0
Level 5	6
Level 6	1
Level Unknown	127
Total	401

The data also revealed that of the 401 FTDs in use, 151 of them were reported to have a visual system, 98 were reported to have dynamic control loading. The data does not reveal the number of devices that have both systems on the same device.

Use of Training Devices in Flight Training Programs

The additional data gathered did not change the numbers depicted in Table 7. This information was not supplied by the responding individual or was left blank. The data revealed that most of the reporting schools use training devices in more than one pilot certificate training program. The data collected was limited to four levels of pilot certification and/or ratings, the private and commercial pilot certificate and the instrument and multiengine ratings. Table 7 shows the number of schools that use each type of device for each of these four levels of certification. The data does not show if the devices are used as part of an approved curriculum for these four types of training programs.

Table 7

Number of Schools Using Training Devices in Training Programs

	FTDs	PCATDs	OTAs
Universities			
Private	61	25	9
Instrument	83	44	9
Commercial	56	18	4
Multiengine	63	14	4
Part 141			
Private	31	20	7
Instrument	65	50	8
Commercial	42	11	3
Multiengine	36	17	4
Part 61			
Private	10	12	5
Instrument	26	37	5
Commercial	10	6	2
Multiengine	6	6	2

While it can be assumed that most of the schools use FTDs and PCATDs in their programs, it cannot be determined if their use is limited to an approved training course outline (TCO). It is possible that some schools use them outside of an approved curriculum, for individual practice, remediation, or other additional training. It can be assumed that all use of non-approved OTAs is done outside any FAA approved curriculum as no training credit is currently awarded for their use. Table 7 shows the breakdown of the number of schools using each type of device in four training programs: private and commercial pilot certification and also in instrument and multiengine rating programs. It is interesting to note the number of Part 61 schools reporting use of devices in approved curriculums. This may have resulted from confusion from schools that offer both Part 141 and Part 61 training.

The data in Table 8 shows how many schools reported using devices in approved TCOs. Schools report a total of 337 FTDs and 143 PCATDs as being used in approved curriculums, but the data does not specify which device is used in which program. Data about weekly use is also included in this table.

Table 8

Schools Using Devices in Approved Curriculum

	University	Part 141	Part 61
Schools using devices in approved curriculum	82	103	46
Schools using FTDs in approved curriculum	73	62	18
Schools using PCATDs in approved curriculum	25	41	28
Average hours per week used- FTD	24.5	20.8	6.4
Average hours per week used- PCATD	24.3	10.1	6.8
Average hours per week used-OTA	15.8	6.0	7.4
Use devices for checkrides	15	18	1
Use devices for examinations	18	10	1

DISCUSSION

The low response rate to this continuing effort suggests one or more issues. One is that there is a very strong reluctance for smaller flight schools to take the time to reply to a simple survey. Another may be the reluctance or hesitancy on the part of many to do the survey via the Internet. As the follow-up telephone conversations suggest, a key factor may be those without any training device in the school might see no reason to take the time to complete this survey.

The additional data collected did not reveal any new types of devices or programs that are being used in today's flight training environment over what had already been discovered. It does, however, continue to suggest that people are having trouble understanding the certification levels and the requirements thereof regarding FTDs. The largest users of any training device continue to be universities and Part 141 programs, especially those with larger student enrollments. As previously mentioned, this is no surprise considering the infrastructure advantage university programs and larger Part 141 programs have over a small Part 61 program.

RECOMMENDATIONS

There are no new recommendations at this time.

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Part I

Appendix A

Cover Letters and Survey Instrument

Date

Address

Dear Sir or Madam:

With increases in computer technology, many advances have been made with respect to various training devices that are available to flight training organizations. While current regulations allow for some training credit to be awarded for the use of these devices, there is no clear picture as to how these devices are actually used in today's training environment. A recent study attempted to identify the makes and models of the various types of devices that are currently being used throughout the industry. These devices range from approved flight training devices, approved personal-computer aviation training devices, and even game programs such as Microsoft's Flight Simulator programs.

What we are trying to do in this study is to determine in more detail just how these devices are being used and what tasks are actually being taught. Attached is a survey designed to determine specifics regarding demographic and device information and the tasks that are being taught in various types of flight training devices. Your training organization was chosen for the survey because of the activity you indicated in the previous study. We sincerely hope you will take the time to complete this survey as accurately as possible. It should take no more than one hour of your time.

The information that is gained from this survey will be compiled in aggregate form to provide a more complete picture of the use of training devices. All individual information will be held confidential and will not be part of any report.

Thank you for your time and consideration of this matter. If you have any questions regarding this survey, please contact one of the following individuals:

Dr. Mike Wiggins, 386-226-7030, wigginsm@erau.edu

Dr. Mike Crognale, 775-784-6828, ext. 2030, mikro@unr.edu

No:

FTD Survey

Part I- Demographic Information:

1) Name of Training Organization _____

2) Name of a contact person in case there are follow-up questions regarding this survey.

_____

3) Phone Number

_____

4) What is your current enrollment of students in private ASEL, instrument-airplane, commercial ASEL, and multiengine airplane courses?

4a) Private _____

4b) Commercial _____

4c) Instrument _____

4d) Multiengine _____

5) How many hours does your organization fly in flight training activities?

5a) Airplanes _____ Per Week/Per Month/ Per Year (please indicate)

5b) FTDs _____ Per Week/Per Month/ Per Year (please indicate)

5c) PCATDs _____ Per Week/Per Month/ Per Year (please indicate)

5d) Any other devices or program _____ Per Week/Per Month/ Per Year (please indicate)

6) Do your students use FTDs or PCATDs outside of the required curriculum hours for the purpose of familiarization or extra-training?

Yes / No If yes, approximately how many hours per student? _____

7) Do your instructors use FTDs or PCATDs with students outside the required curriculum hours for the purpose of familiarization or extra training?

Yes / No If yes, approximately how many hours per student? _____

Part II Program and Device Information

8) Are your training programs approved under 14 CFR 141?

Yes/No

9) Do you conduct training under 14 CFR 61?

Yes/No

10) What percentage of your training is conducted under 14 CFR 141?

_____

11) Does your organization use Flight Training Devices in your flight training programs?

No

Yes in 14 CFR 141 programs only

Yes, in 14 CFR 61 programs only

Yes, in both types of programs.

12) If Yes, what are the makes and models of each FTD, year of manufacture, and certification level.?

Make	Model	Year	Cert. Level
Make	Model	Year	Cert. Level
Make	Model	Year	Cert. Level

13) Do you use FAA approved PCATDs in your programs?

No

Yes in 14 CFR 141 programs only

Yes, in 14 CFR 61 programs only

Yes, in both types of programs.

14) If Yes, what are the makes and models of each?

Make	Model	Year
Make	Model	Year
Make	Model	Year

15) Please give an estimate of the average flight training hours (in airplanes) each student accumulates in the following courses. If possible, base the estimates on actual logged flight hours for each student.

Private _____

Instrument _____

Commercial _____

Multiengine _____

16) Are your FTDs approved:

By a letter of authorization using conferred status (pre 8-1-1996)

By a specific letter of authorization (post 8-1-1996)

Not sure how they are approved.

_____

If approved by other means- please explain here.

17) Do you understand the regulations and requirements for gaining FAA approval for using your FTDs?

Complete understanding Some understanding No much understanding No understanding

18) Do you understand the regulation and requirements for continued use of your FTD?

Complete understanding Some understanding No much understanding No understanding

19) Is your local FSDO helpful in approval process of your FTDs?

Very helpful Somewhat helpful Not very helpful No help at all.

Instructions for Part III

This survey is seeking to collect information about three major areas: the types of training devices used, the type of learning targeted, and the level of certifications for which the training is being conducted.

The maneuvers and procedures are based on the Practical Test Standards. Since there are four PTS involved in this survey, the tasks were grouped into like Areas of Operations. This is to help prevent duplication and to simply the completion of it. The Areas of Operation are in ***Bold Italicized*** print.

The first three columns prior to the Areas of Operation and Tasks refer to Flight Training Devices (FTD), PC-Aviation Training Devices (PCATD), and any other device (Training Aid), such as Microsoft 2002, which you might use.

The three shaded columns immediately following the Areas of Operation and Task ask if you are using the device to teach Knowledge (K), Skill (S), and/or Attitudes (A). An example of teaching a Knowledge item would be teaching the use of a checklist, how to tune a VOR radial, or execute an emergency checklist from memory. An example of a Skill item would be any maneuver that involves hand-eye coordination, such as a steep turn, ILS approach, or maneuvering with an engine inoperative. An example of an Attitude item would involve some sort of decision-making, such as diverting to an alternate or deciding to follow a checklist rather than depend on memory.

Here is an example of how to complete Part III.

In this case, the FTD is being used to teach take offs and landing in the private and commercial courses, with both knowledge and skill items being emphasized. A PCATD is being used to teach knowledge and decision-making regarding go-arounds and rejected landings

FTD	PCATD	Training Aid	Areas of Operation and Tasks	K	S	A	PVT	INST	COM	ME
			Takeoffs, Landings, and Go-Around							
X			Normal and Crosswind Takeoff and Climb	X	X		X		X	
X			Normal and Crosswind Approach and Landing	X	X		X		X	
	X		Go-Around/Rejected Landing	X		X	X			

.

Part III

FTD	PCATD	Training Aid	Areas of Operation and Tasks	K	S	A	PVT	INST	COMM	ME
			Preflight Procedures							
			Preflight Inspection							
			Cockpit Management							
			Engine Starting							
			Taxiing							
			Before Takeoff Check							
			Aircraft Systems Related to IFR Operations							
			Aircraft Flight Instruments And Navigation Equipment							
			Instrument Cockpit Check							
			Air traffic Control Clearances And Procedures							
			Air Traffic Control Clearances							
			Compliance With Departure, En Route, And Arrival Procedures And Clearances							
			Holding Procedures							
			Takeoffs, Landings, and Go-Arounds							
			Normal and Crosswind Takeoff and Climb							
			Normal and Crosswind Approach and Landing							
			Soft-Field Takeoff and Maximum Performance Climb							
			Soft-Field Approach and Landing							
			Short-Field Takeoff and Climb							

			Short-Field Approach and Landing							
			Forward Slip to a Landing							
			Go-Around/Rejected Landing							
			Power-Off 180 Accuracy Approach and Landing							
			Flight By Reference To Instruments							
			Straight-And-Level Flight							
			Change Of Airspeed							
			Rate Climbs And Descents							
			Timed Turns To Magnetic Compass Headings							
			Constant Airspeed Climbs And Descents							
			Recovery From Unusual Attitudes							
			Steep Turns							
			Navigation Systems							
			Intercepting And Tracking Navigational Systems And DME Arcs							
			Instrument Approach Procedures							
			Nonprecision Instrument Approach							
			Precision ILS Instrument Approach							
			Missed Approach							
			Circling Approach							
			Landing from a Straight In or Circling Approach							
			Performance Maneuvers							
			Steep Turns							
			Chandelles							
			Lazy Eights							

			Ground Reference Maneuvers							
			Rectangular Course							
			S-Turns							
			Turns Around A Point							
			Eights On Pylons							
			Navigation							
			Pilotage And Dead Reckoning							
			Navigation Systems and Radar Services							
			Diversion							
			Lost Procedures							
			Navigation Systems and DME Intercepting and Tracking Arcs							
			Slow Flight And Stalls							
			Maneuvering During Slow Flight							
			Power-Off Stalls							
			Power-On Stalls							
			Spin Awareness							
			Basic Instrument Maneuvers							
			Straight-And-Level Flight							
			Constant Airspeed Descents							
			Turns To Headings							
			Constant Airspeed Climbs							
			Recovery From Unusual Flight Attitudes							
			Radio Communications, Navigation							

			Systems/Facilities, And Radar Services							
			Emergency Operations							
			Emergency Descent							
			Systems And Equipment Malfunctions							
			Emergency Approach And Landing							
			Emergency Equipment And Survival Gear							
			Loss Of Communications							
			Loss Of Gyro Attitude And/Or Heading Indicators							
			Maneuvering With One Engine Inoperative							
			Engine Inoperative – Loss Of Directional Control Demonstration							
			Engine Failure During Takeoff Before Vmc							
			Engine Failure After Lift-Off (Simulated)							
			Approach And Landing With An Inoperative Engine (Simulated)							
			One Engine Inoperative During Straight-and-Level Flight and Turns							
			Multiengine Operations							
			Engine Failure During Flight (By Reference To Instruments)							
			Instrument Approach – All Engines Operating (By Reference To Instruments)							
			Instrument Approach – One Engine Inoperative (By Reference To Instruments)							
			Performance And Limitations							
			Operation Of Systems							
			Engine Inoperative Principles Of Flight							
			Night Operations							
			Night Preparation							
			Night Flight							
			Postflight Procedures							

			After Landing							
			Parking And Securing							
			Checking Instruments And Equipment							

Part I

Appendix B

List of Devices Reported

Devices Reported in Phase II study

Device Name	Make	Model	Year	Certification
Training Aid		ON TOP PC		
Training Aid		ON TOP 7.0		
PC-ATD				
Training Aid		GPS Trainer		
Training Aid		Comm 1 VFR		
Training Aid		Bell		
Training Aid		Cessna CPC		
PC-ATD				
PC-ATD	ASA	On Top	1999	
PC-ATD	ASA	ON TOP	2002	
PC-ATD	ASA	ON TOP 2.0	2002	
FTD	AST	300	1993	
FTD	AST	300	1985	B
FTD	AST	Hawk	2000	1
FTD	AST	300	1996	
FTD	AST	Hawk	1999	3
FTD	AST	Hawk	2000	3
FTD	AST	Hawk	2002	3
FTD	AST	300	1996	3
FTD	AST	300		3
FTD	AST	300	1999	1
FTD	AST	300	93	
FTD	AST	300T	93	
FTD	ATC	710		
FTD	ATC	610	1980	
FTD	ATC	810		
FTD	ATC	920	1989	NONE
FTD	ATC	610		
FTD	ATC	810		
FTD	ATC	710	1988	NA
FTD	ATC	810	1992	NA
FTD	ATC	710		
FTD	ATC	810	1985	1
FTD	ATC	710	1985	
FTD	BH407			
FTD	BH427			
Training Aid	Cessna	Computer		
FTD	Cessna	172	2002	3
Training Aid	Cessna	Pilot Center		
Training Aid	Cessna/King	CBI Kit		
PC-ATD	Elite	GV	1999	
PC-ATD	Elite	GV	1999	

PC-ATD	Elite	5.2	1999	
PC-ATD	Elite	GV	1999	
PC-ATD	Elite	V.6	2002	
PC-ATD	Elite	PCATD PI		
PC-ATD	ELITE	Elite	1998	
PC-ATD	Elite	MFD	2002	
PC-ATD	Elite	6.0	2001	
PC-ATD	Elite	Pilot Version	2002	
FTD	Fidelity	Motus 322i	2002	3
FTD	Fidelity	Motus 621i	2001	2
PC-ATD	FLITE PRO	2000	2000	
FTD	Flyit	1	2001	
FTD	Frasca	142	1988	1
FTD	Frasca	PA44	2002	
FTD	Frasca	141	1994	
FTD	Frasca	142	1994	
FTD	Frasca	142	1998	
FTD	Frasca	PA44	2002	
FTD	Frasca	142		
FTD	Frasca	141	2001	NA
FTD	Frasca	C-172	2002	3
FTD	Frasca	142		3
FTD	Frasca	141		3
FTD	Frasca	142	1993	3
FTD	Frasca	142	1995	3
FTD	Frasca	142		
FTD	Frasca	131	1992	
FTD	Frasca	131		
FTD	Frasca	142	1996	
FTD	Frasca	142		1
FTD	Frasca	BH206B/206		
FTD	Frasca	242T		
FTD	Frasca	131		
FTD	Frasca	141	2001	1
FTD	Frasca	141	1978-1982	
FTD	Frasca	142		
FTD	Frasca	241	2000	1
FTD	Frasca	242T	2001	1
FTD	Frasca	132	1998	
FTD	Frasca	141		1
FTD	Frasca	142	1990	
FTD	Frasca	142	1998	
FTD	Frasca	242	2002	1
FTD	Frasca	242		
FTD	Frasca	142	1998	
FTD	Frasca	242T	1995	3
FTD	Frasca	242	1992	1

FTD	Frasca	141		
FTD	Frasca	242	1992	1
FTD	Frasca	242	1992	1
FTD	Frasca	142	1996	3
FTD	Frasca	C-172	2003	6
FTD	Frasca	141	1993	
FTD	Frasca	142	1995	1
FTD	Frasca	242	1995	1
FTD	Frasca	242T		1
FTD	Frasca	141	2001	1
FTD	Frasca	142	1995	2
FTD	Frasca	141	1993	1
FTD	Frasca	141	1993	1
FTD	Frasca	142		
FTD	Frasca	141		1
FTD	Frasca	142	2001	1
FTD	Frasca	142		
FTD	Frasca	141		
FTD	Frasca	141		1
FTD	Frasca	141		
FTD	Frasca	141		1
FTD	Frasca	142	1993	
FTD	Frasca	141		1
FTD	Frasca	141		2,3
FTD	Frasca	142		1
FTD	Frasca	141	1993	
FTD	Frasca	141	90	
FTD	Frasca	242	1998	1
FTD	Frasca	142		1
FTD	Frasca	242		1
FTD	Frasca	141		1
Training Aid	Gleim	Test Prep		
PC-ATD	HP Computer	ON TOP	2000	
PC-ATD	Jeppesen			
PC-ATD	Jeppesen	FS-200	1999	
PC-ATD	Jeppesen			
PC-ATD	Jeppesen	FS-200	1998	
PC-ATD	Jeppeson	FS 200	1999	
Training Aid	Microsoft	Flight Sim		
PC-ATD	Percision	Cirrus Elite		
PC-ATD	Percision	Cirrus		
PC-ATD	Percision	Cirrus II	2000	
PC-ATD	Precision	Elite 7.0		
PC-ATD	Precision	Elite V. 6.03	2000	
PC-ATD	Precision	Elite 7.0		
PC-ATD	Precision	Elite 7.0		
PC-ATD	Precision	Elite 7.0	2002	

PC-ATD	Precision	Elite 7.0		
PC-ATD	Precision	Elite	2000	
PC-ATD	Precision	CAT III	2001	
PC-ATD	Precision	Elite 7.0		
PC-ATD	Precision	Elite	2001	
PC-ATD	Precision	Cirrus II		
PC-ATD	Professional		1997	
PC-ATD	PSA	Elite	1998	
FTD	Singer Link	GAT1	1983	1
FTD	Singer Link	GAT 1	1983	1
FTD	Singer Link	GAT 1	1983	1
FTD	Vector	Venture 7100	2000	3

Part I

Appendix C

List of FAA Approved Level 1 Flight Training Devices and Personal Computer-Aviation Training Devices As Supplied by AFS-800

Approved PCATDs and Level 1 FTDs
As Supplied by AFS-800

Manufacturer	Type of Device	Approved Models	Notes
Aviation Supplies and Academics	PCATD		
Aviation Teachware Technologies	PCATD		
Fidelity Flight Simulaton	PCATD		
Jeppesen Sanderson	PCATD		
Precision Flight Controls	PCATD		
Aviation Simulation Technologies	FTD	AST 201, ST 300	
ATC Flight Simulator Company	FTD	ATC 112H, ATC510, ATC 610, ATC 710, ATC 810	ATC 920 - No approval for use under 14 CFR parts 61 and 141
Emulation Systems	FTD	ES 200	
Frasca International	FTD	Frasca 121, 122, 131, 132, 135, 141,142, 241, 242, 242 T, and 342, R22	
FLYIT Simulators	FTD	Generic Helicopter Device and Generic Airplane Me model	Issued equivalent Level 1 authorized use
Singer Link	FTD	Gat 1 and Gat 2	
Pacer Systems Corporation	FTD	Pacer MK 11	
Vector Training Systems	FTD	Venture One	Qualified Level 2 and issued equivalent Level 1 authorized use
SIMCOM International	FTD	BE-58P, PA31-350, C-421C, PA31T-720, BE-B200, BE-C90,	Piper PA 46T & PA46-350. All Qualified Level 2 and above by NSP,

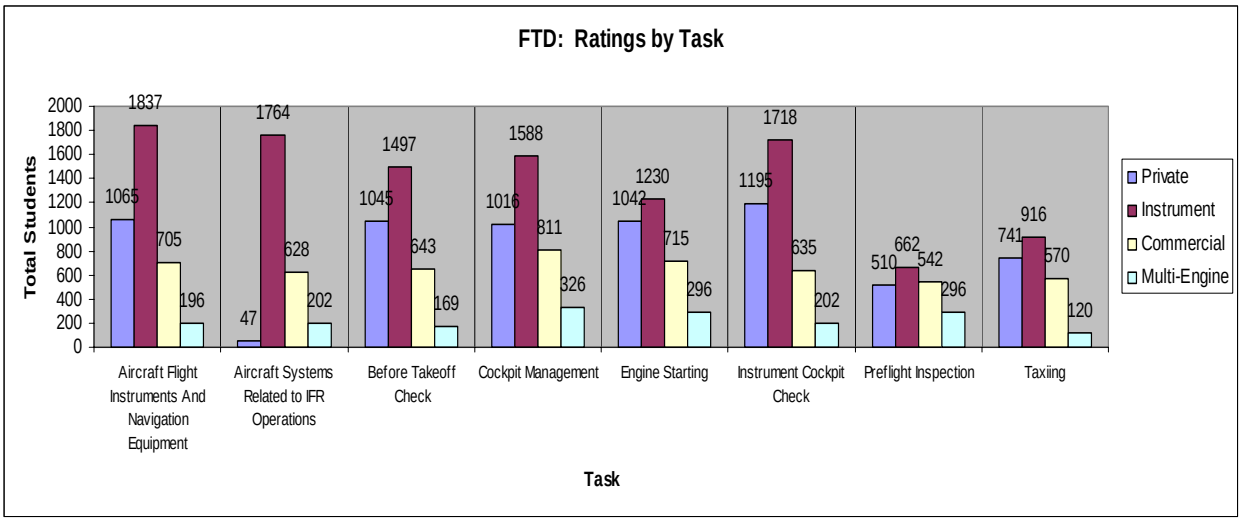
Part I

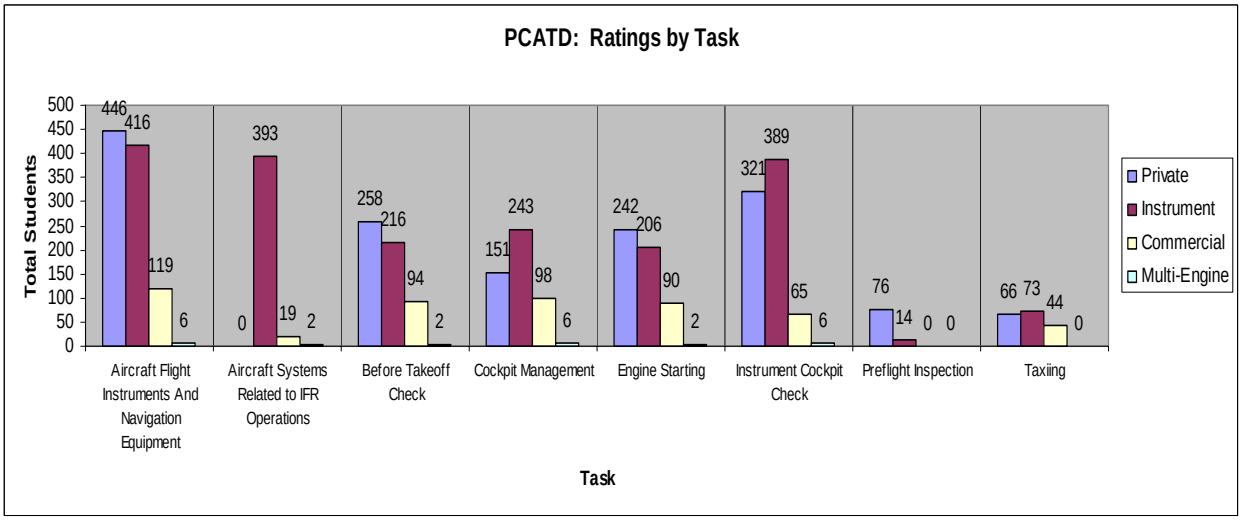
Appendix D

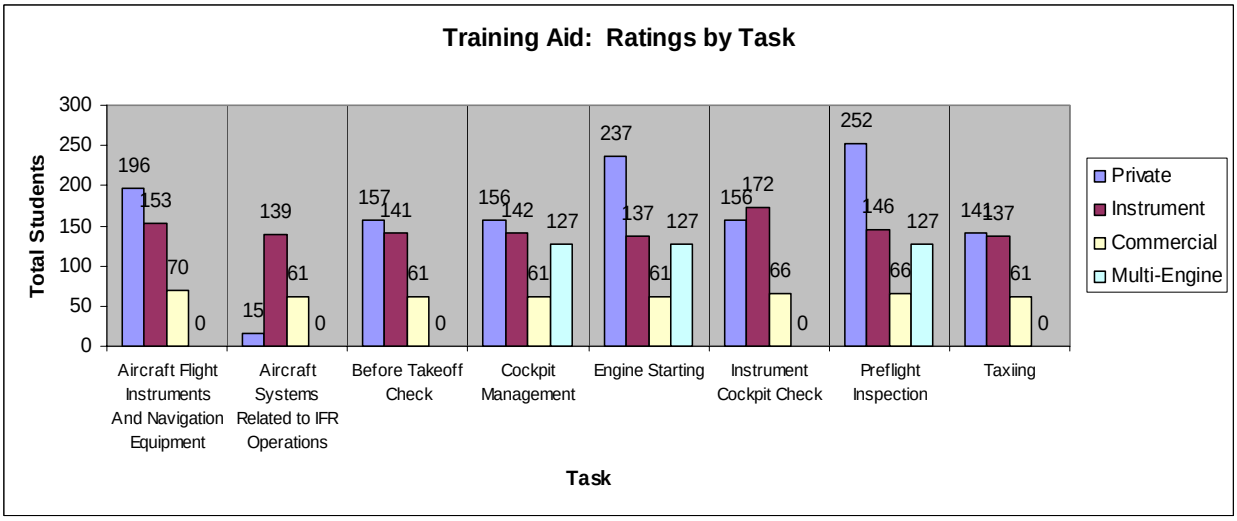
Data Charts for Areas of Operation

Area of Operation: Preflight Procedures- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

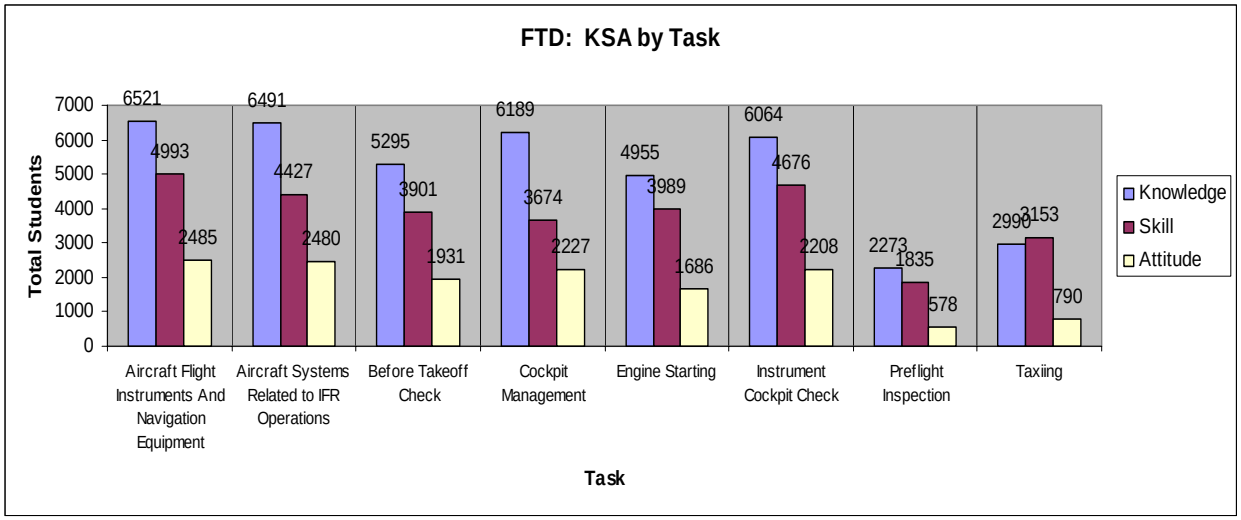


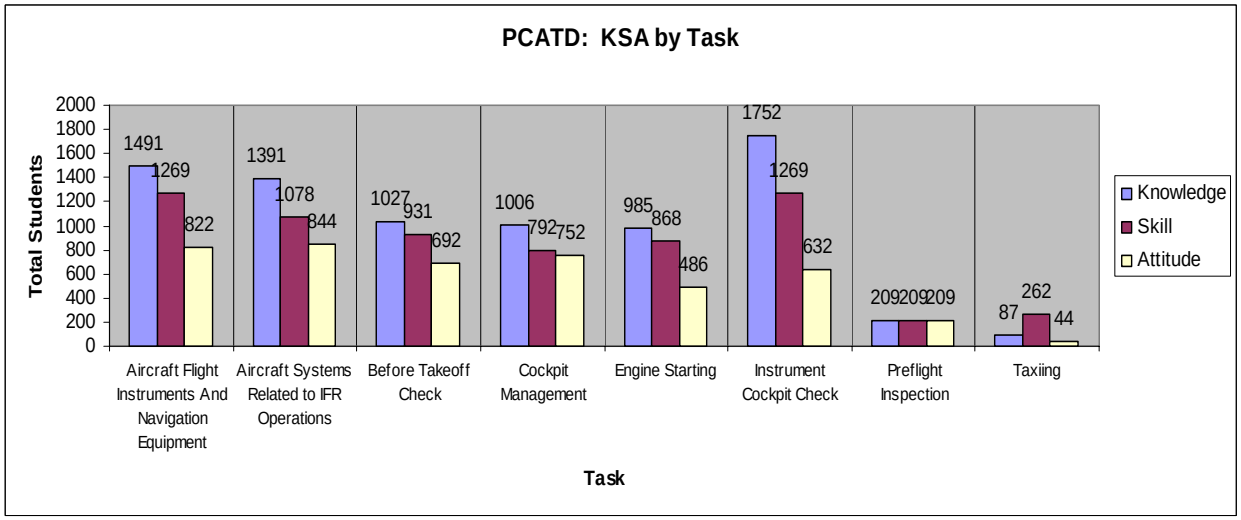


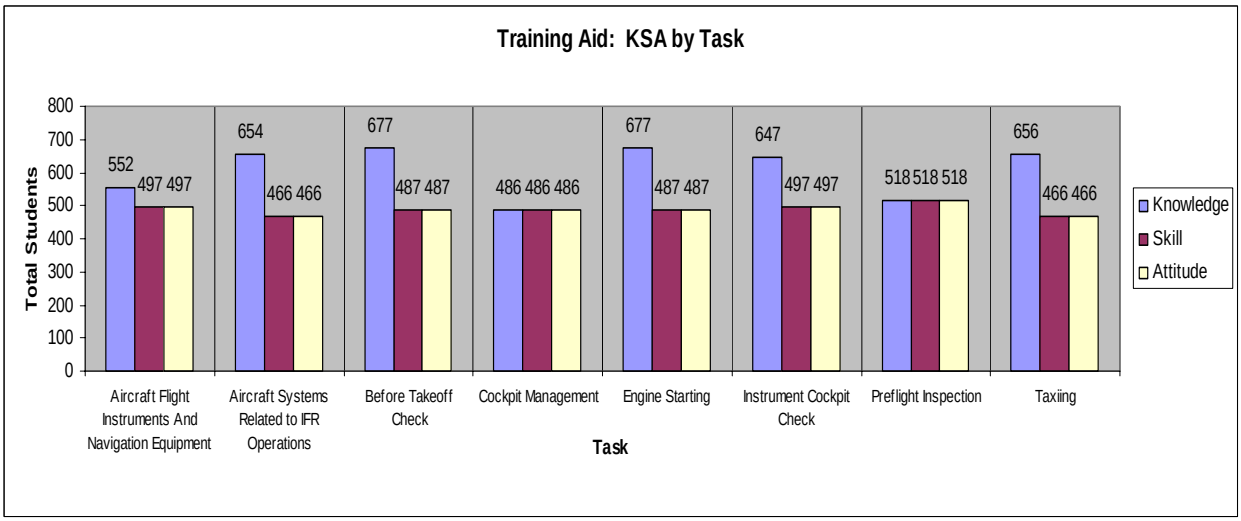


Area of Operation: Preflight Procedures- KSAs

Total Enrollment: 9258

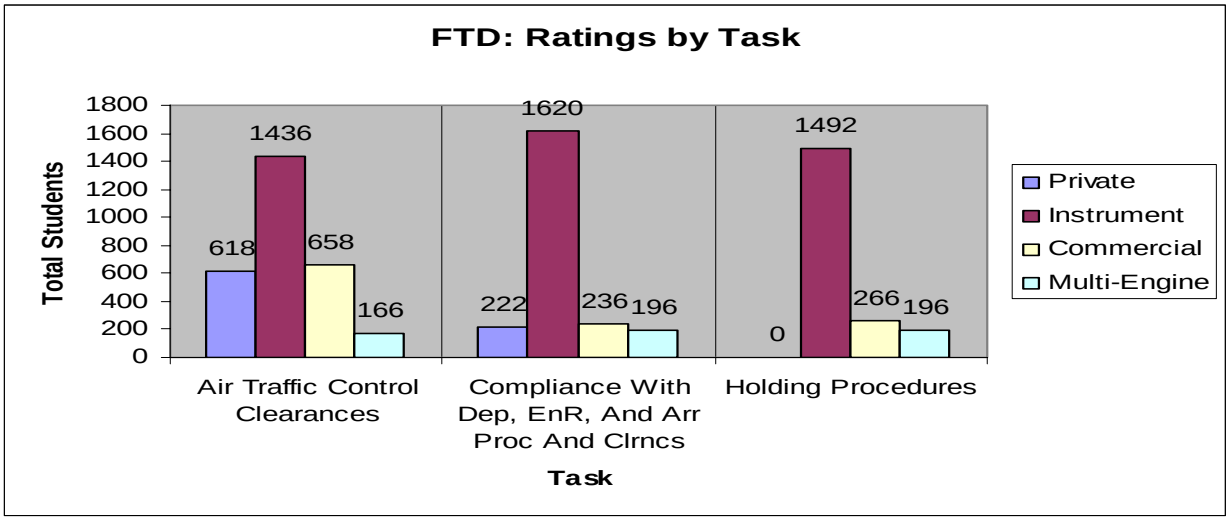


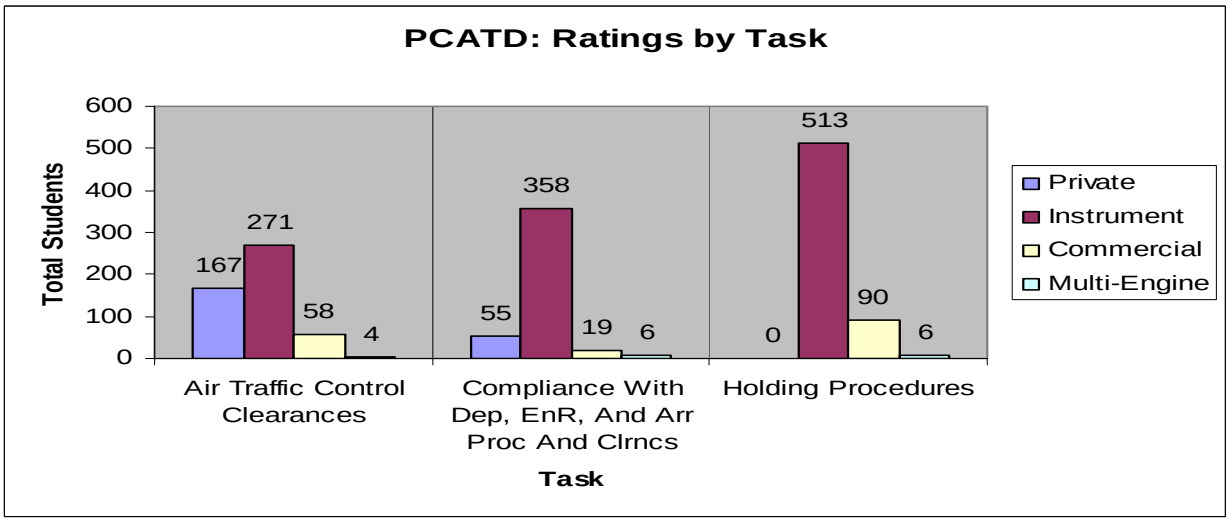


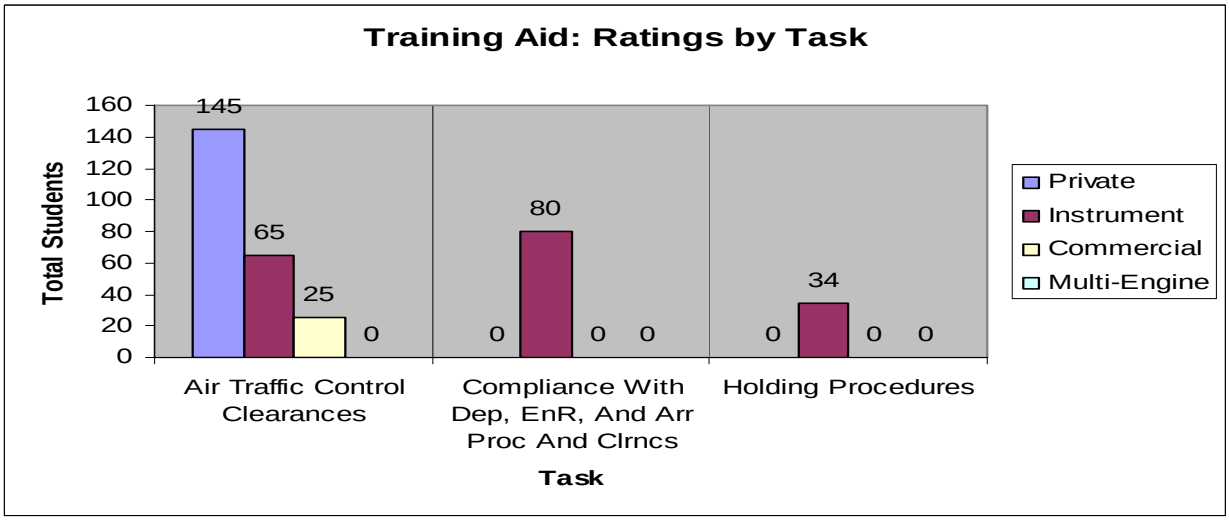


Area of Operation: Air Traffic Control Clearances and Procedures- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

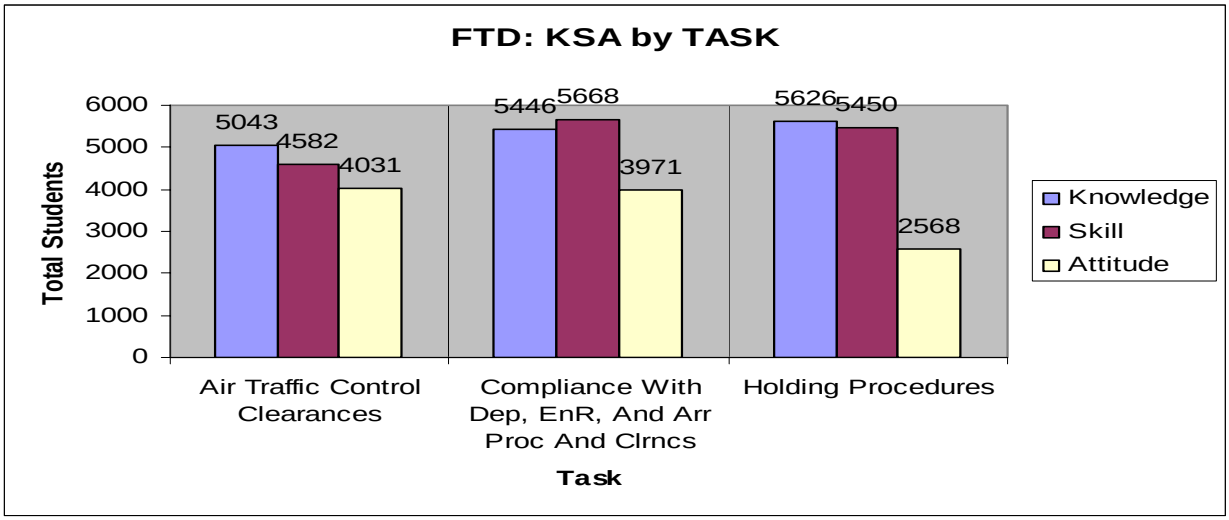


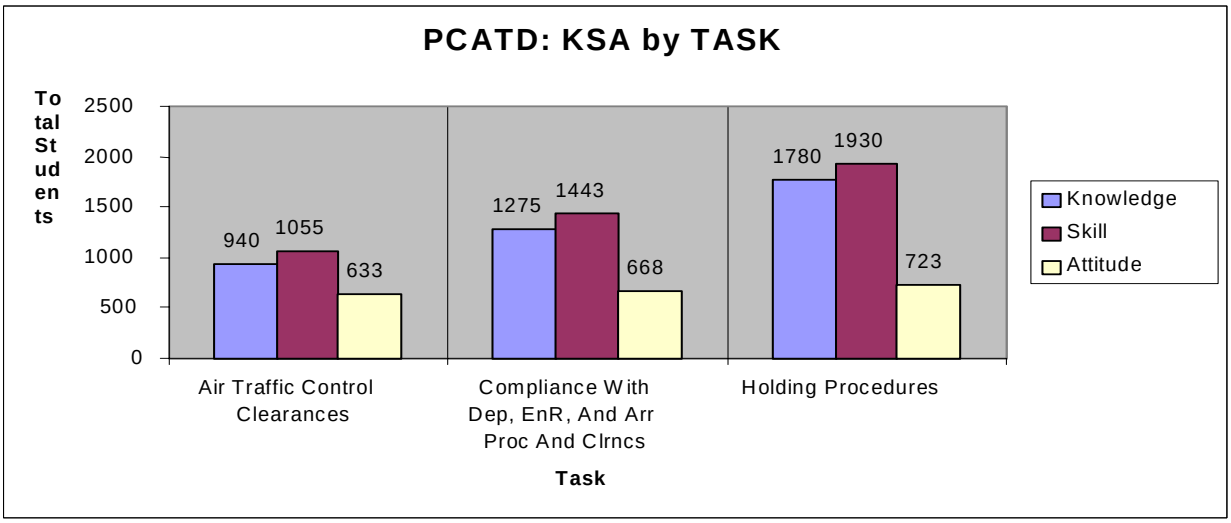


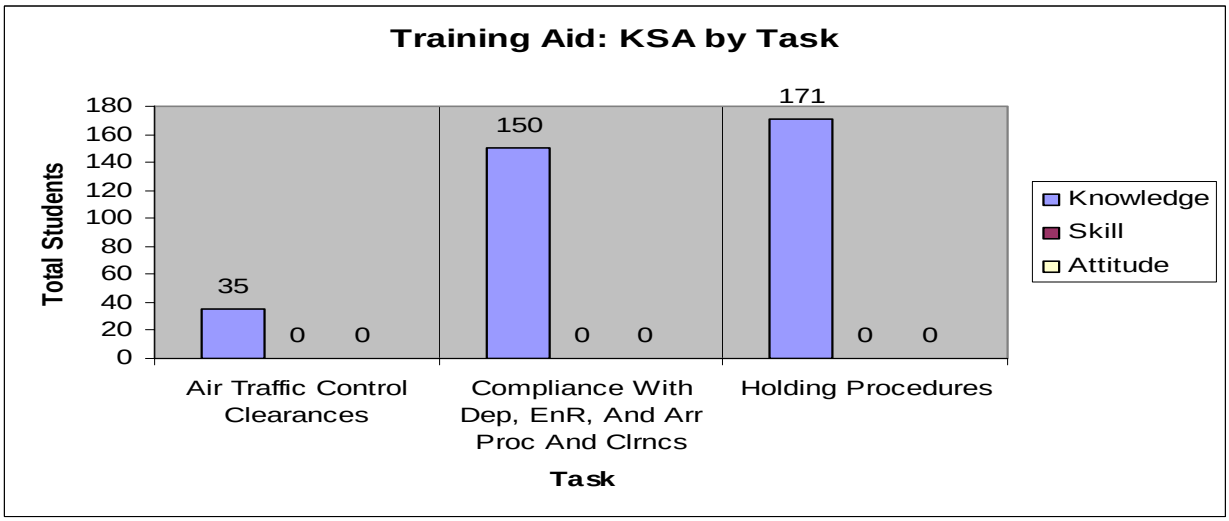


Area of Operation: Air Traffic Control Clearances and Procedures-KSAs

Total Enrollment: 9258



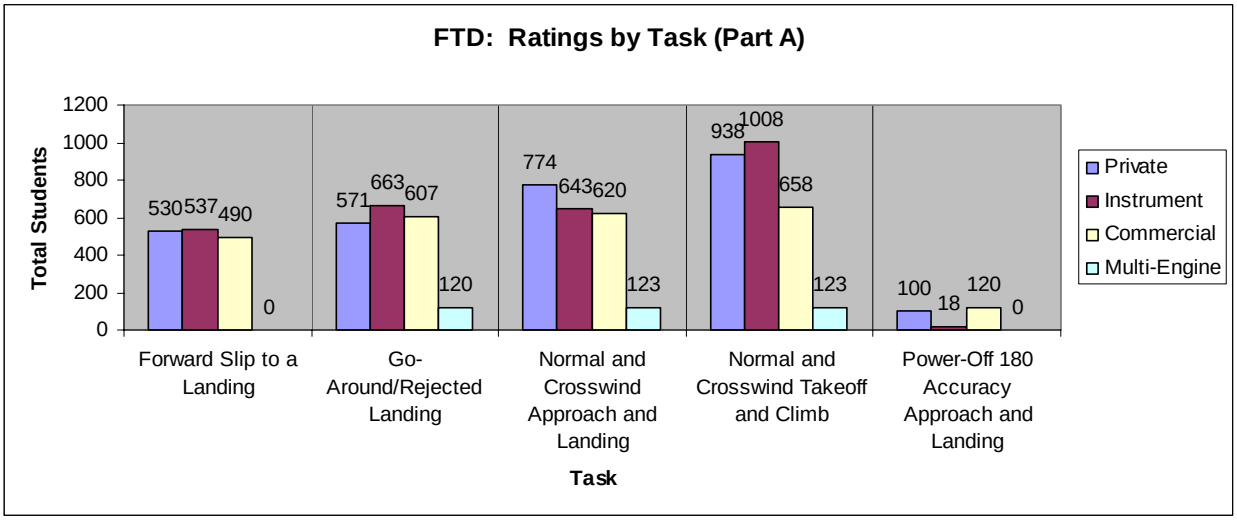


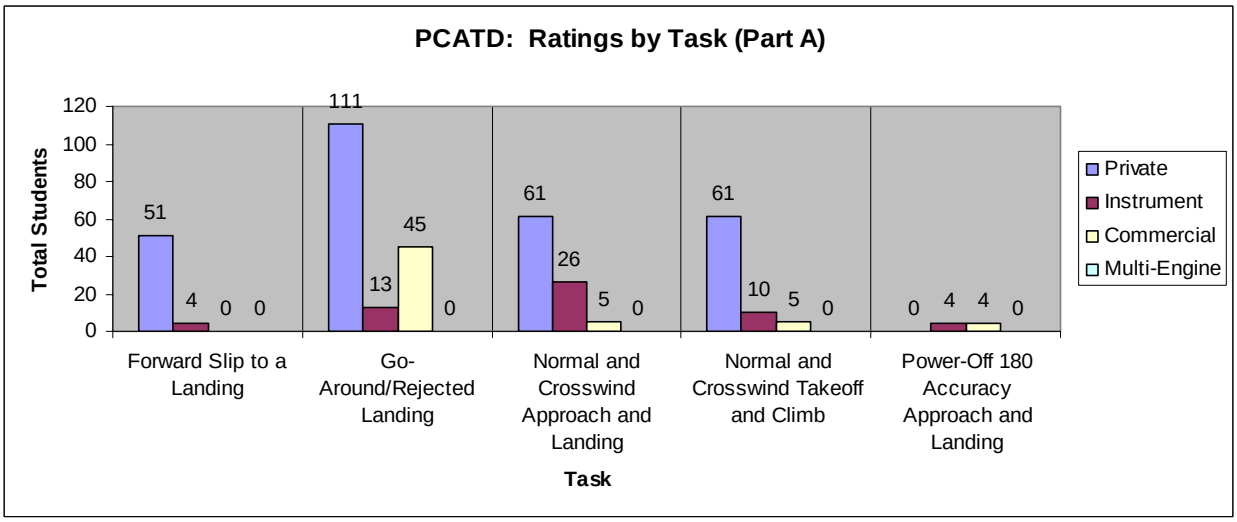


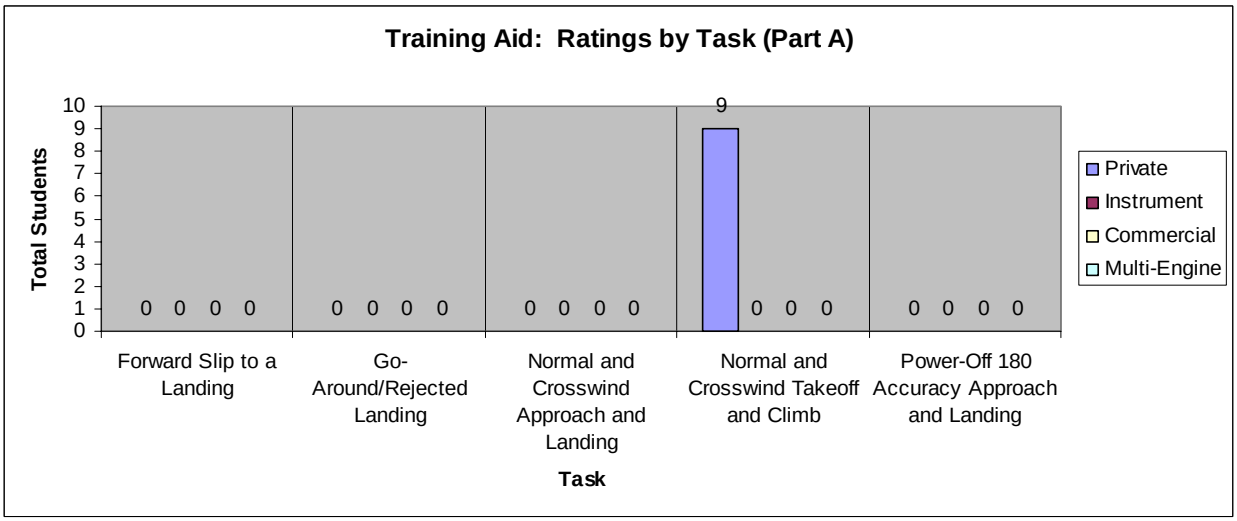
Area of Operation: Takeoff, Landings, and Go-Arounds- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

The tasks in this Area of Operation are divided into two charts.

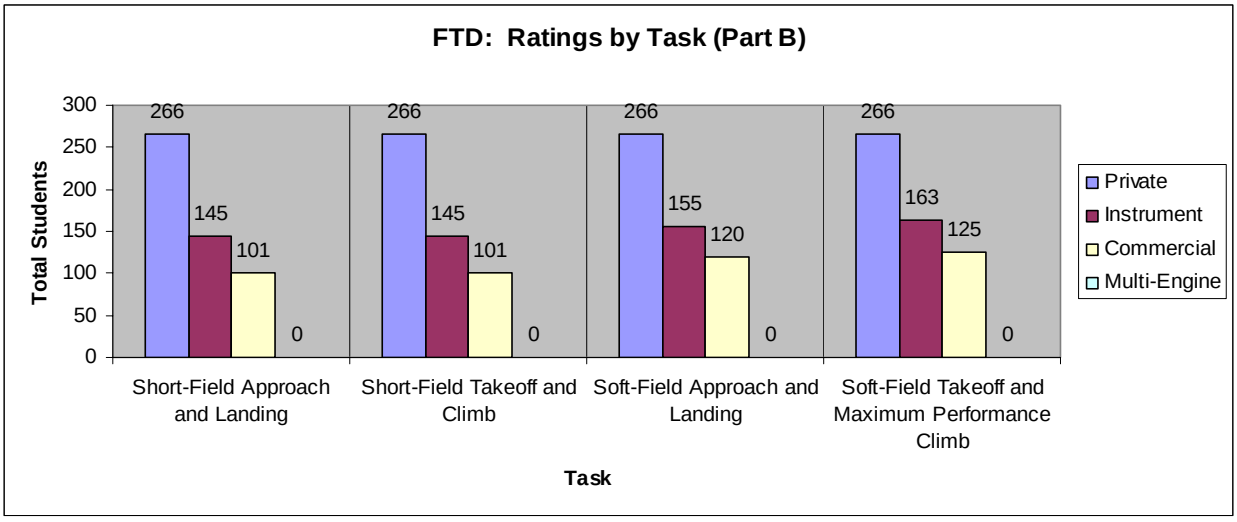


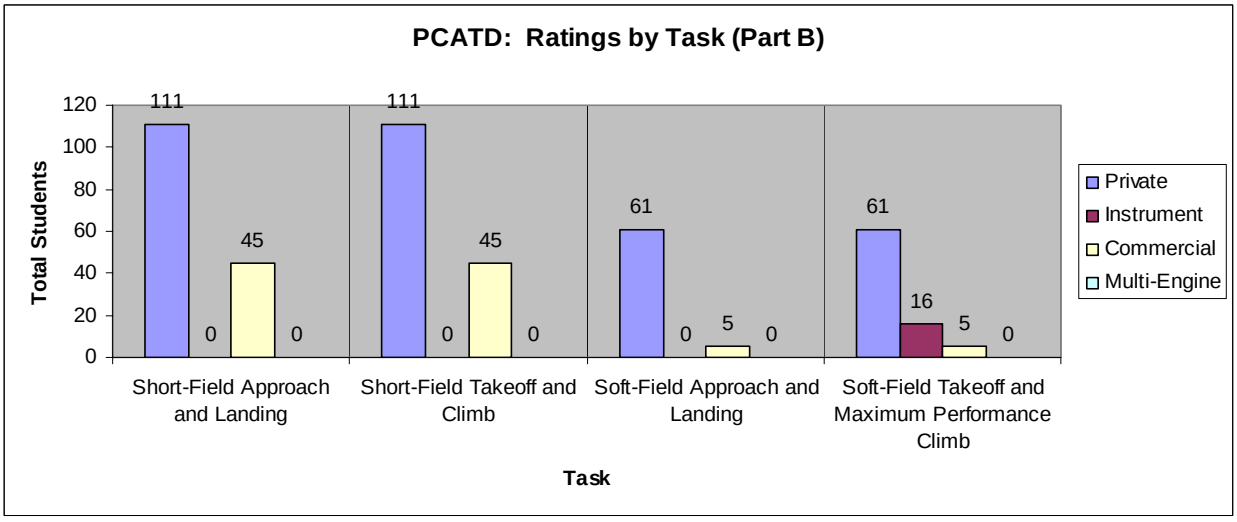


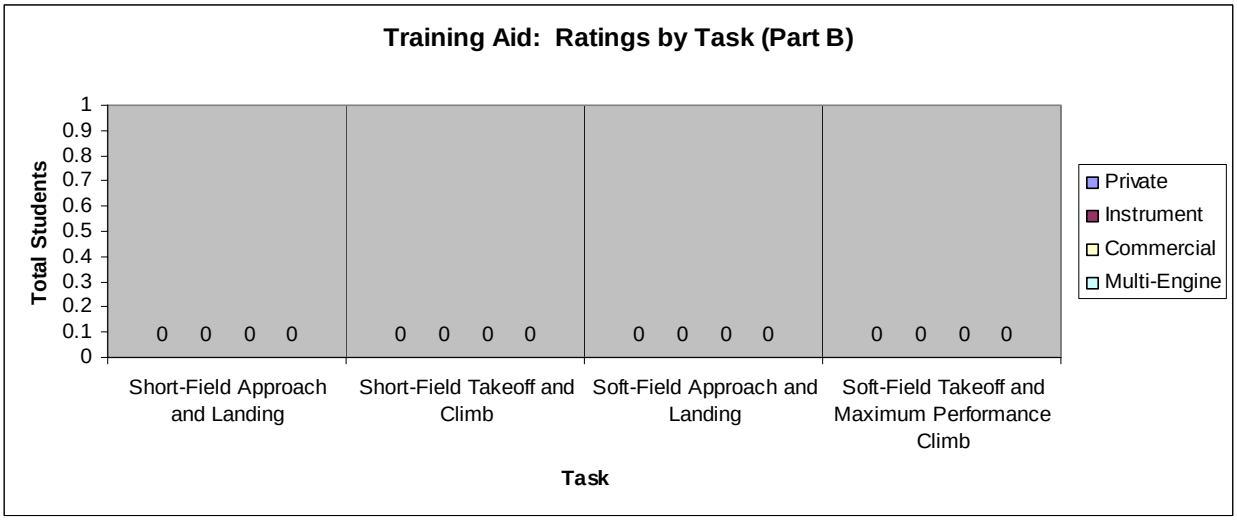


Area of Operation: Takeoff, Landings, and Go-Arounds- Tasks (cont.)

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.



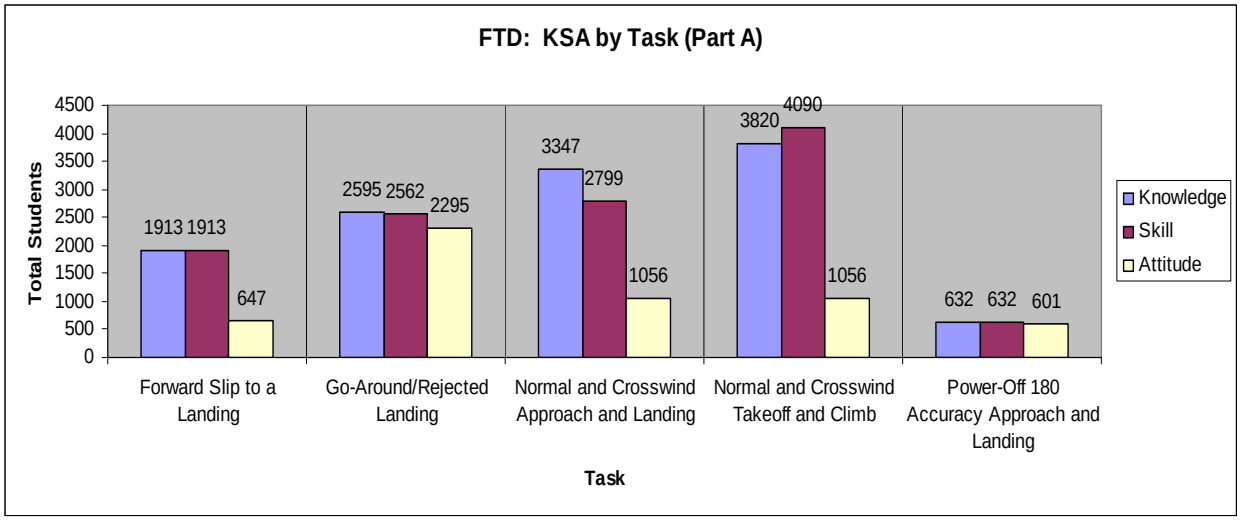


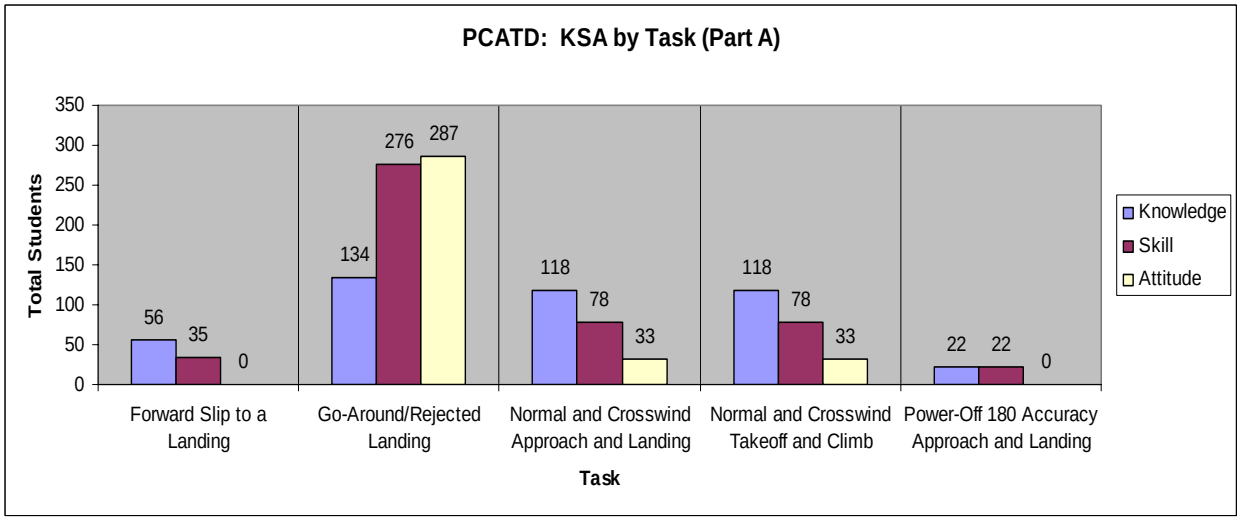


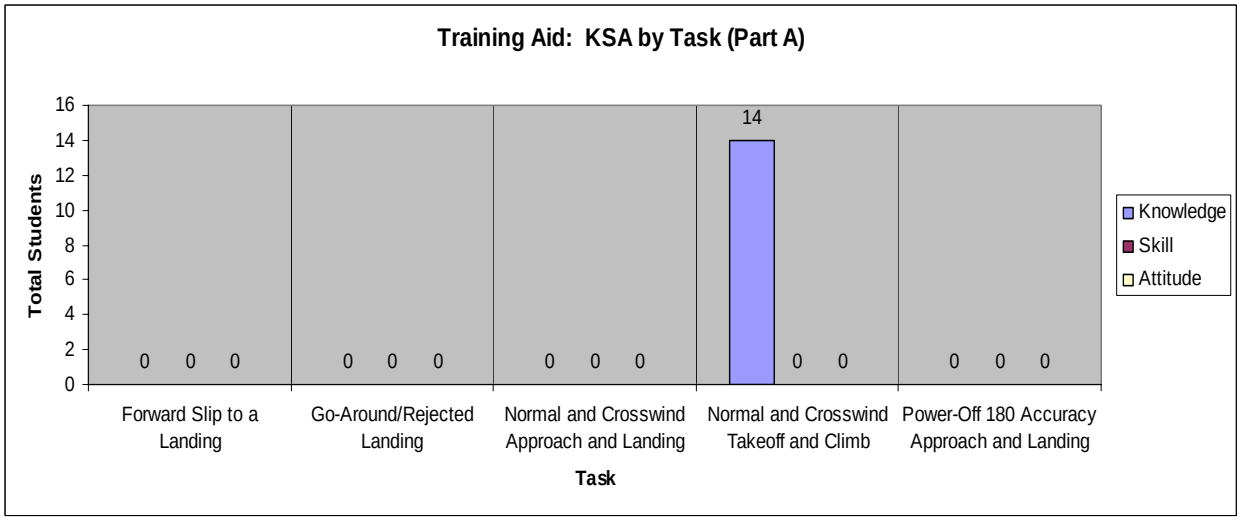
Area of Operation: Takeoffs, Landings, and Go-Arounds- KSAs

Total Enrollment: 9258

The tasks in this Area of Operation are divided into two charts.

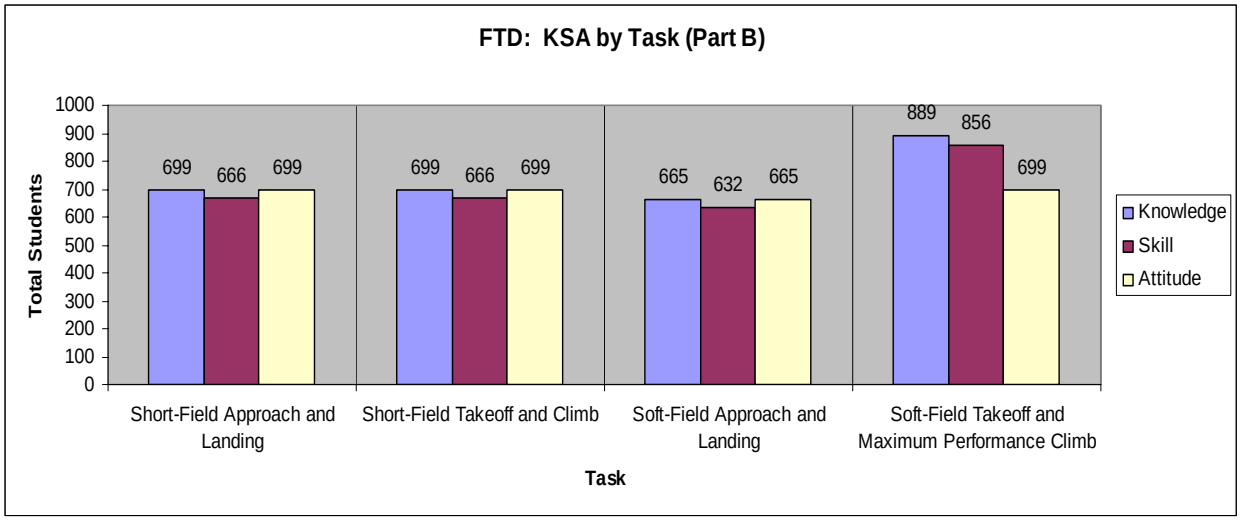


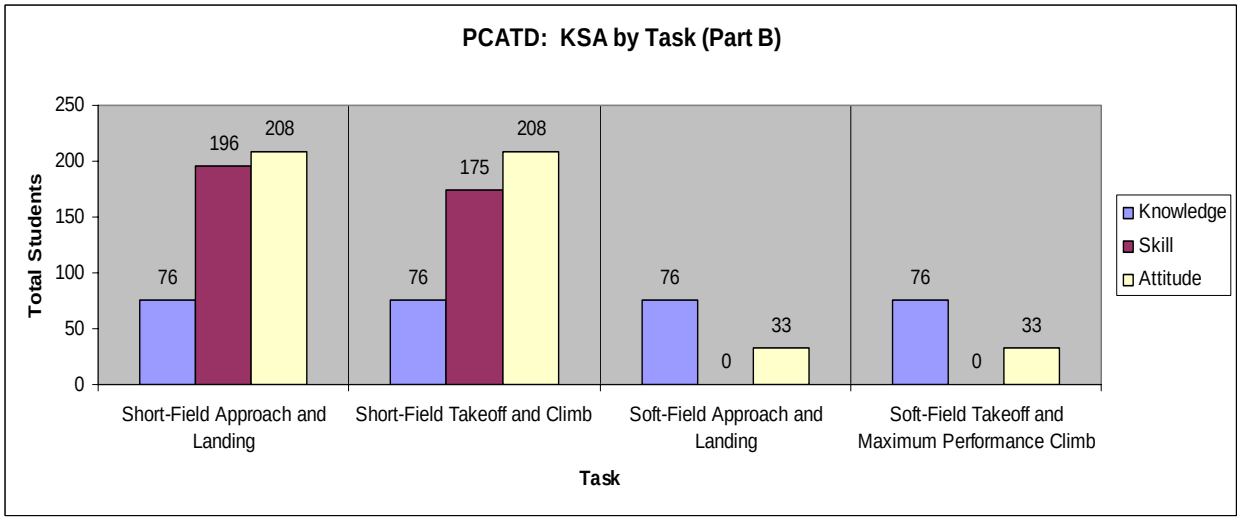


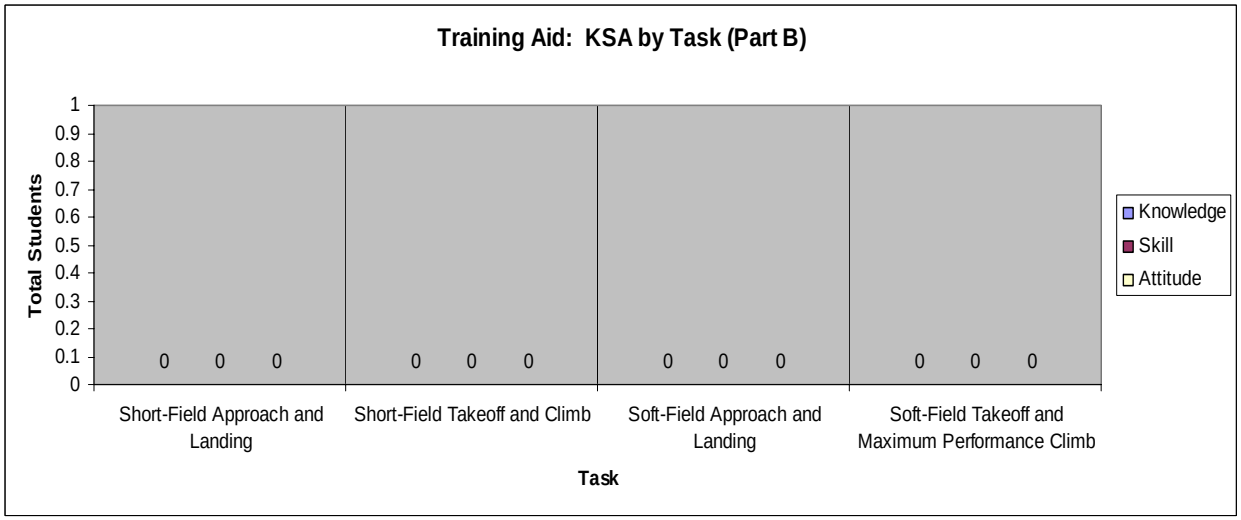


Area of Operation: Takeoffs, Landings, and Go-Arounds- KSAs (cont.)

Total Enrollment: 9258

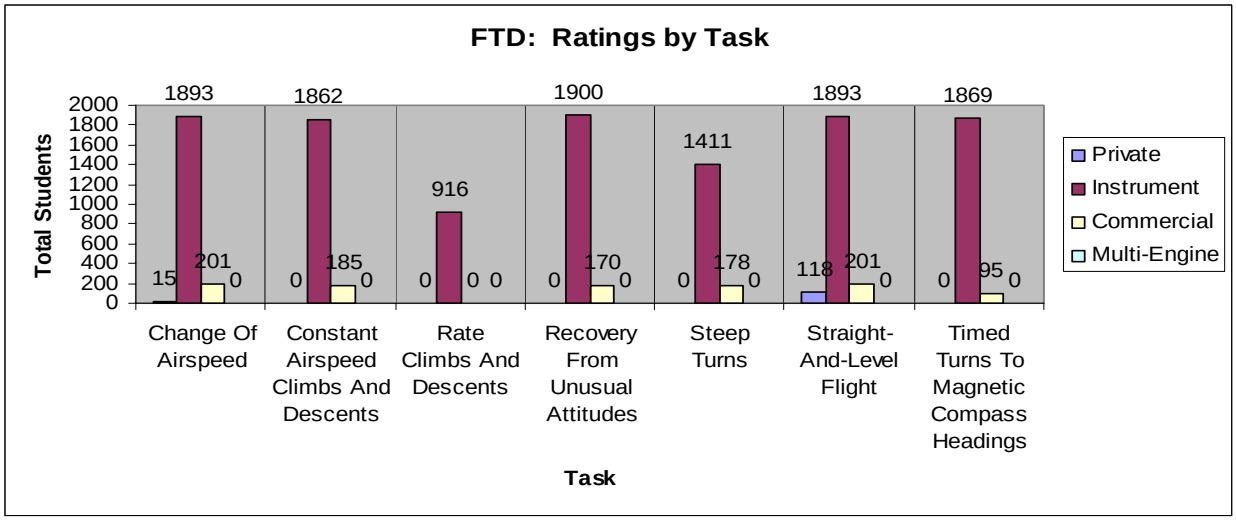


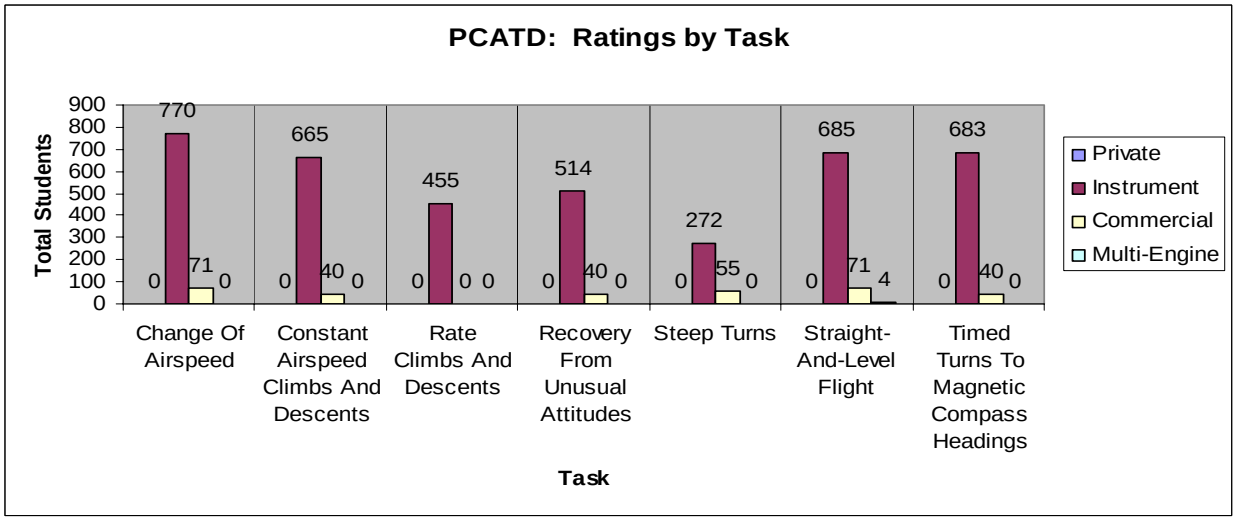


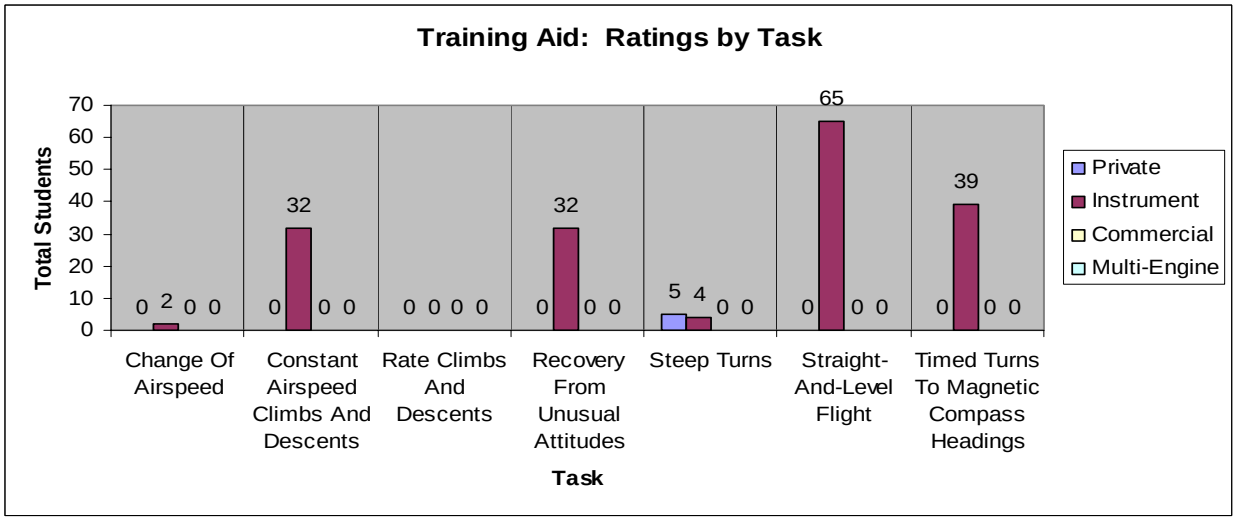


Area of Operation: Flight By Reference to Instruments- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

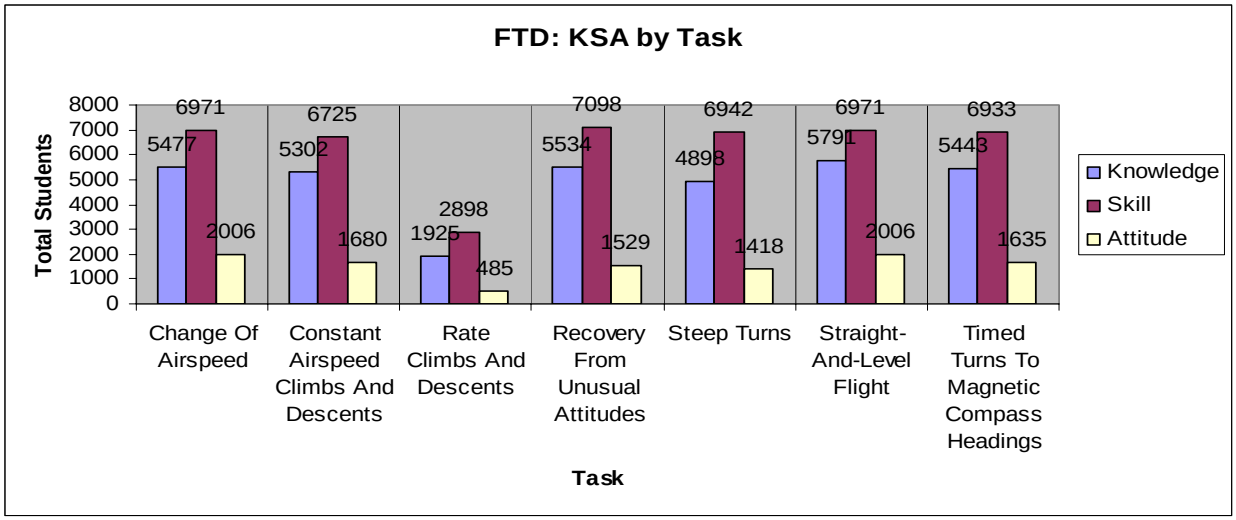


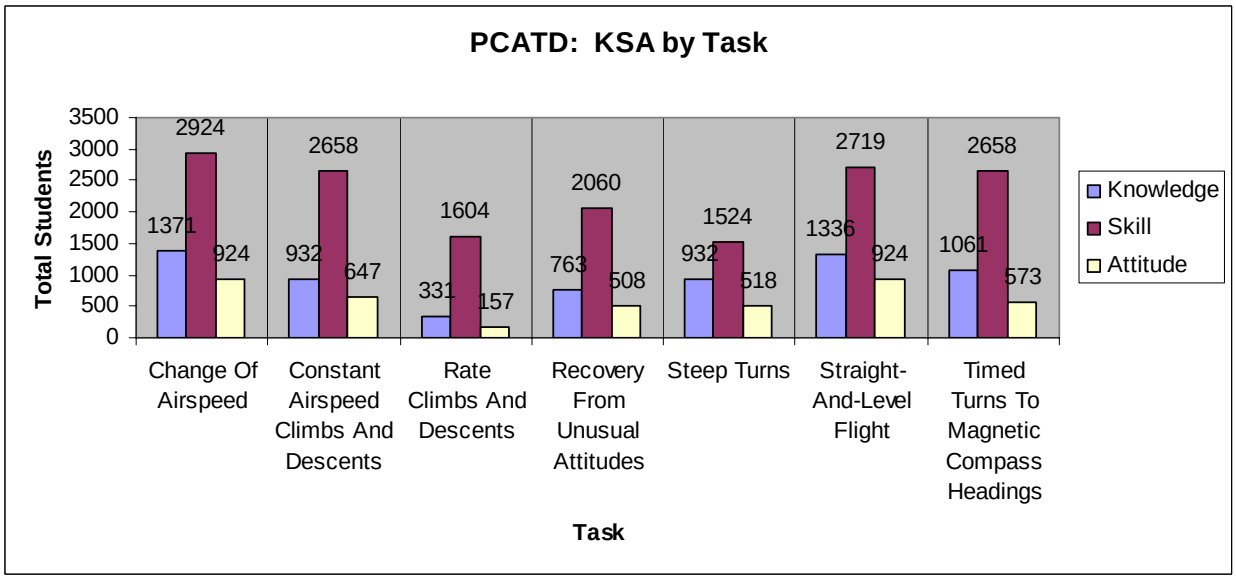


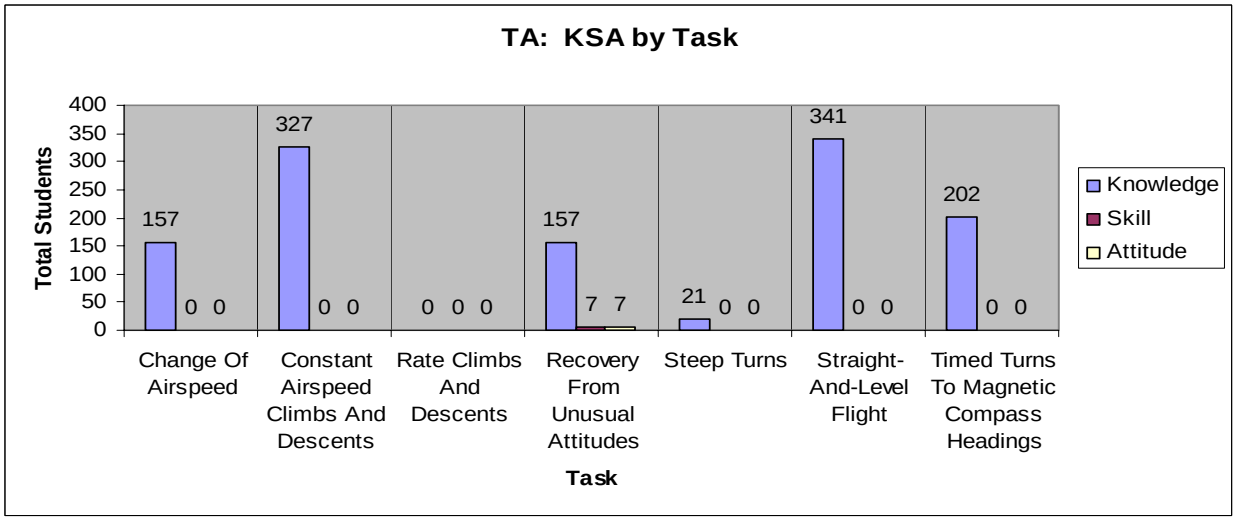


Area of Operation: Flight By Reference to Instruments- KSAs

Total Enrollment: 9258

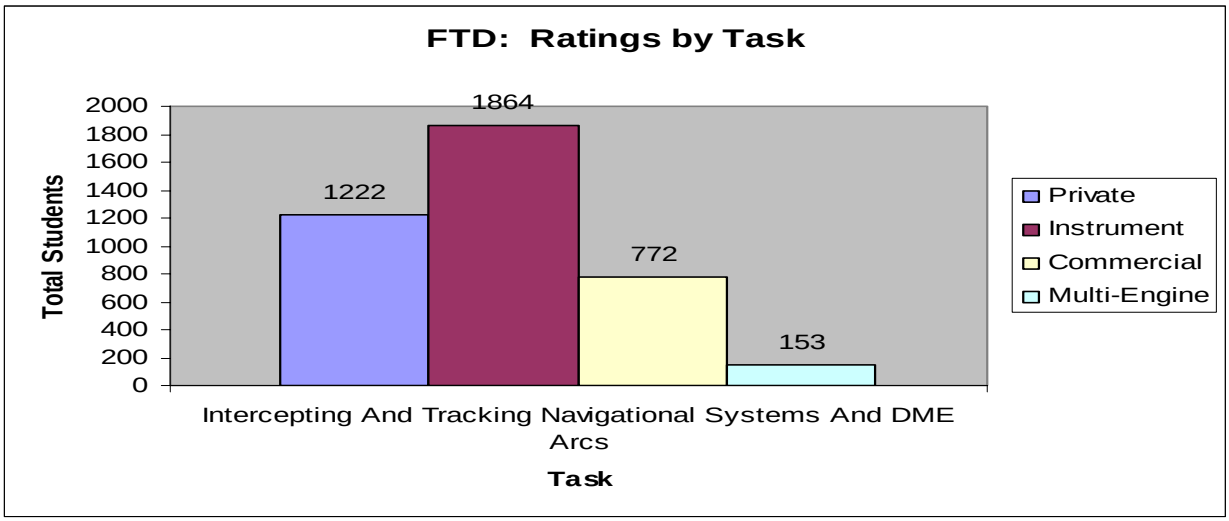


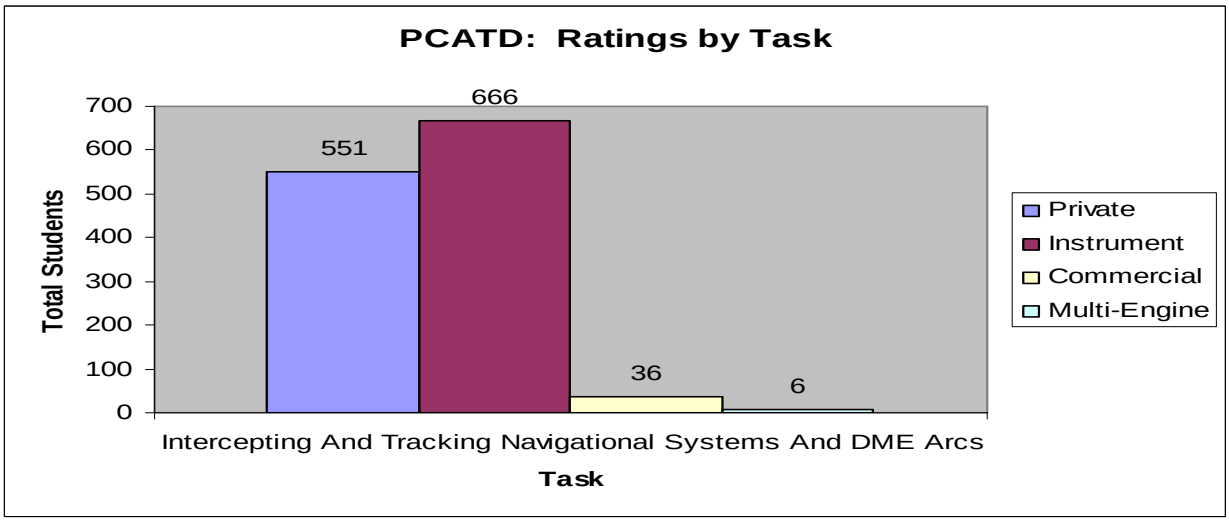


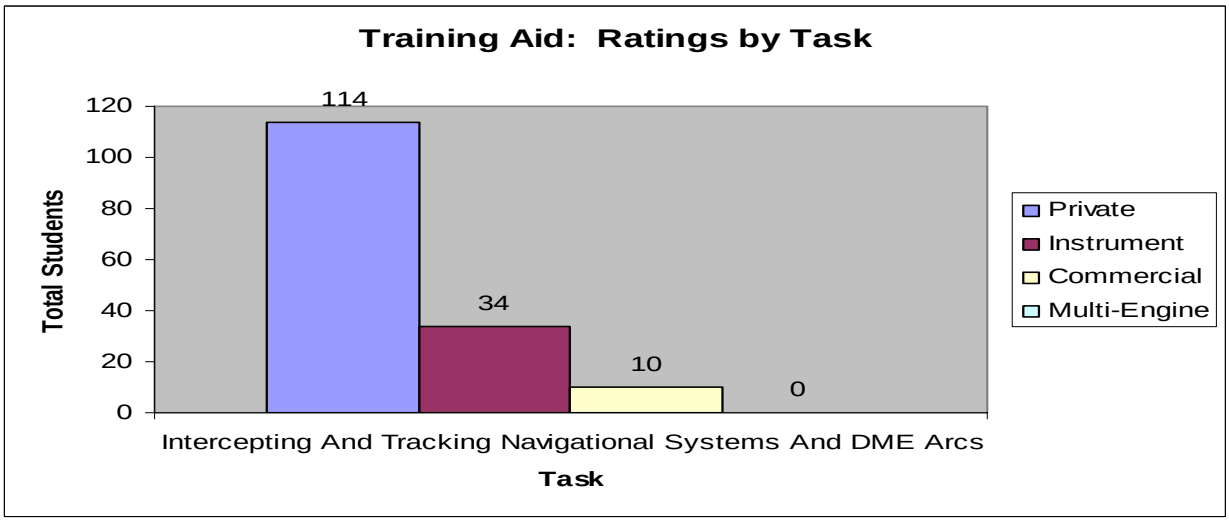


Area of Operation: Navigation Systems- Task

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

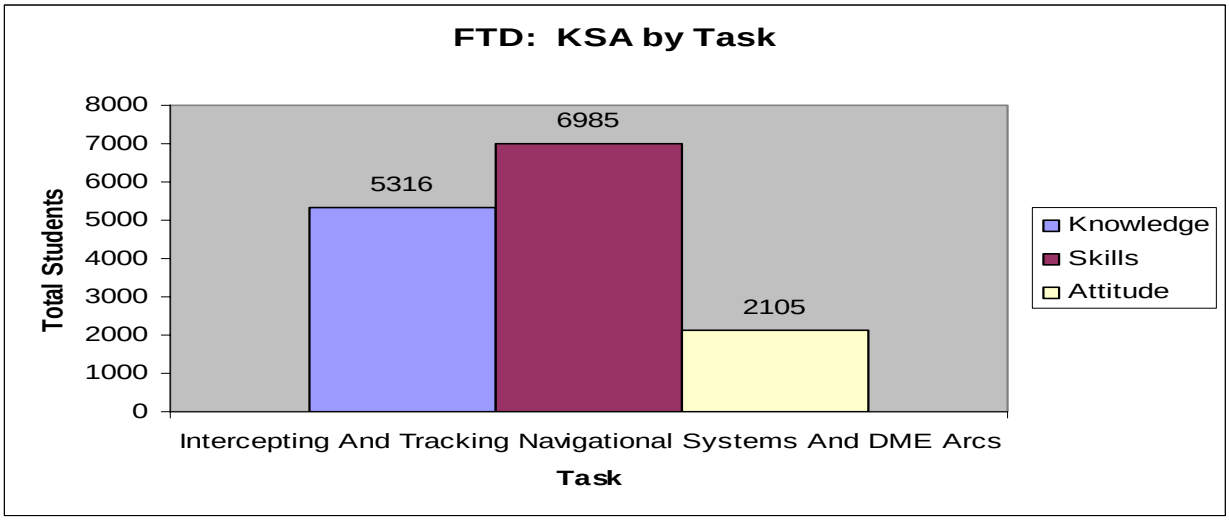


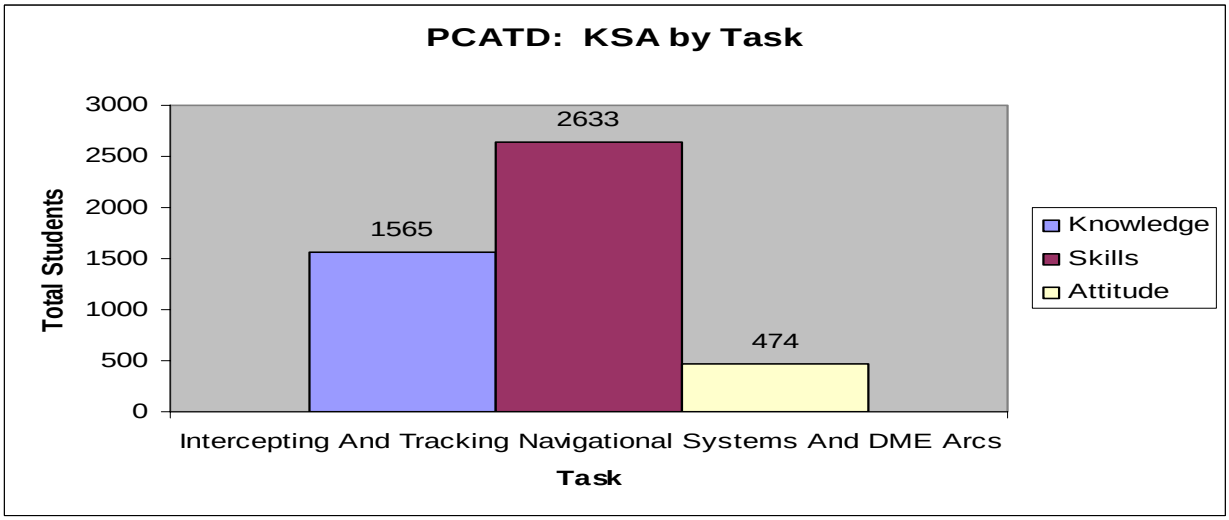


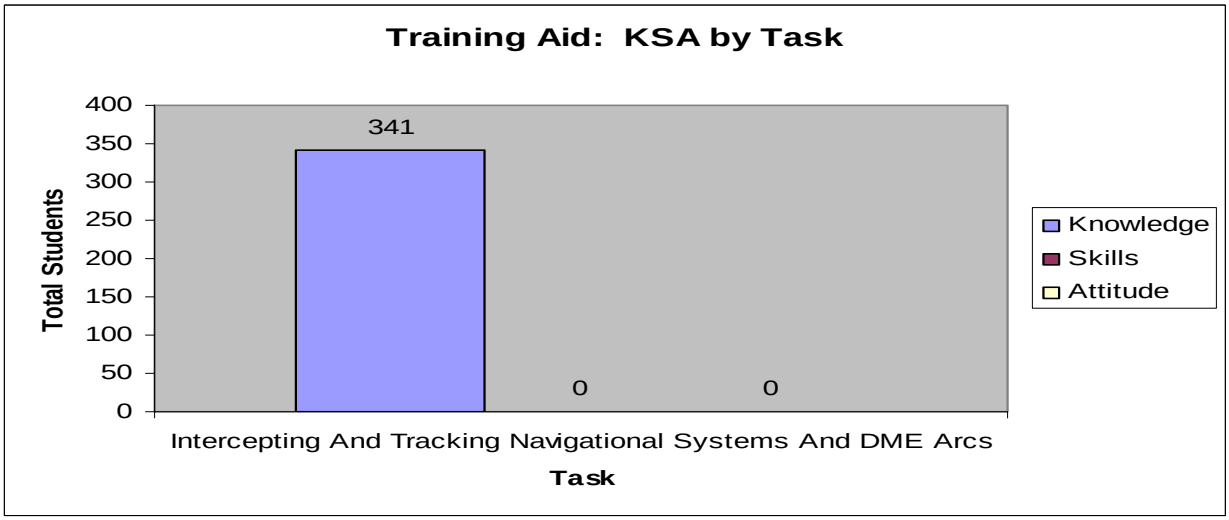


Area of Operation: Navigation Systems- KSAs

Total Enrollment: 9258

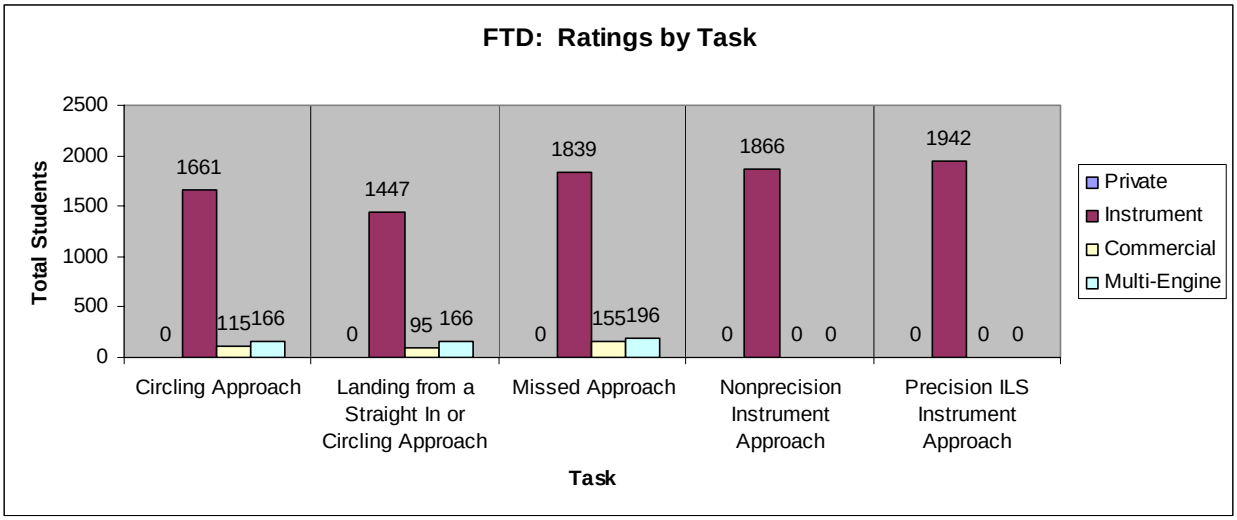


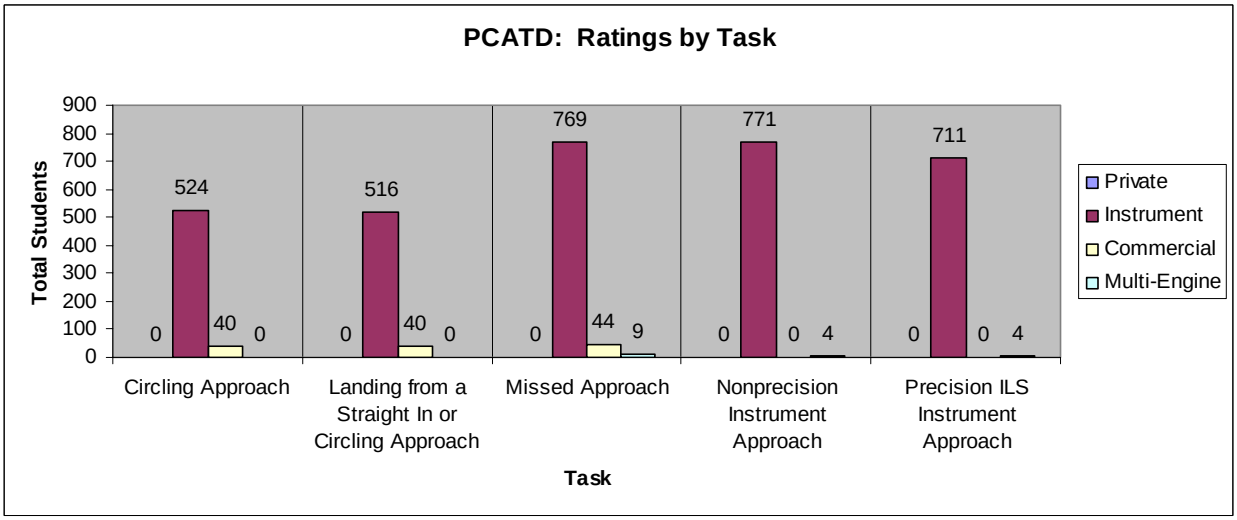


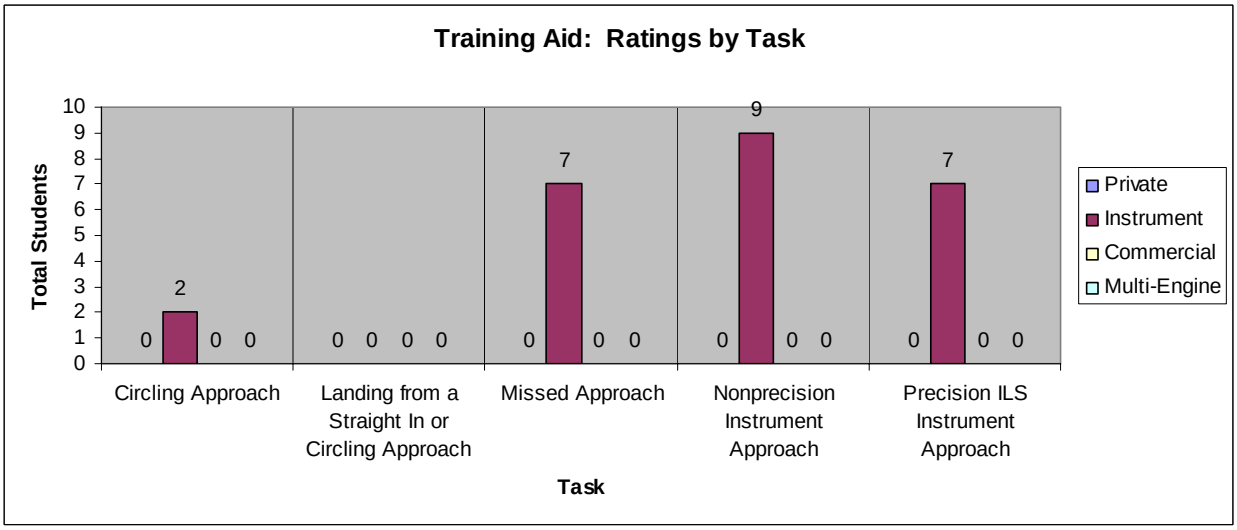


Area of Operation: Instrument Approach Procedures- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

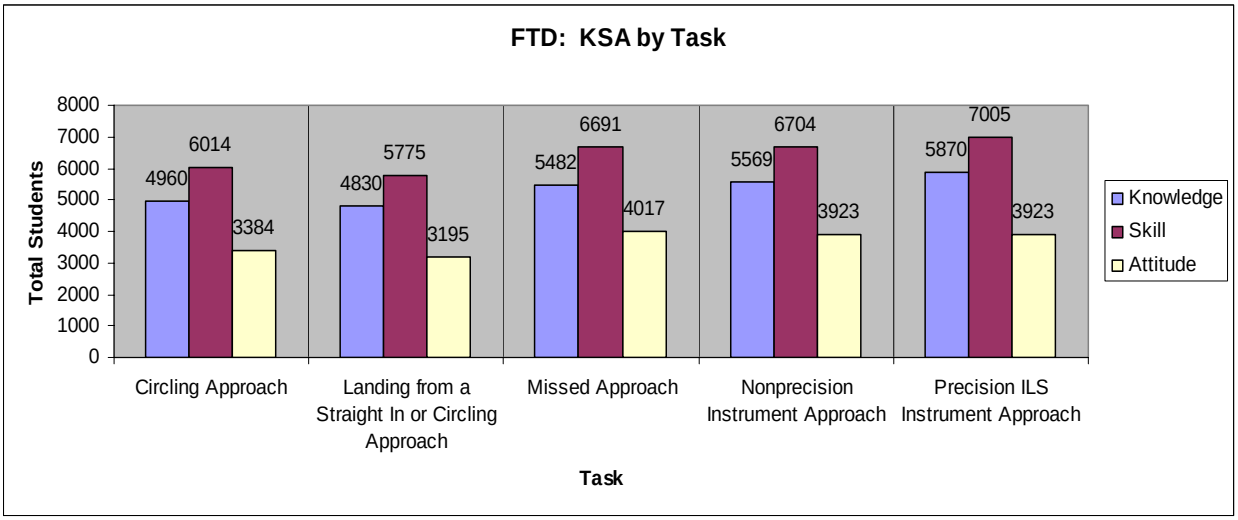


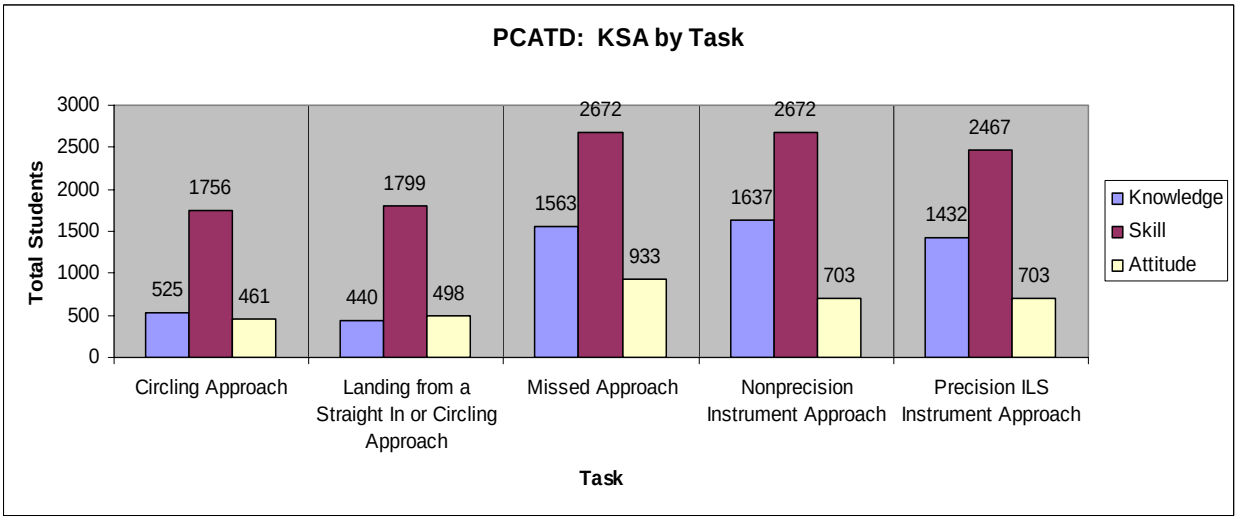


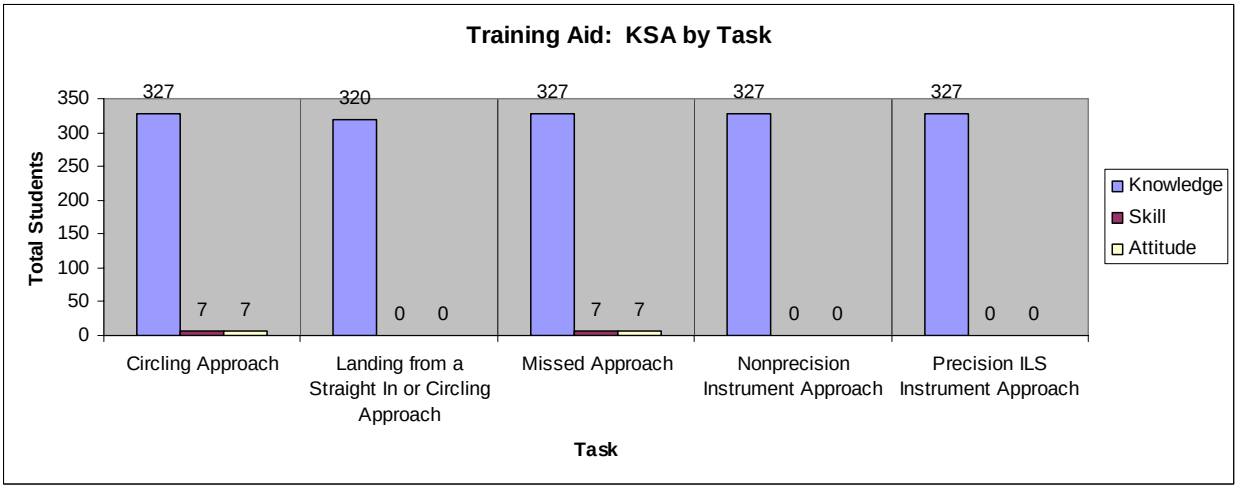


Area of Operation: Instrument Approach Procedures- KSAs

Total Enrollment: 9258

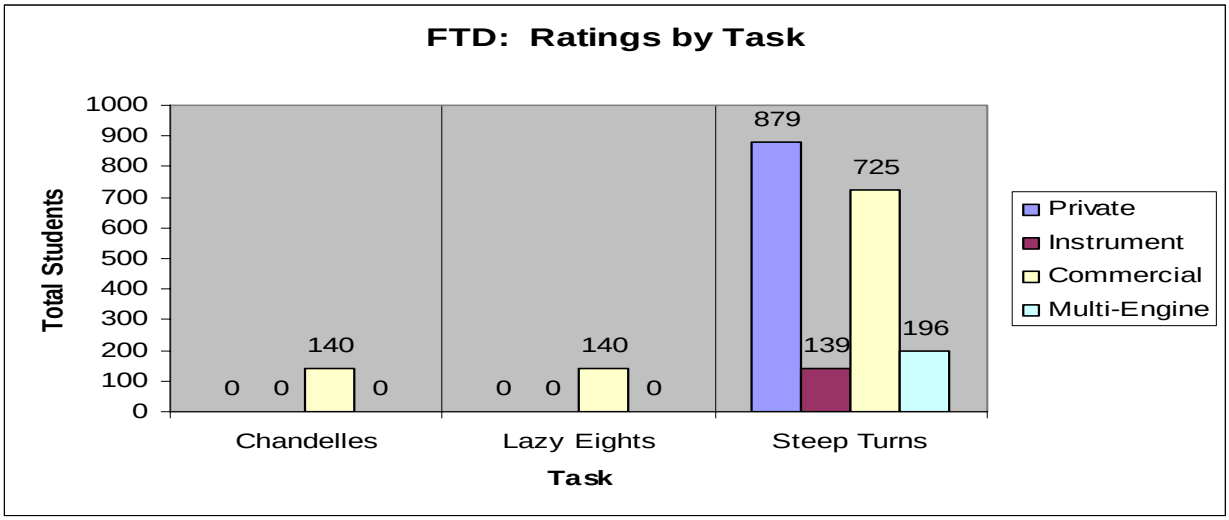


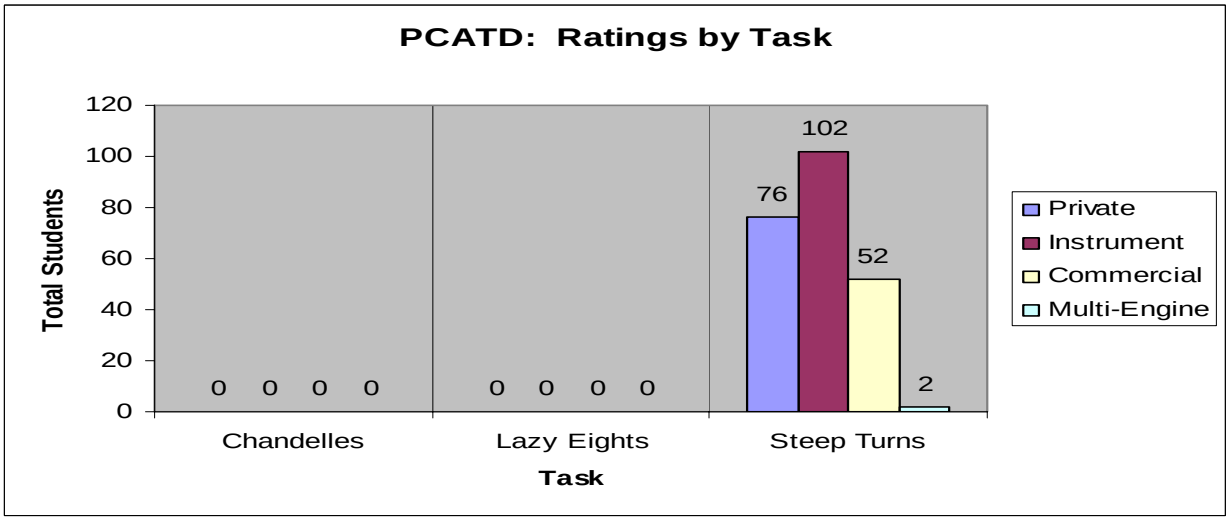


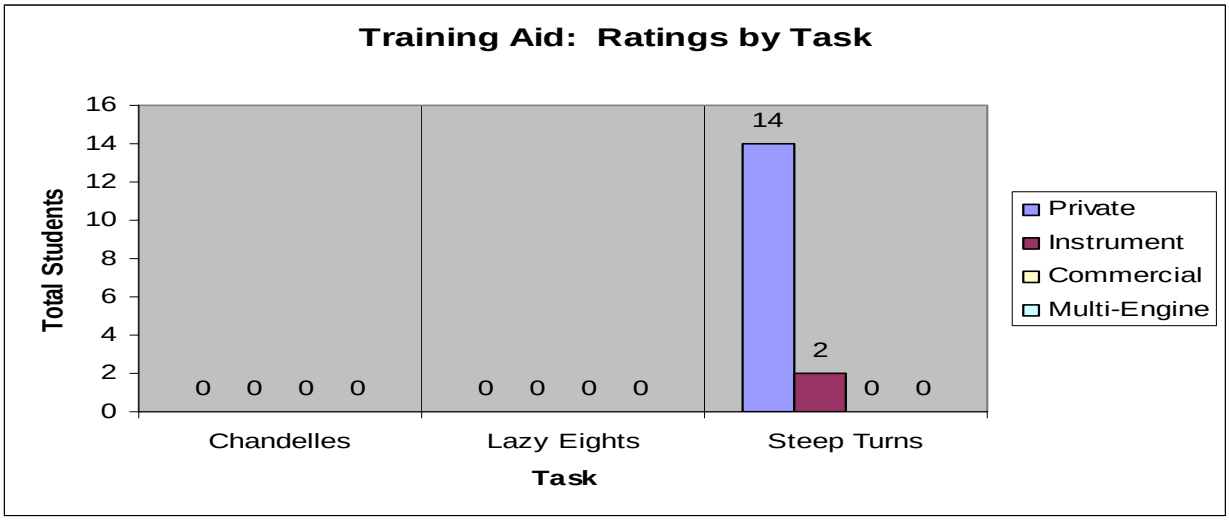


Area of Operation: Performance Maneuvers- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

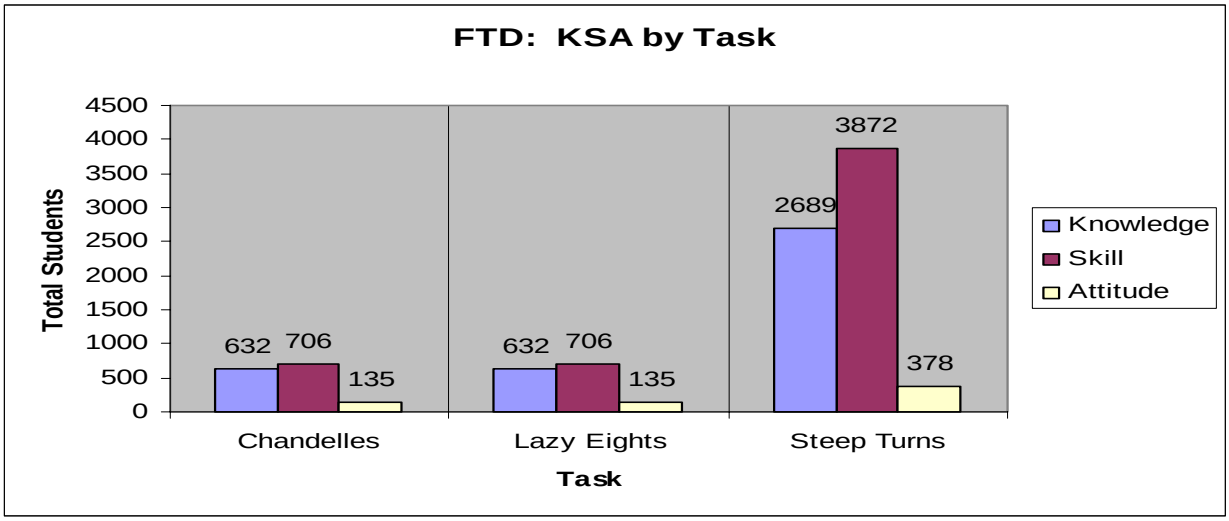


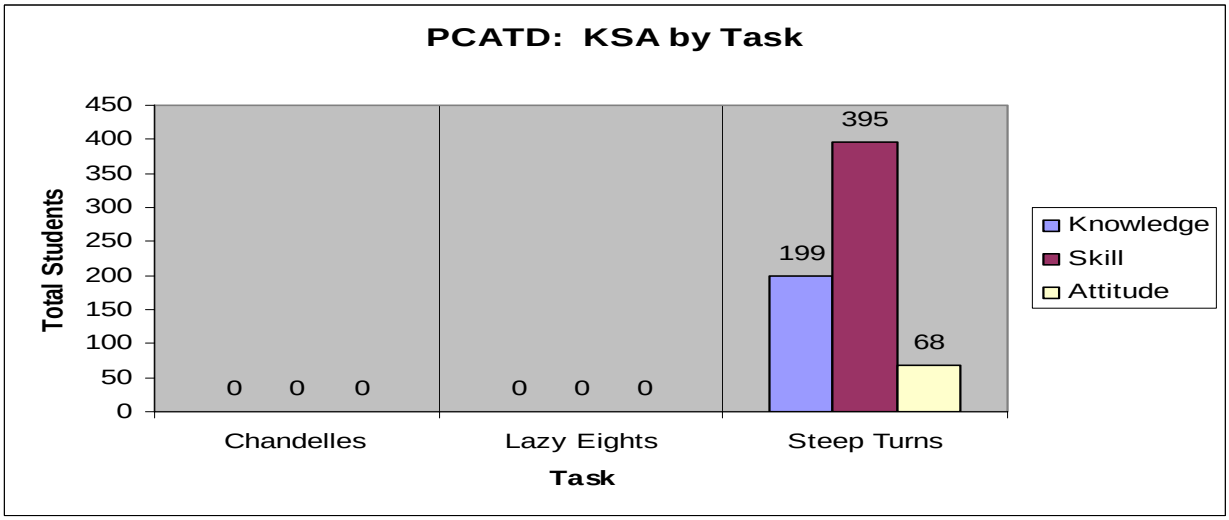


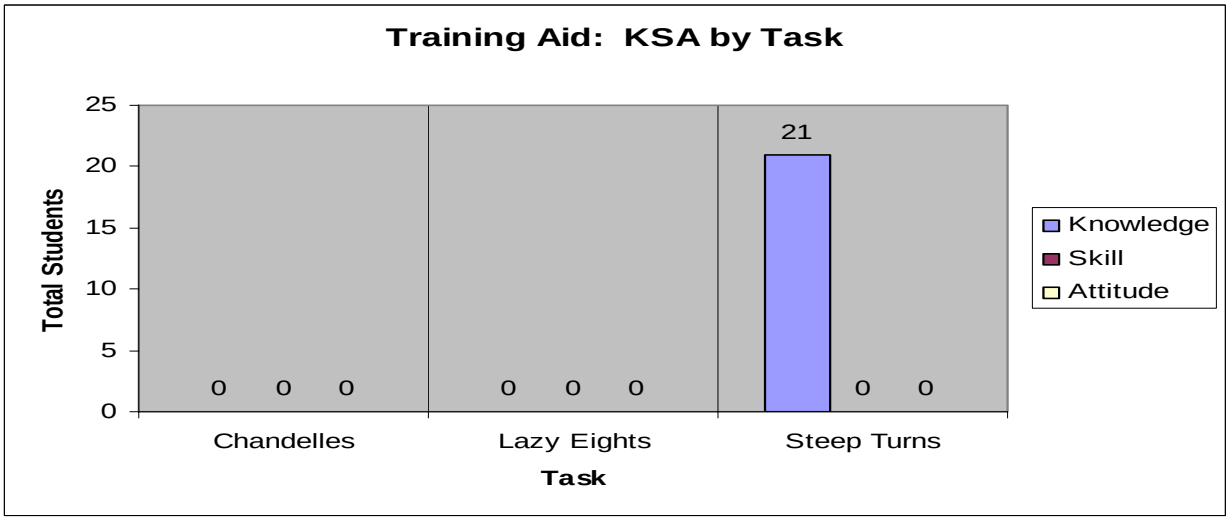


Area of Operation: Performance Maneuvers- KSAs

Total Enrollment: 9258

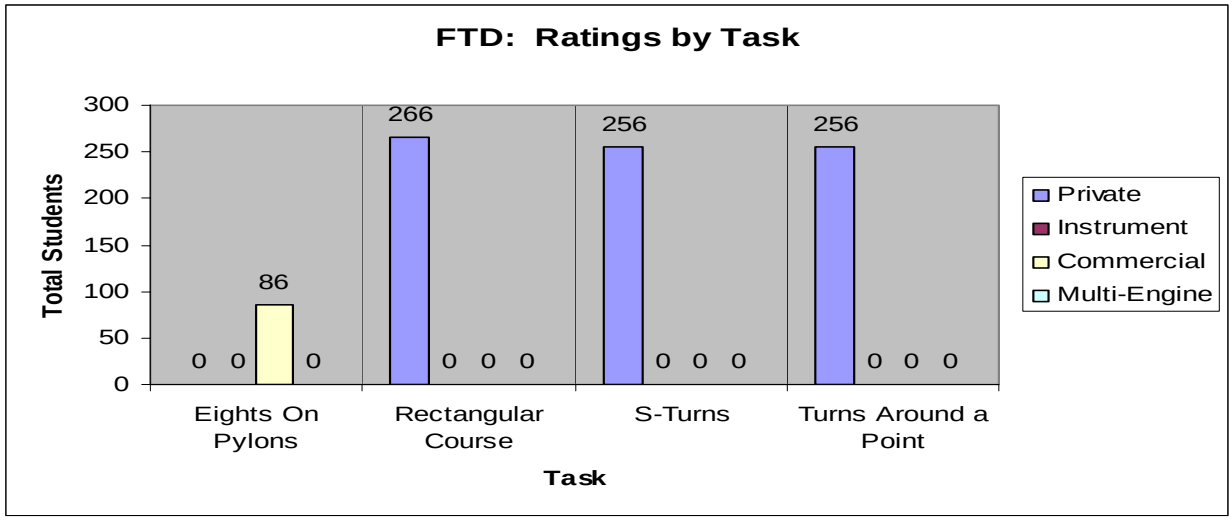


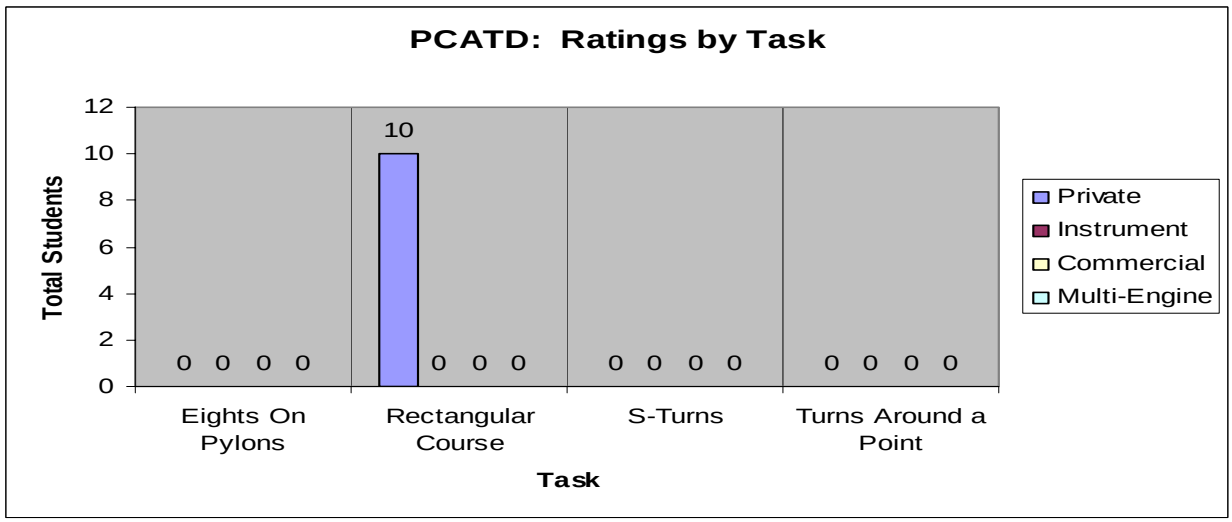


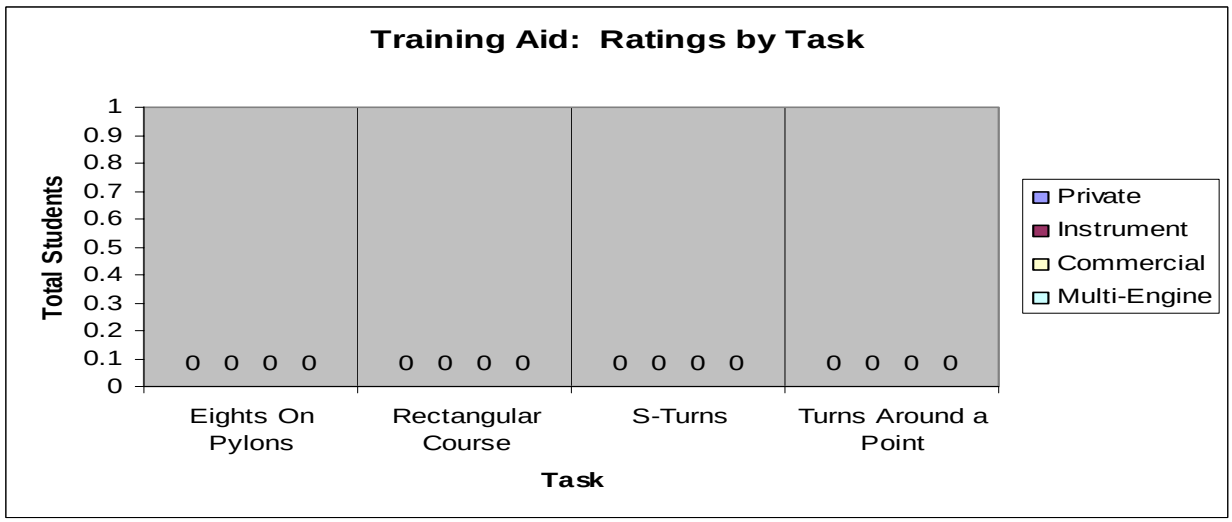


Area of Operation: Ground Reference Maneuvers- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

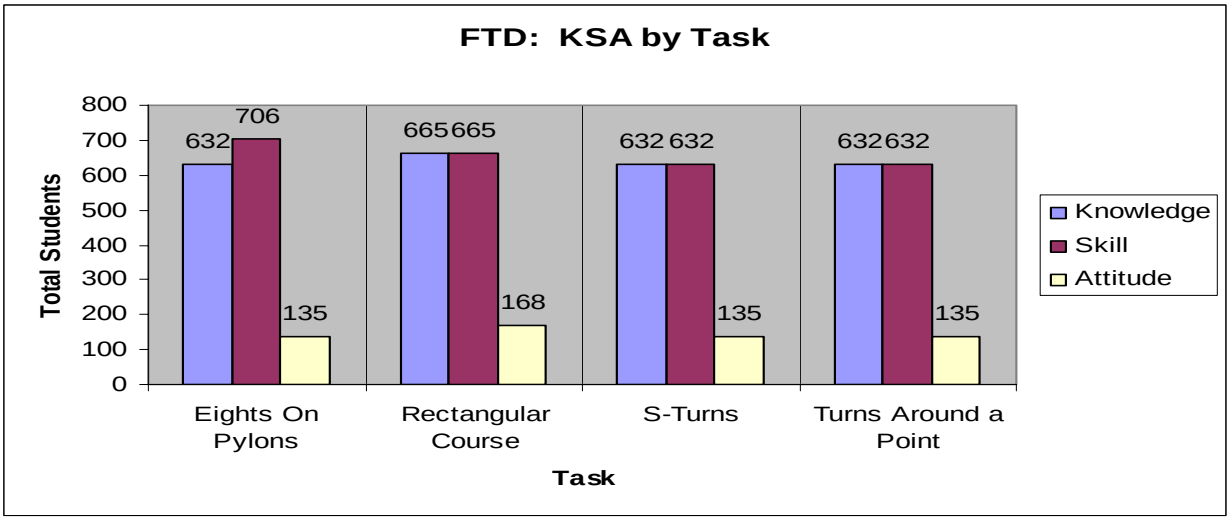


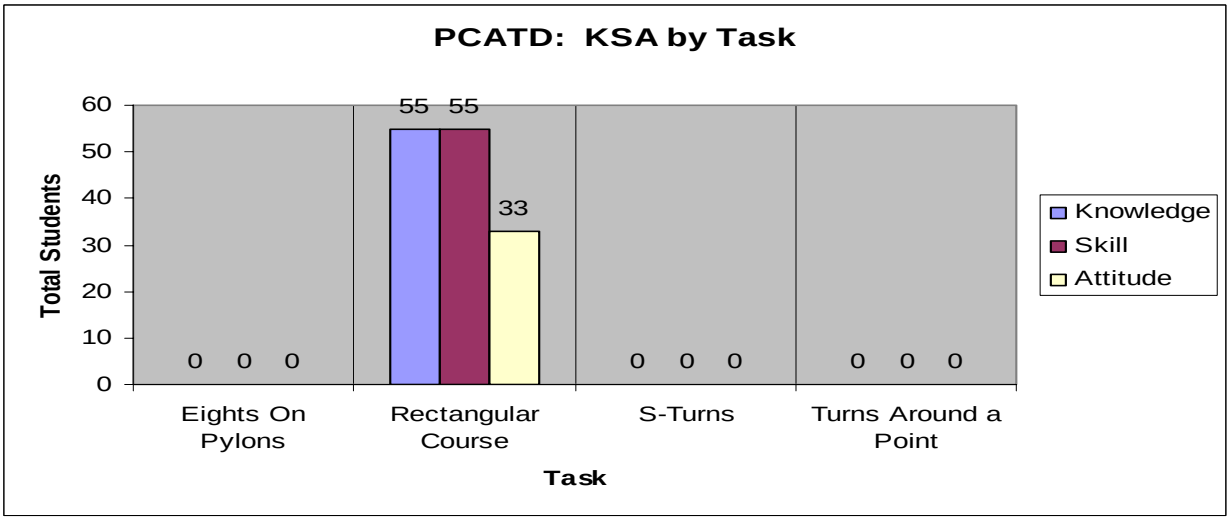


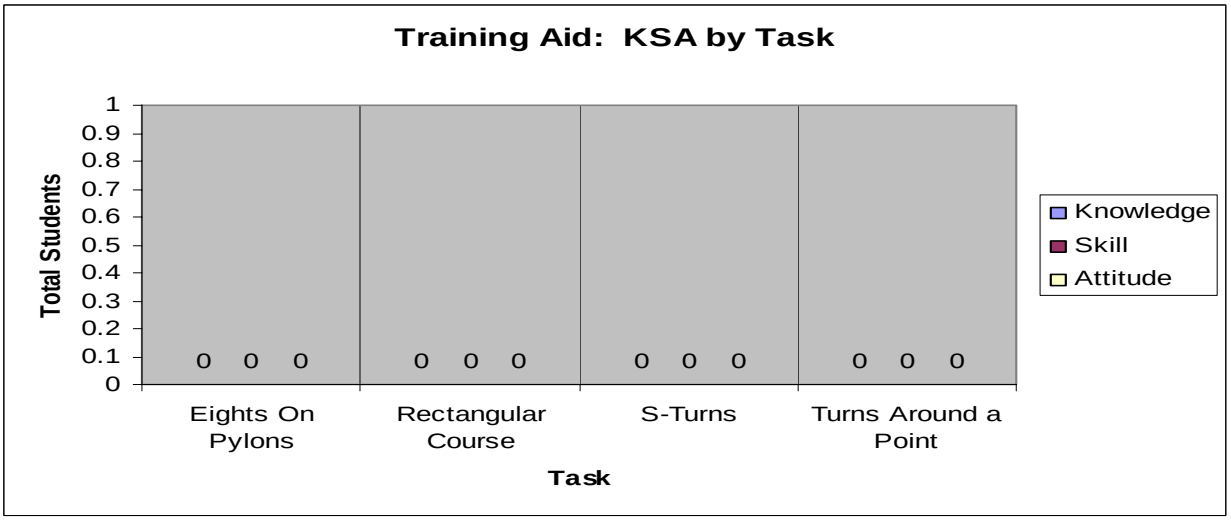


Area of Operation: Ground Reference Maneuvers- KSAs

Total Enrollment: 9258

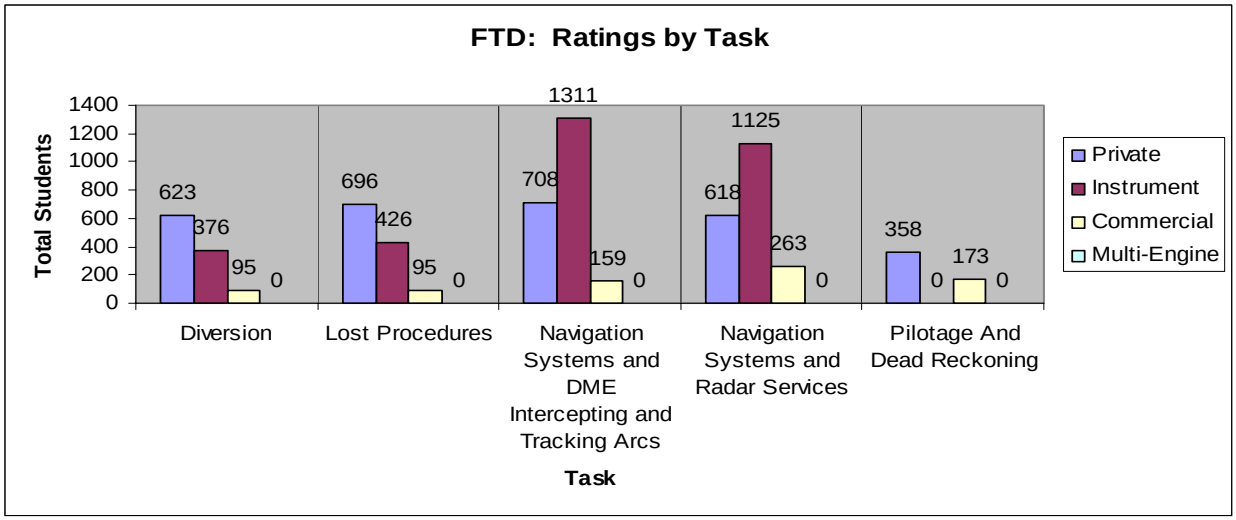


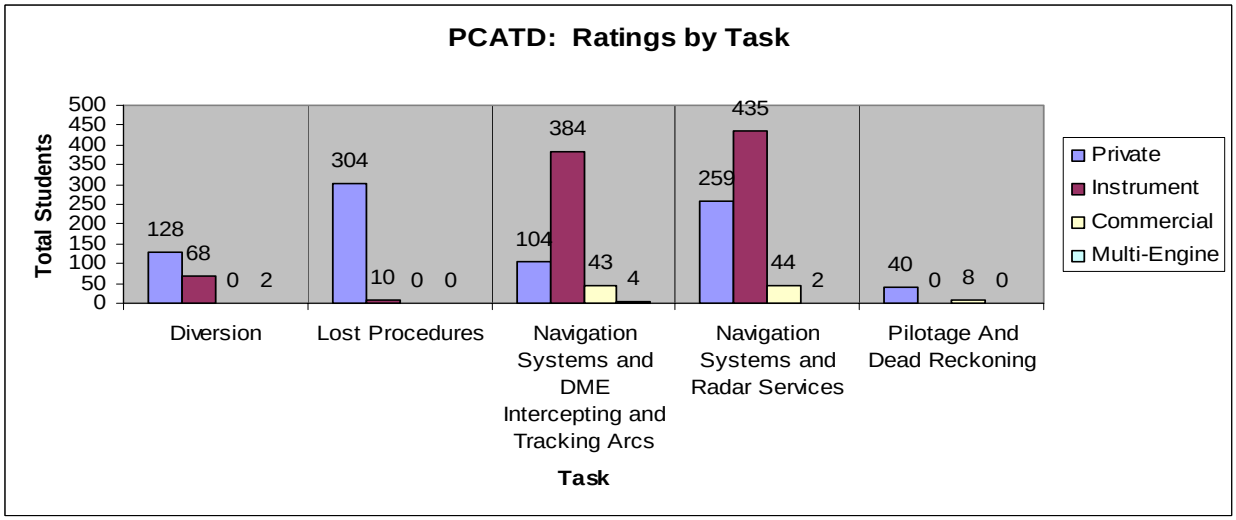


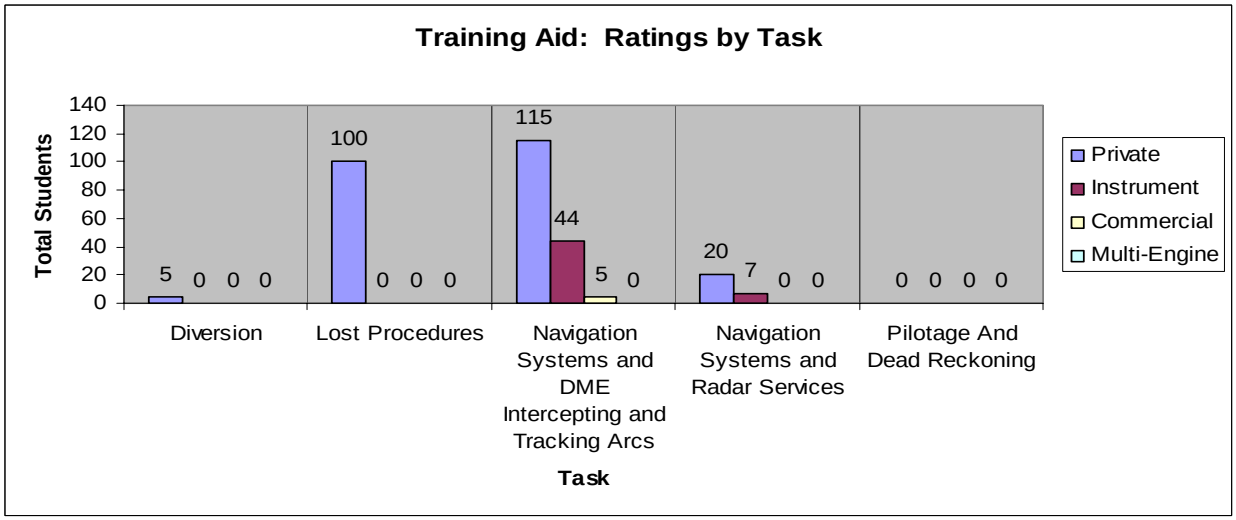


Area of Operation: Navigation- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

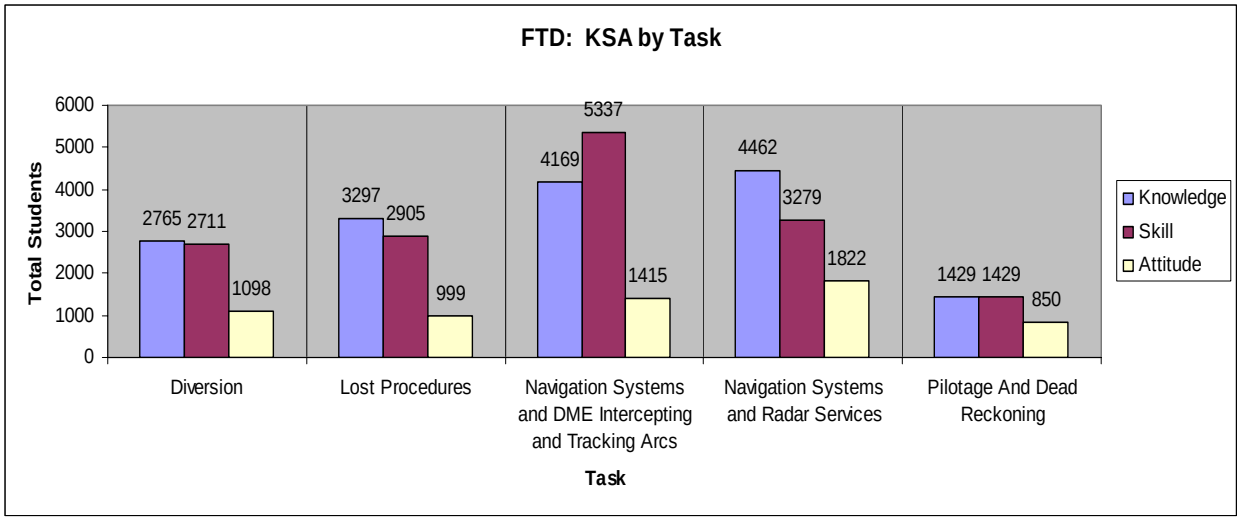


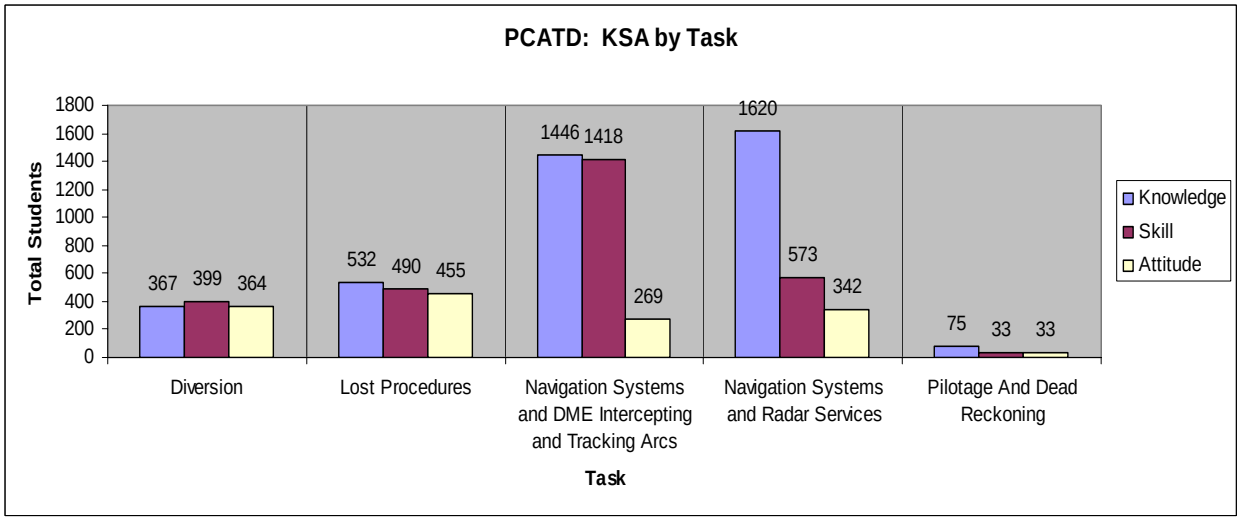


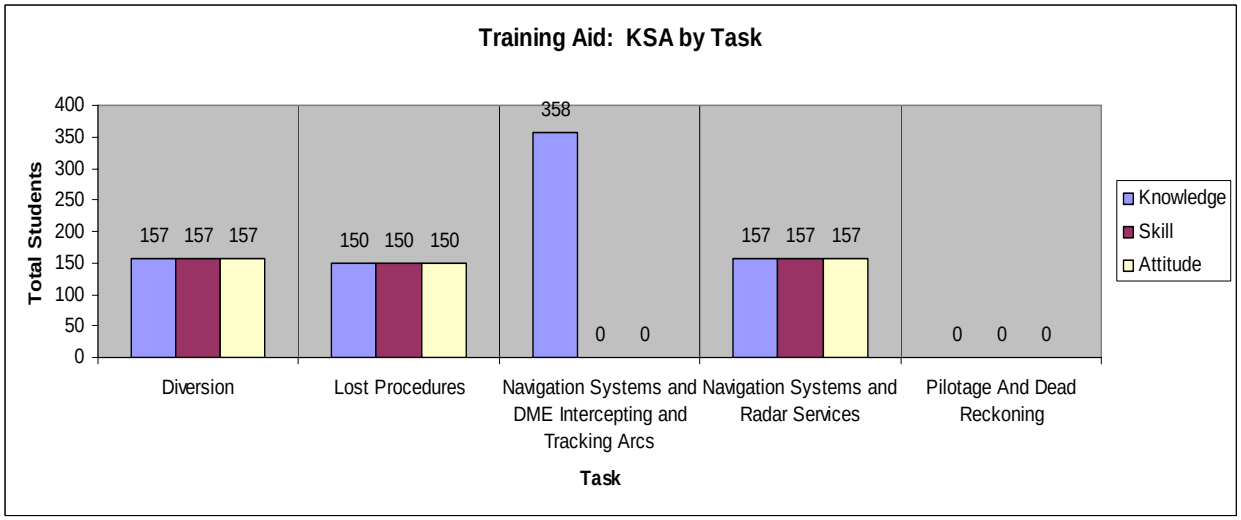


Area of Operation: Navigation- KSAs

Total Enrollment: 9258

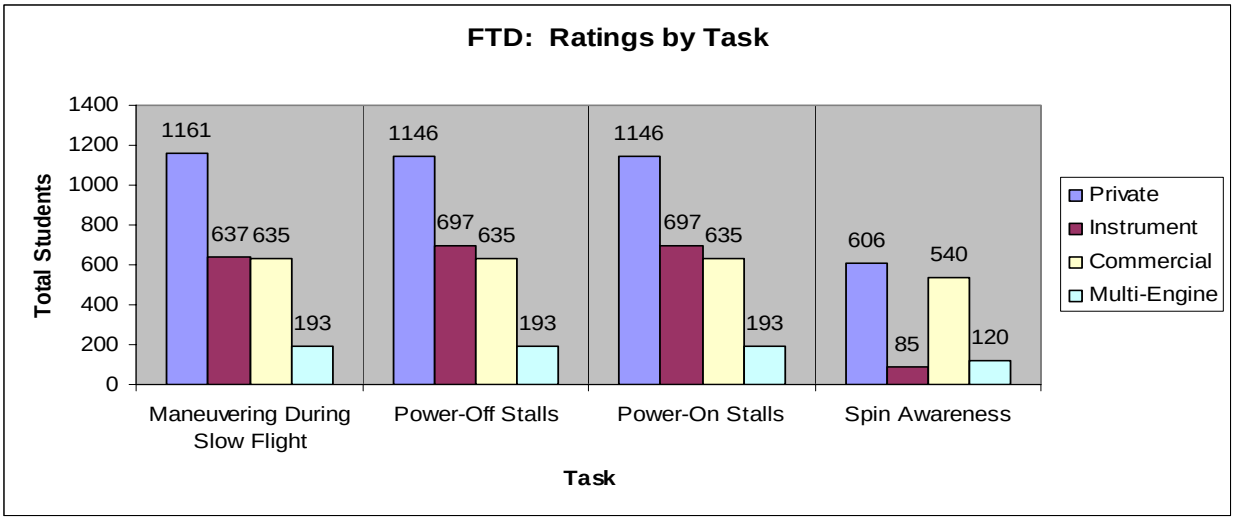


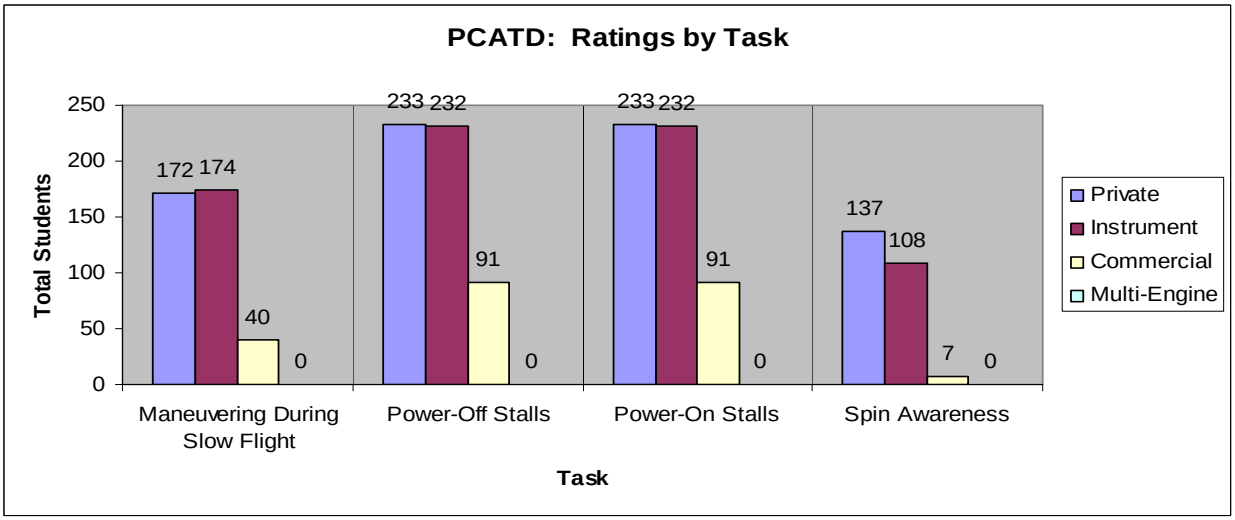


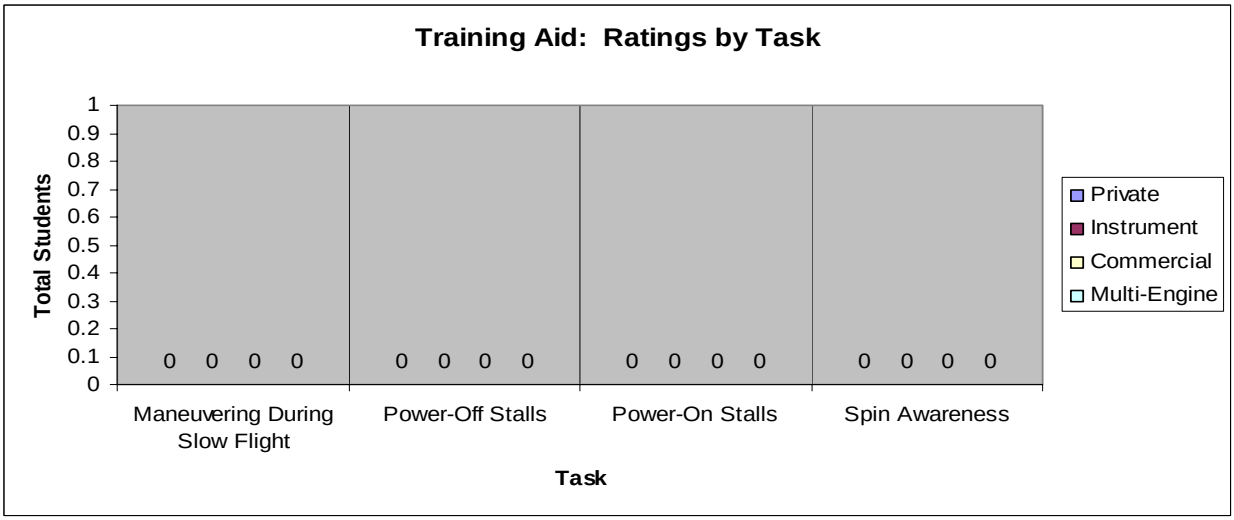


Area of Operation: - Slow Flight and Stalls- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

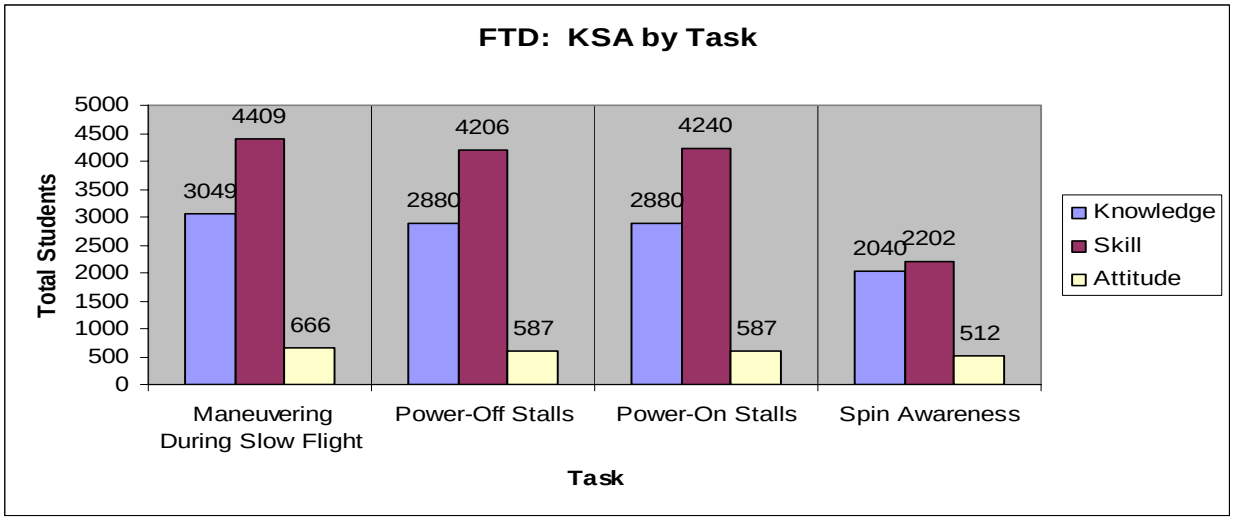


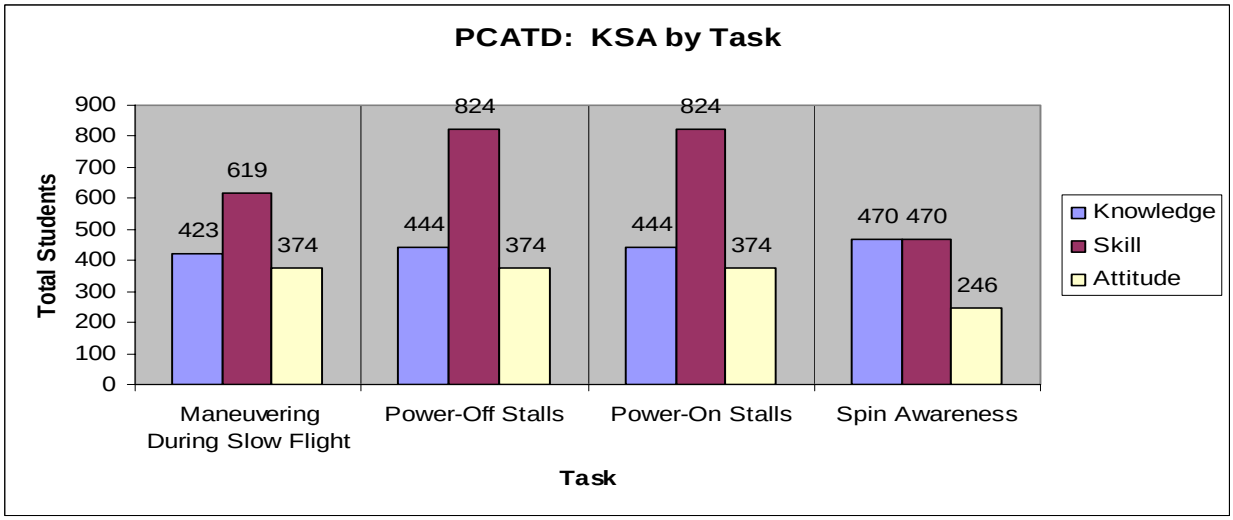


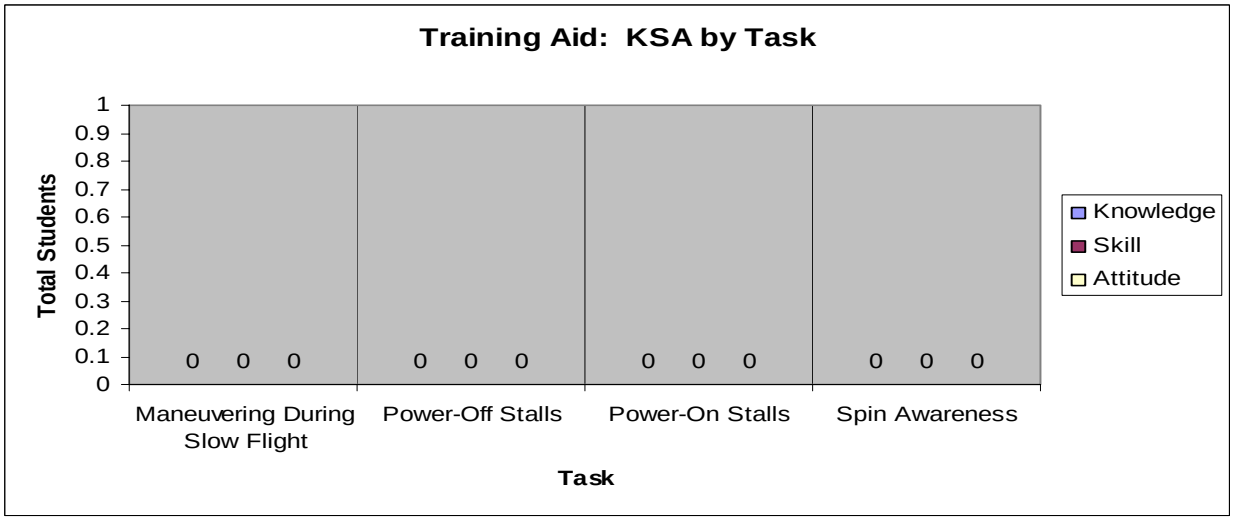


Area of Operation: Slow Flight and Stalls- KSAs

Total Enrollment: 9258

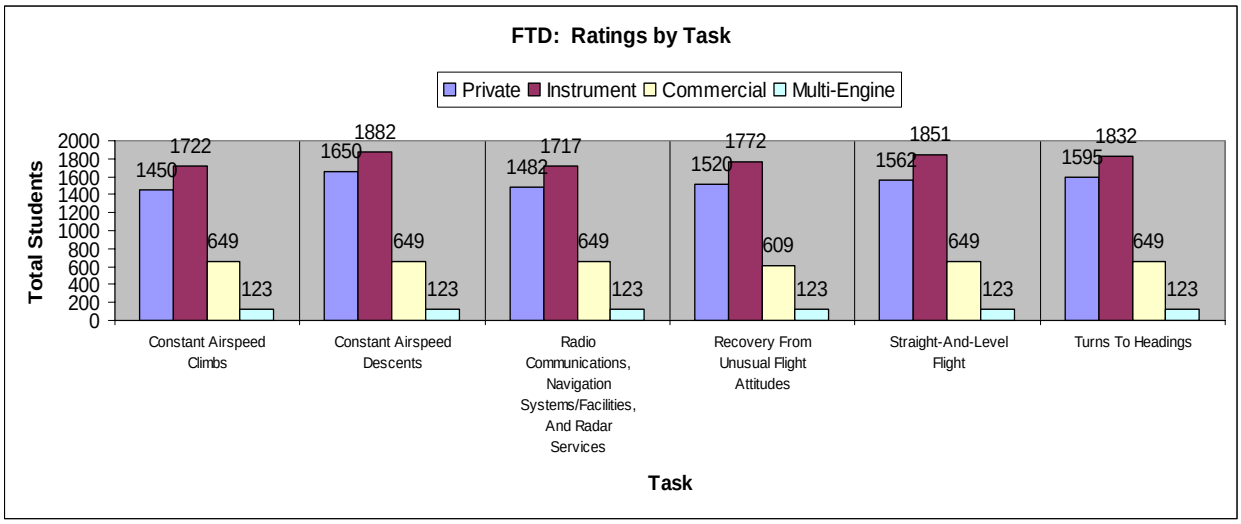


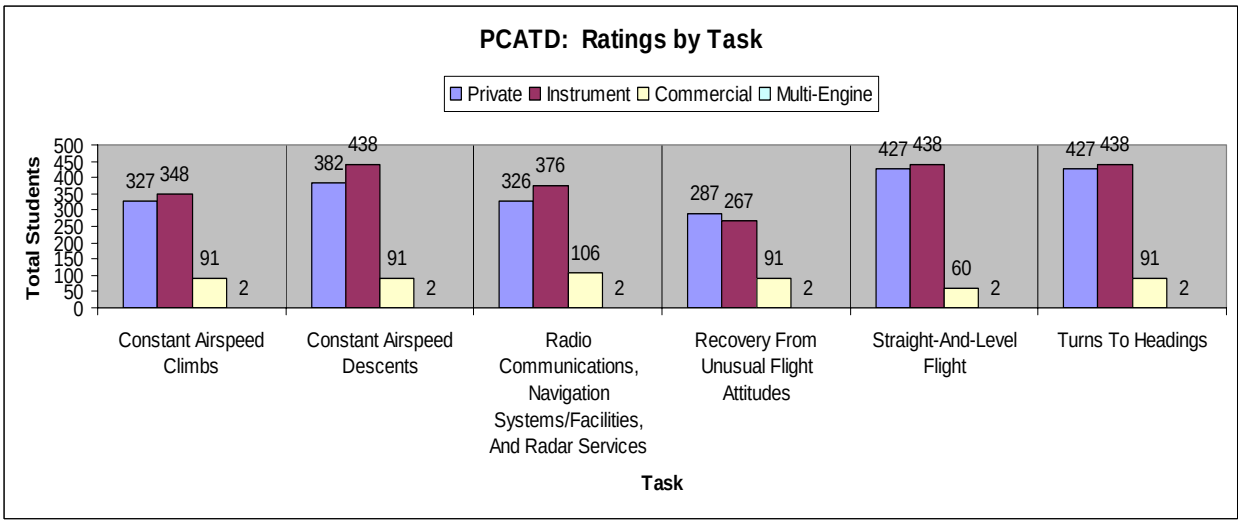


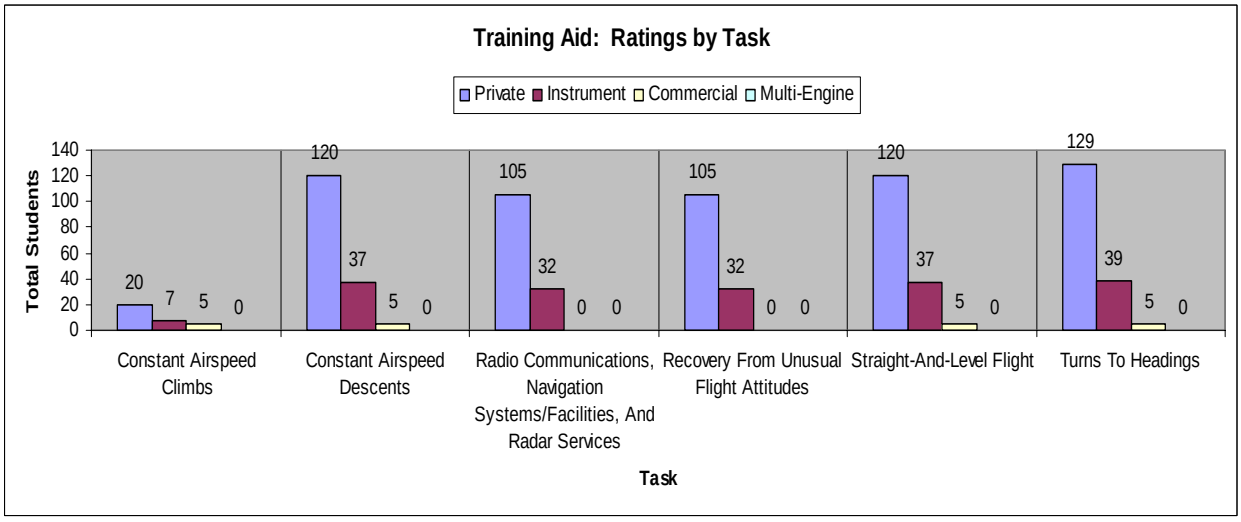


Area of Operation: Basic Instrument Maneuvers- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

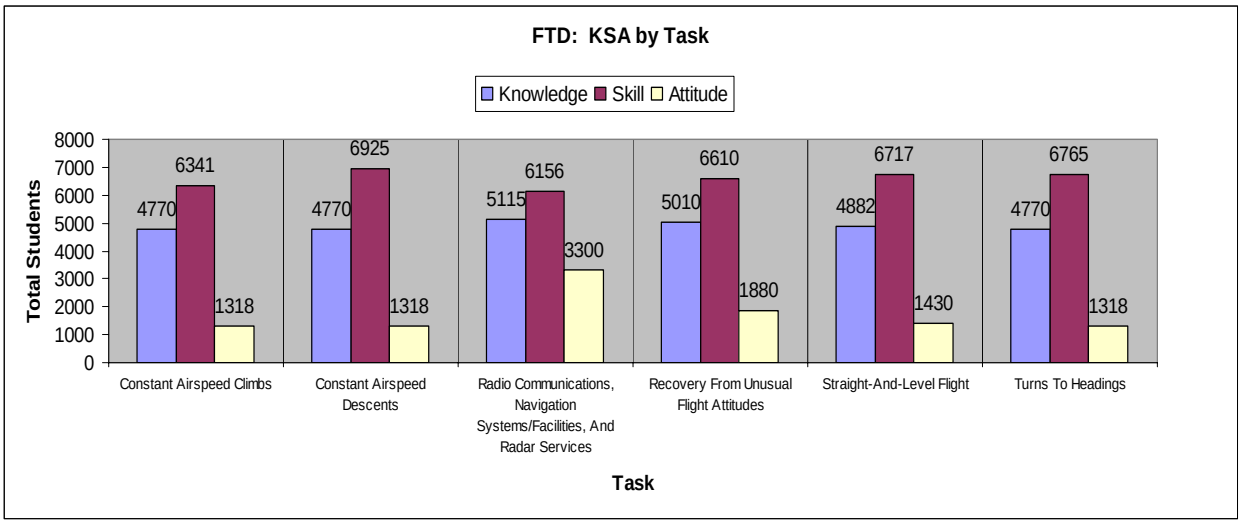


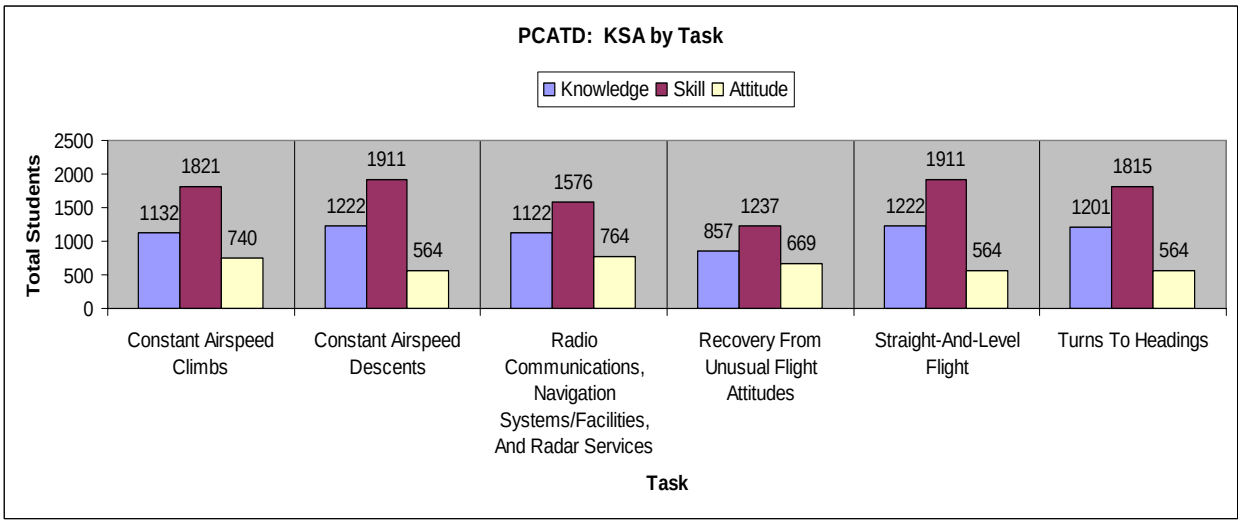


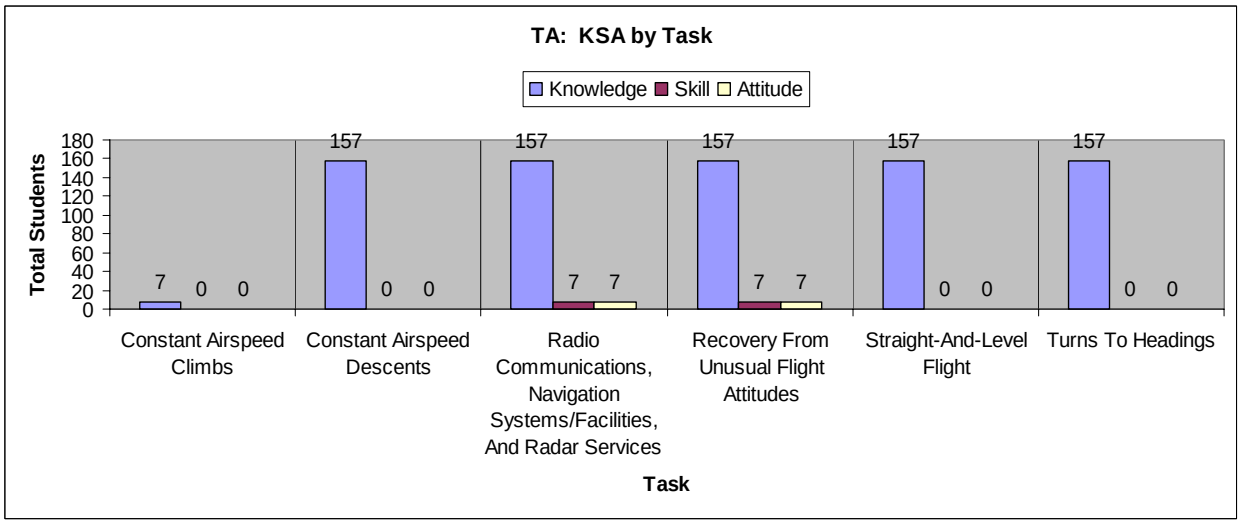


Area of Operation: Basic Instrument Maneuvers- KSAs

Total Enrollment: 9258



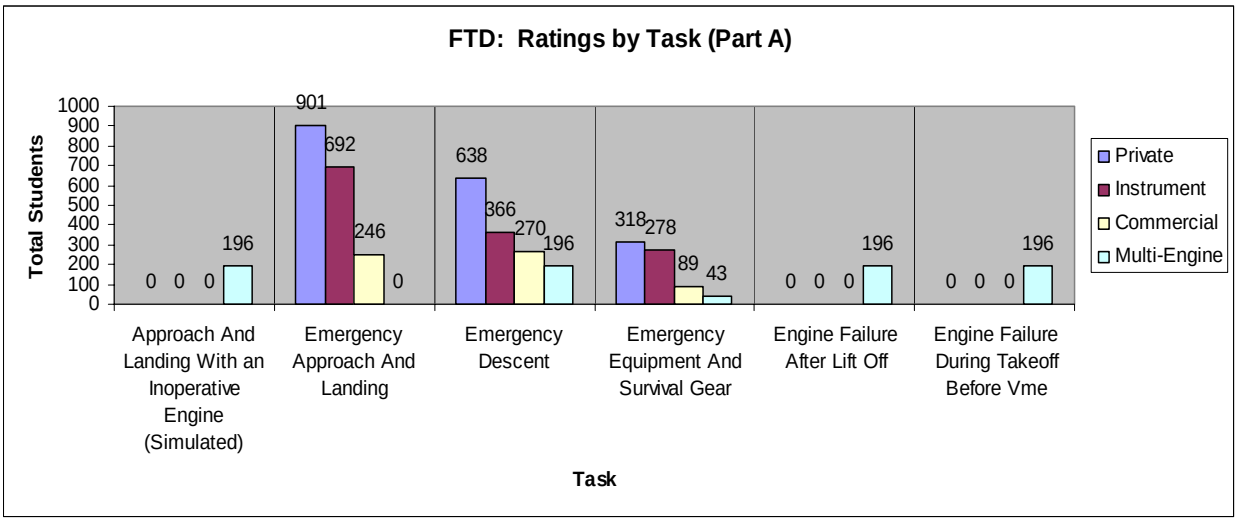


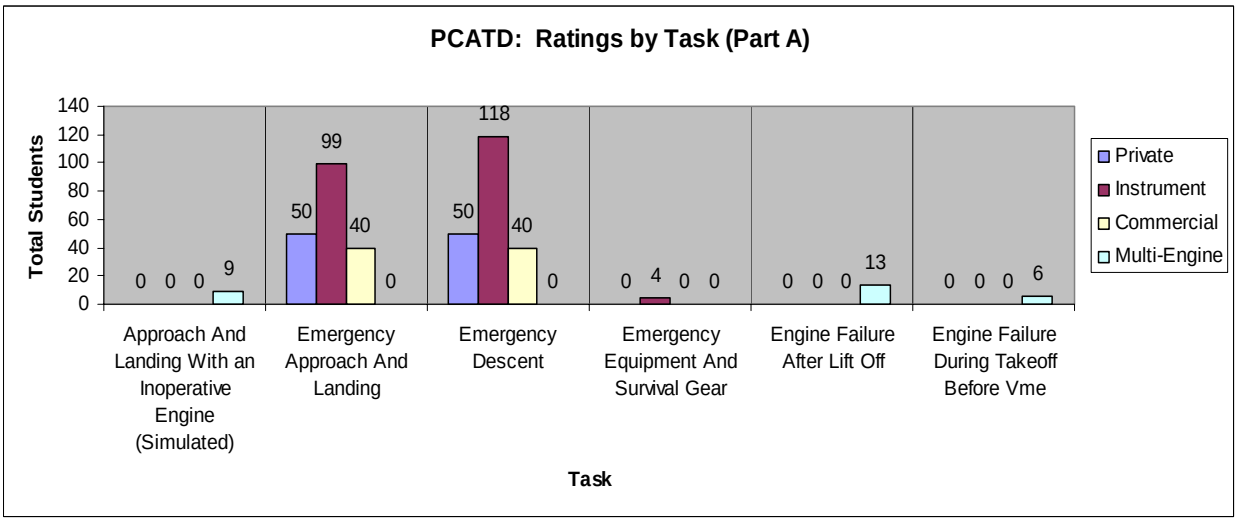


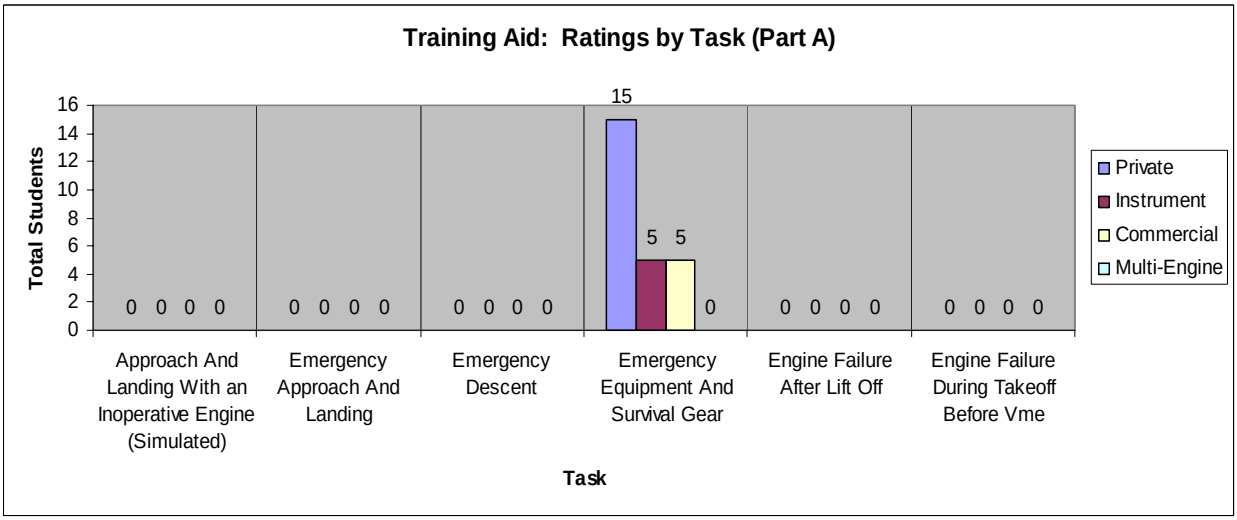
Area of Operation: Emergency Operations- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

The tasks in this Area of Operation are divided into two charts.

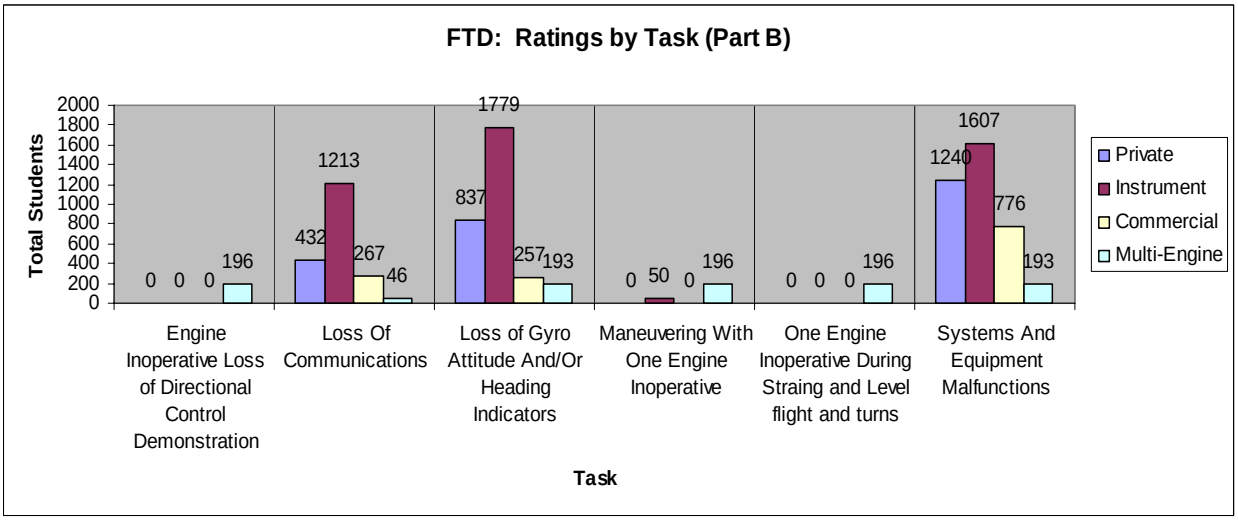


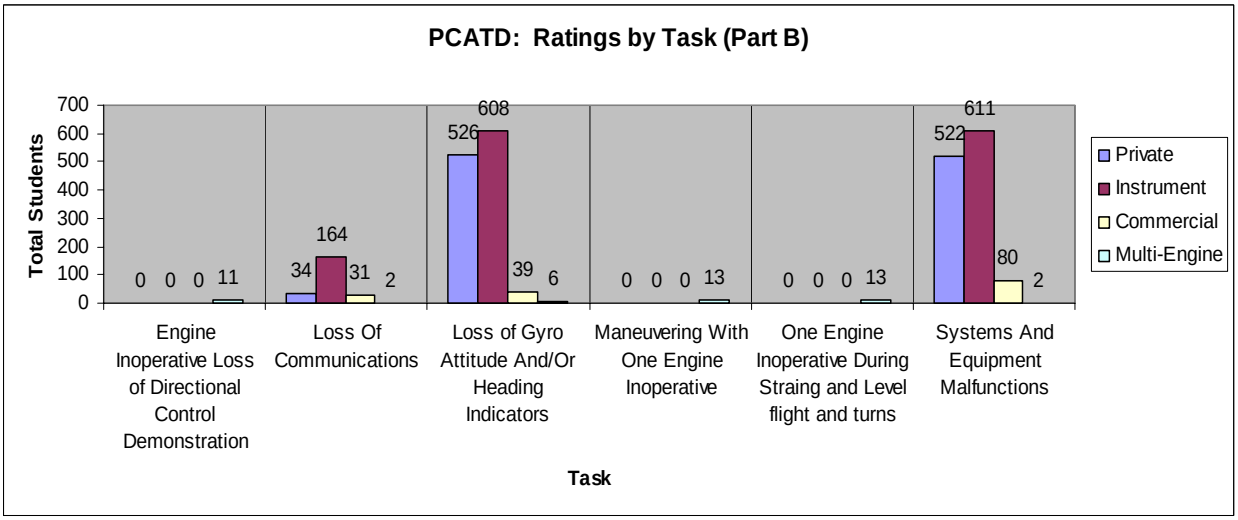


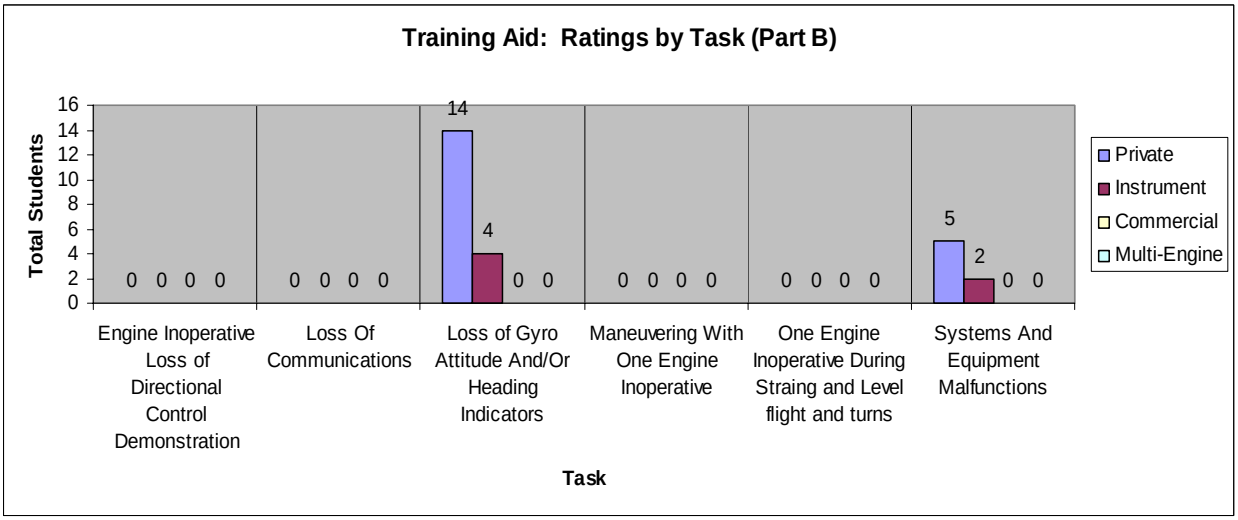


Area of Operation: Emergency Operations- Tasks (cont.)

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.



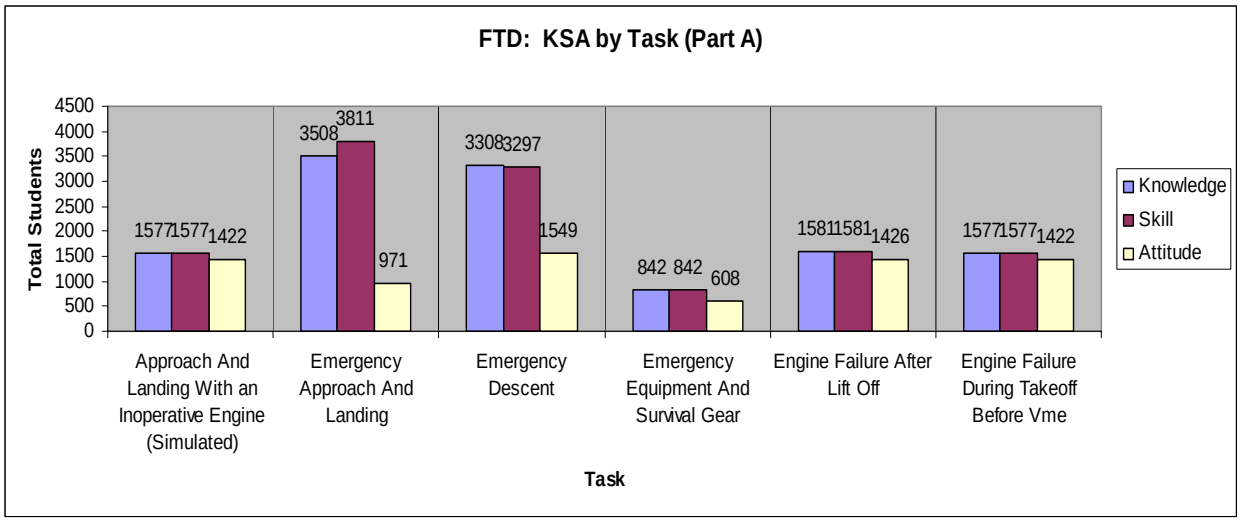


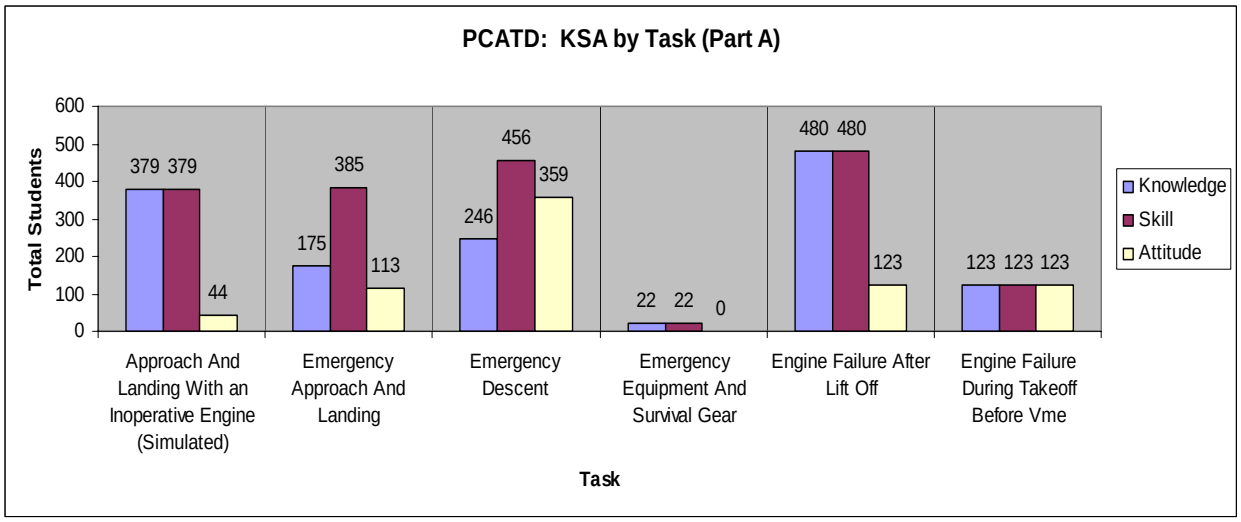


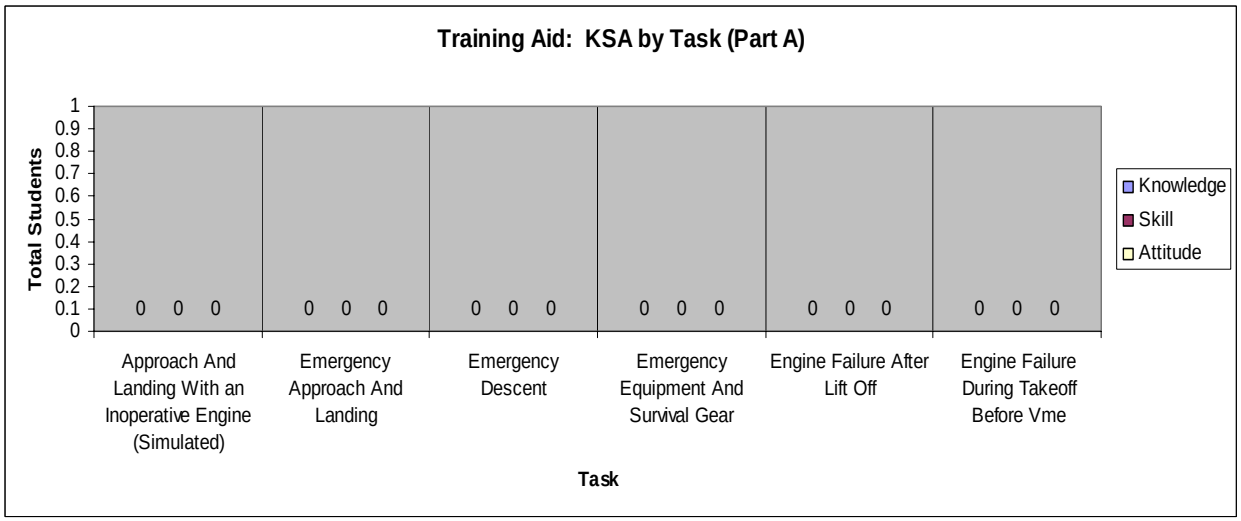
Area of Operation: Emergency Operations- KSAs

Total Enrollment: 9258

The tasks in this Area of Operation are divided into two charts.

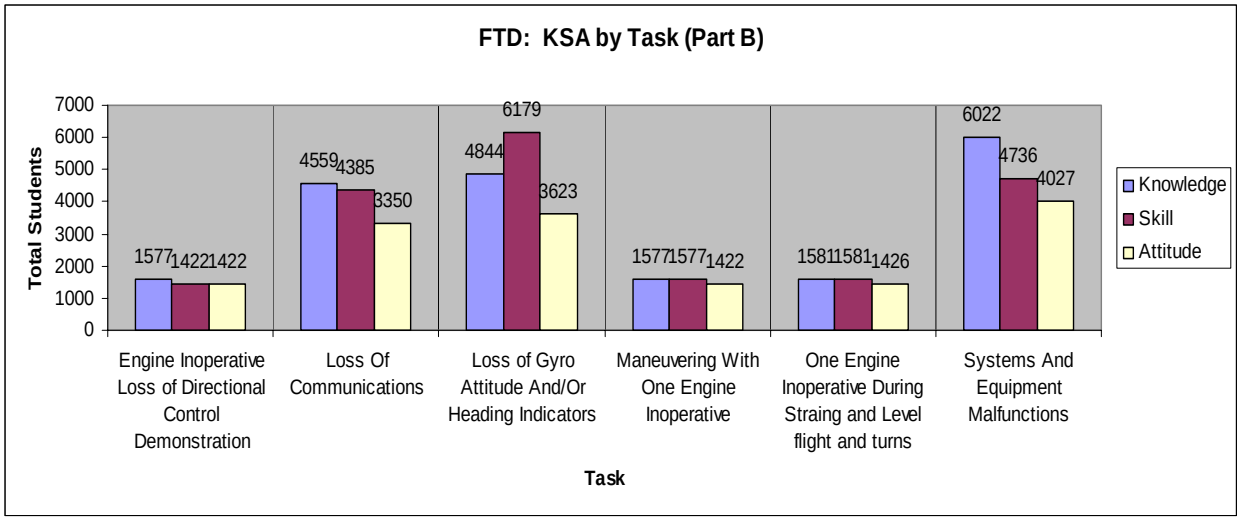


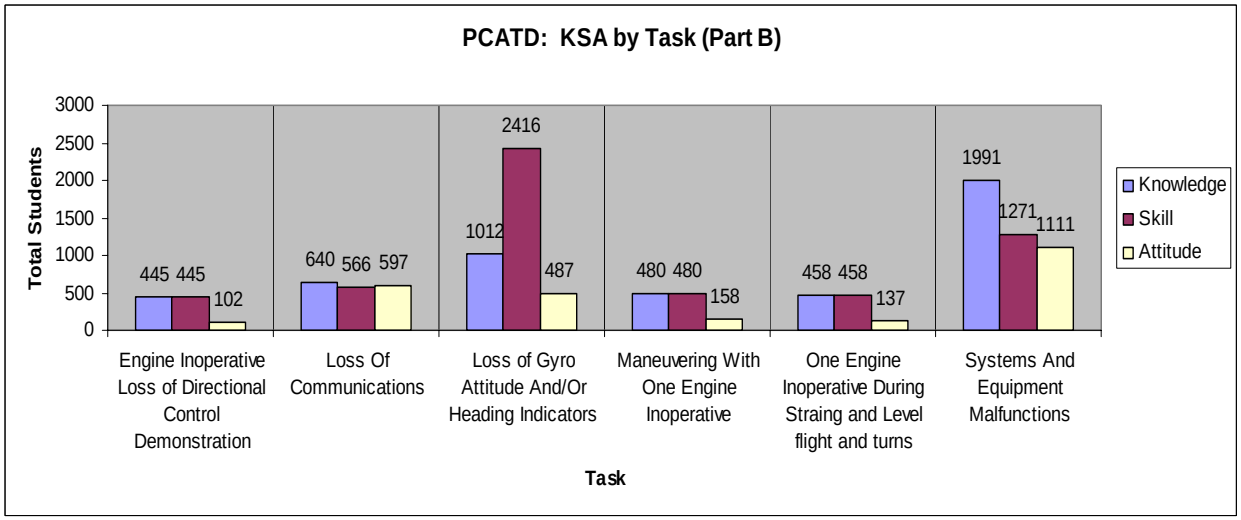


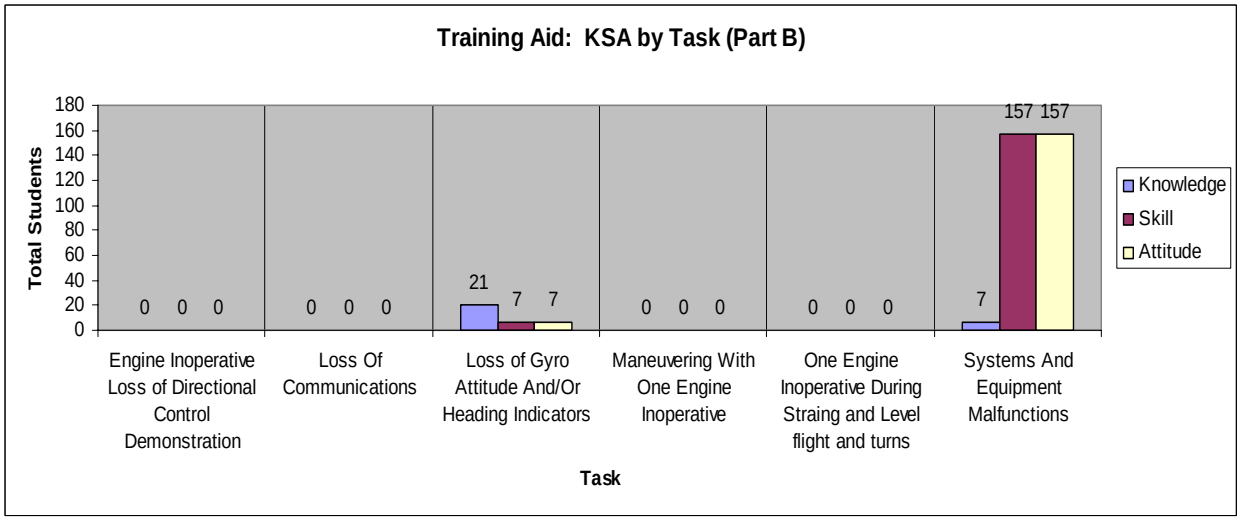


Area of Operation: Emergency Operations- KSAs (cont.)

Total Enrollment: 9258

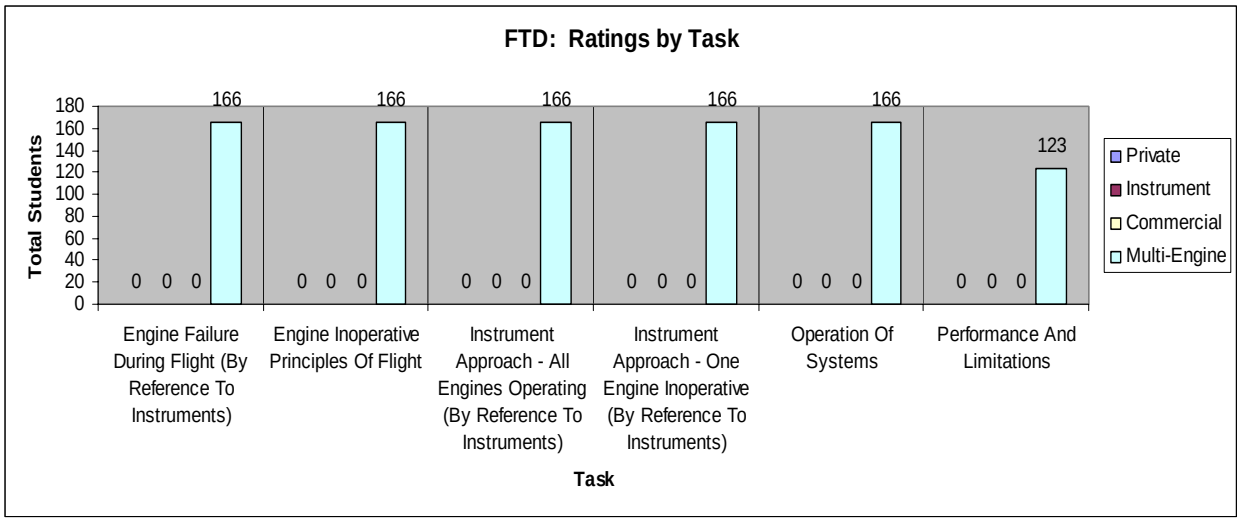


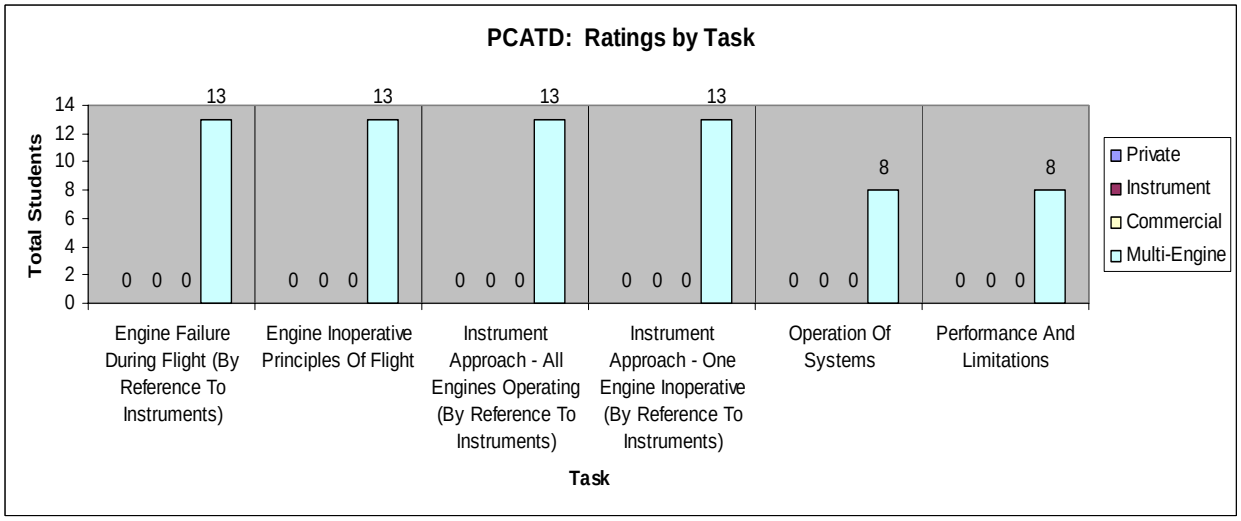


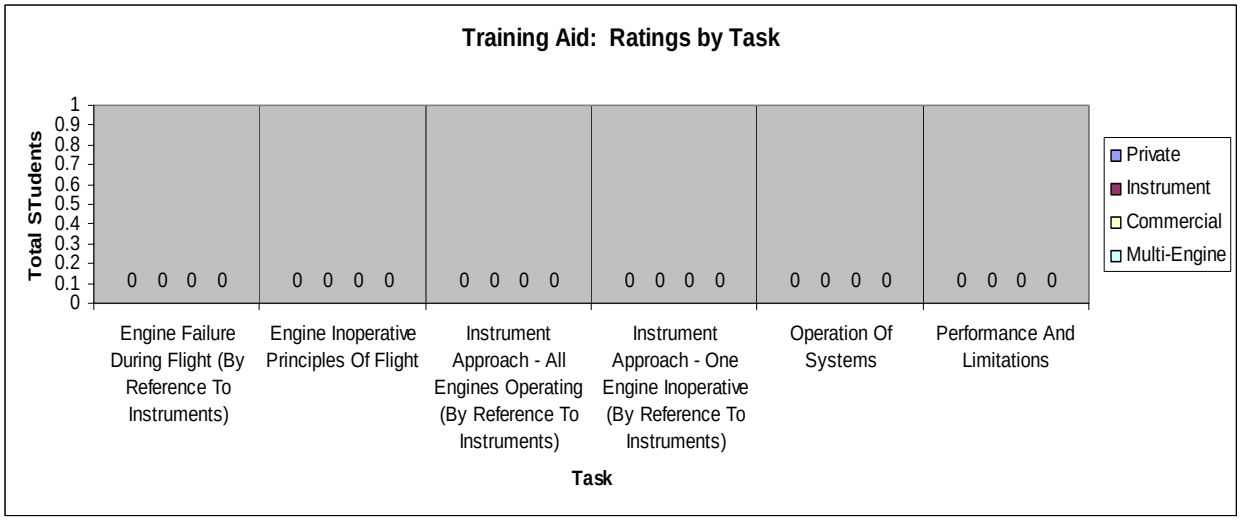


Area of Operation:Multiengine Operations- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

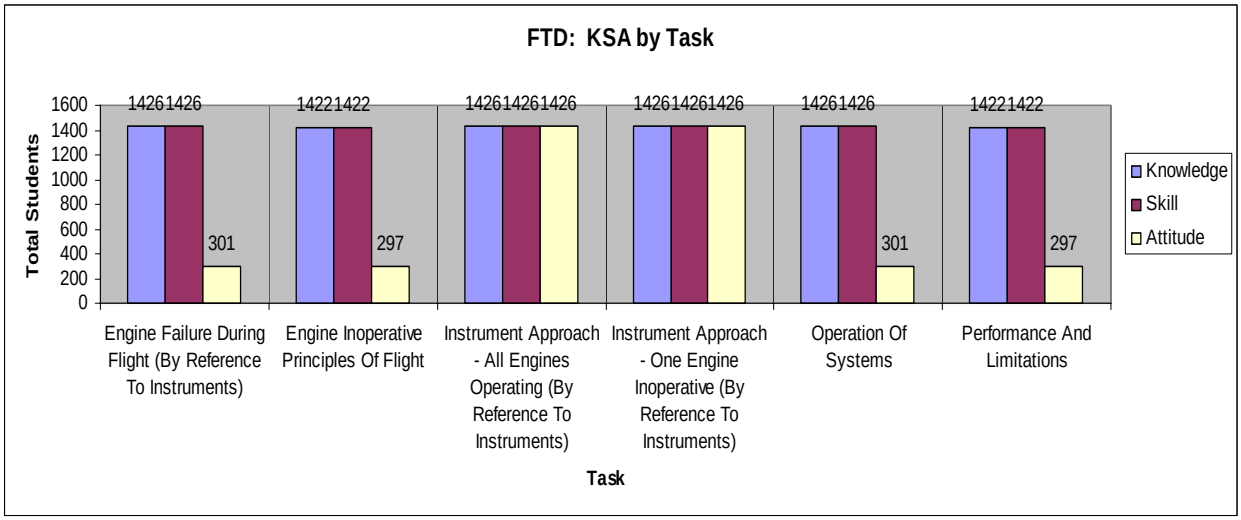


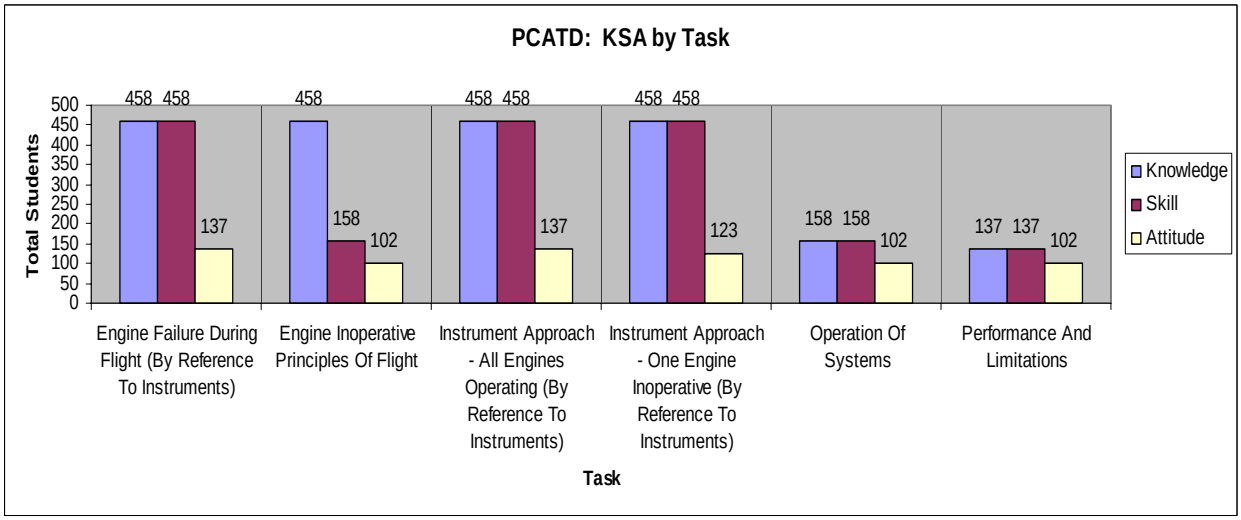


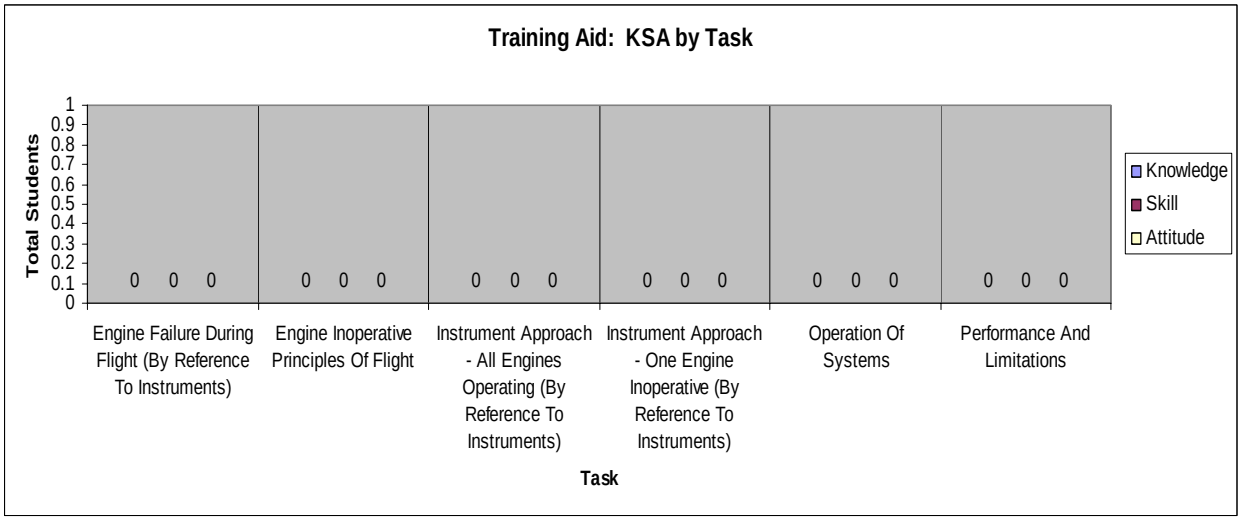


Area of Operation: Multiengine Operations- KSAs

Total Enrollment: 9258

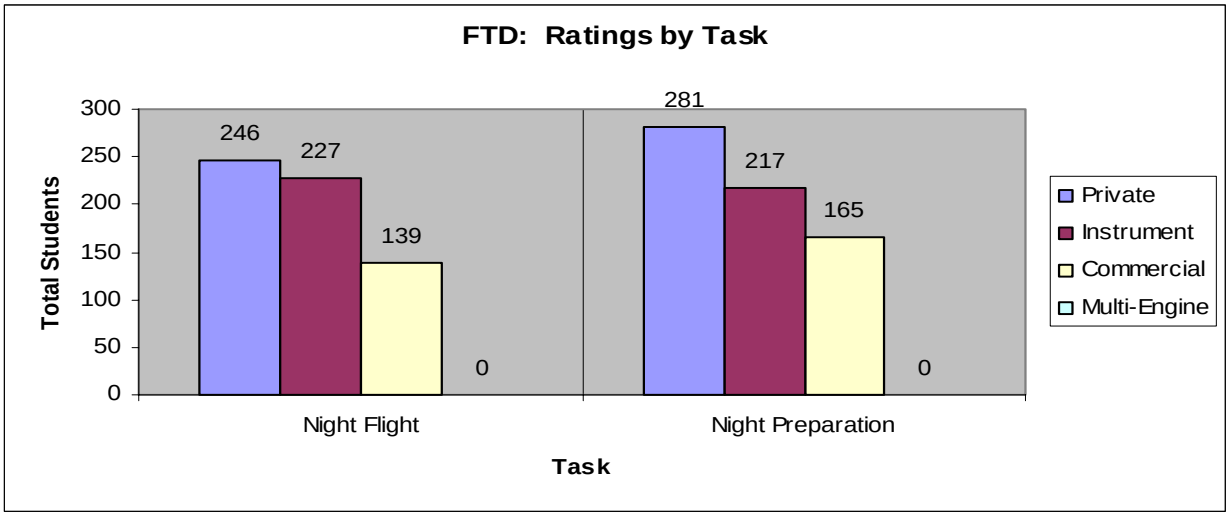


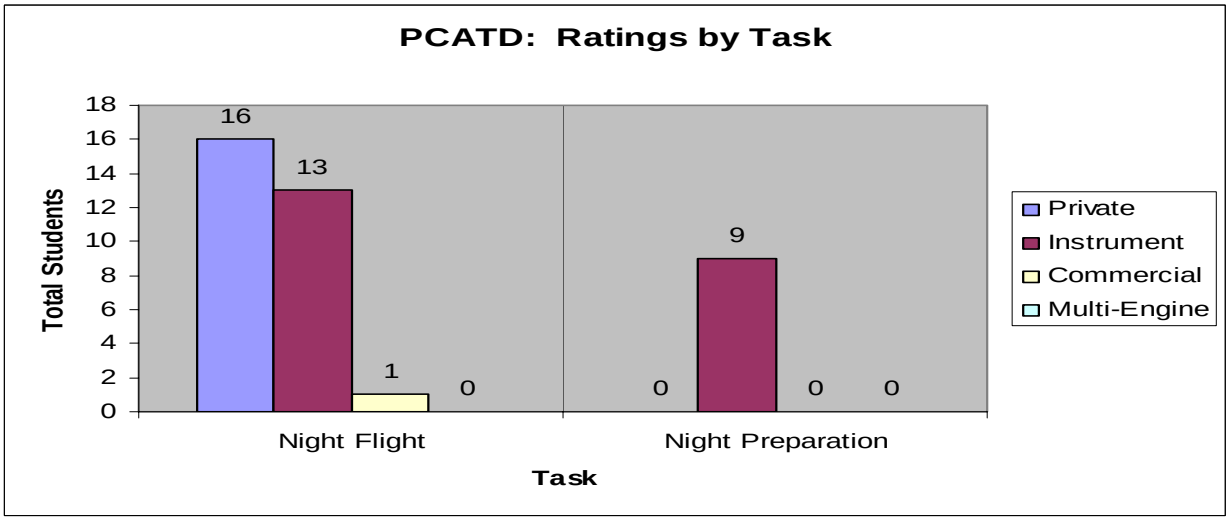


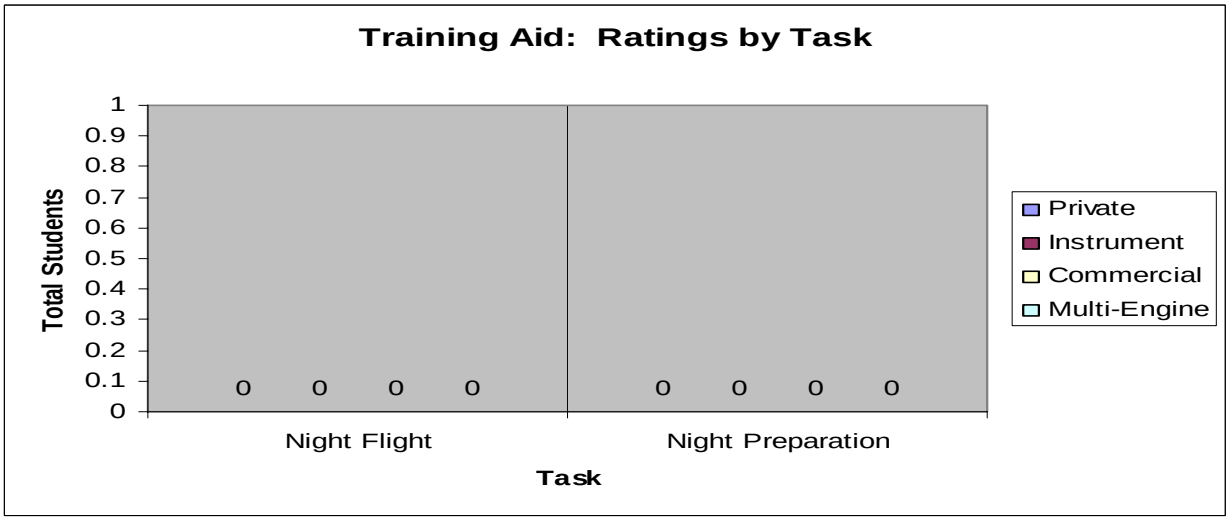


Area of Operation: Night Operations- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

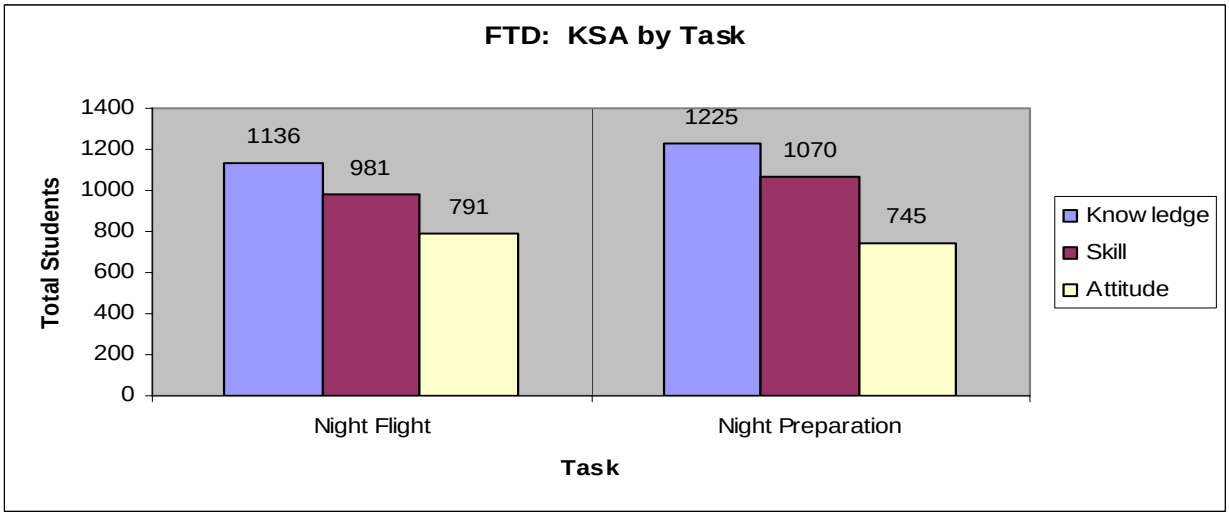


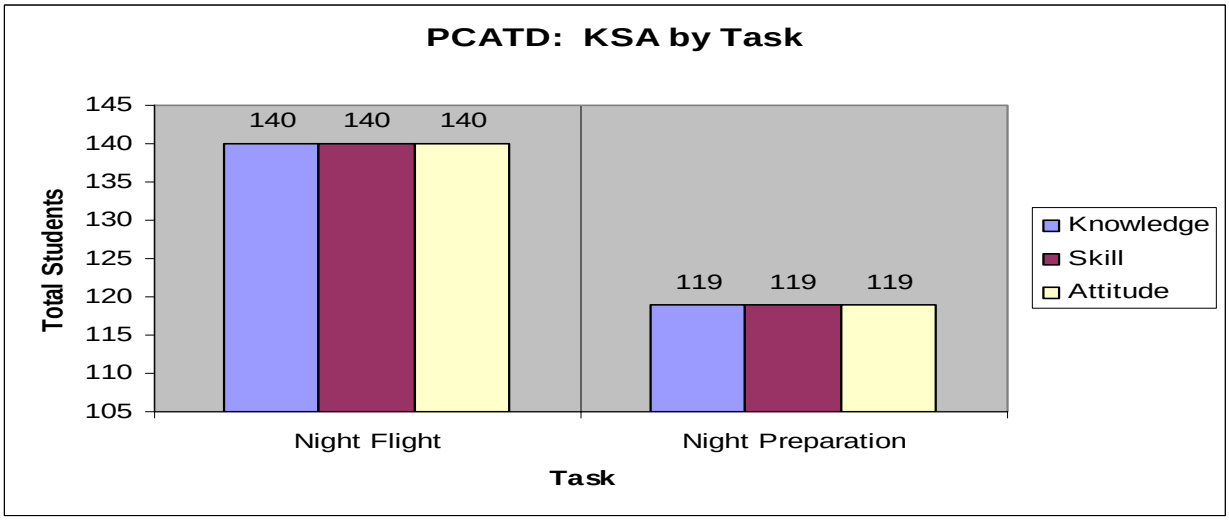


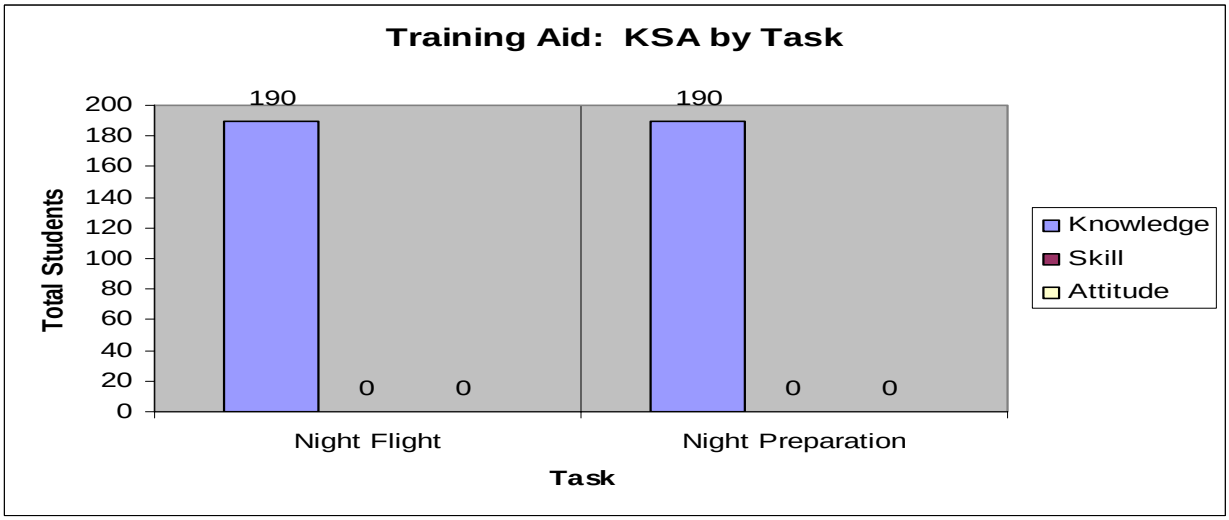


Area of Operation: Night Operatons- KSAs

Total Enrollment: 9258

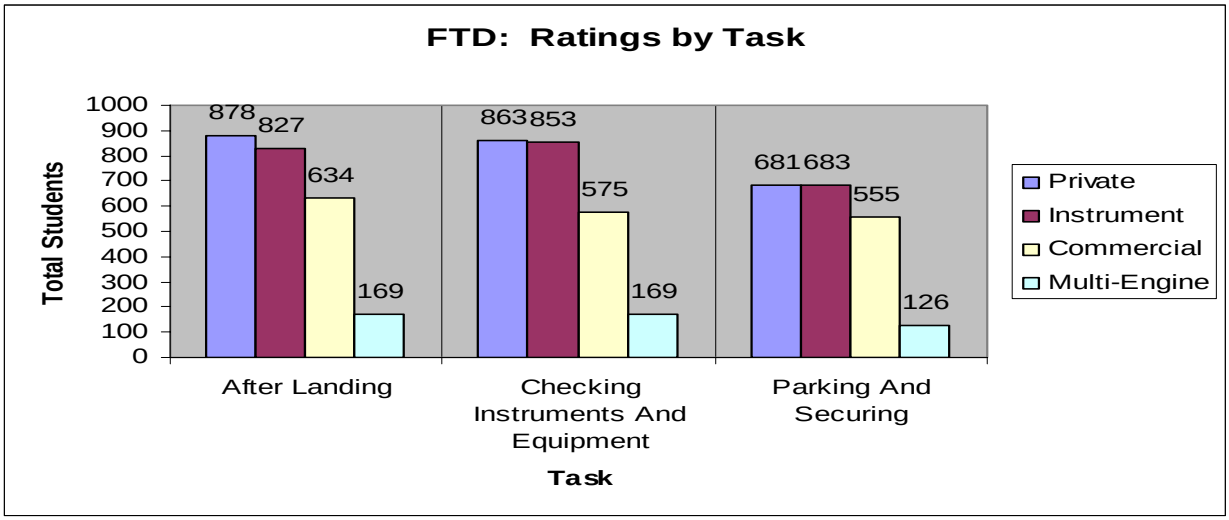


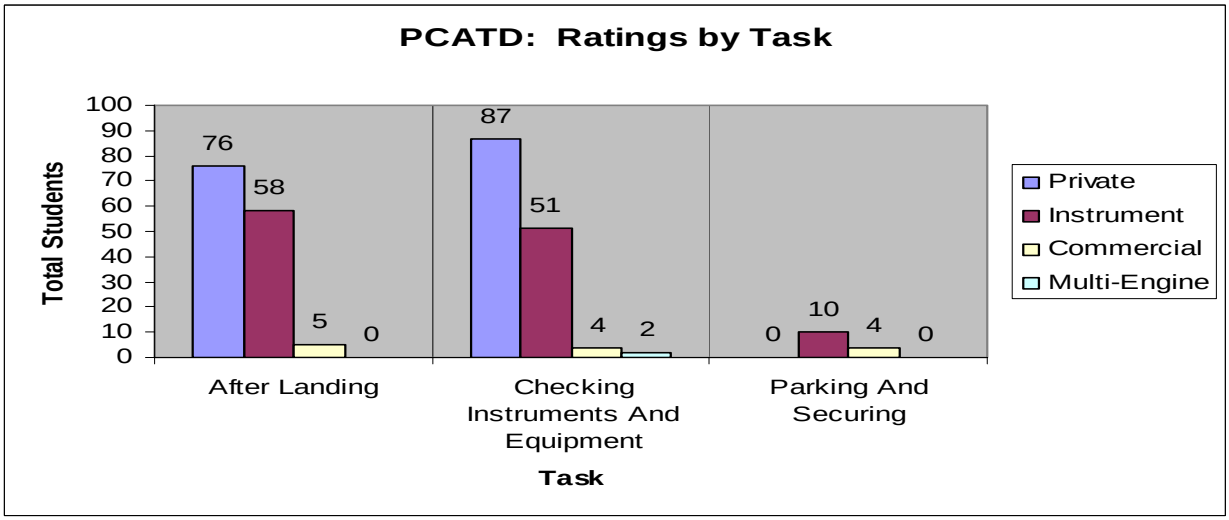


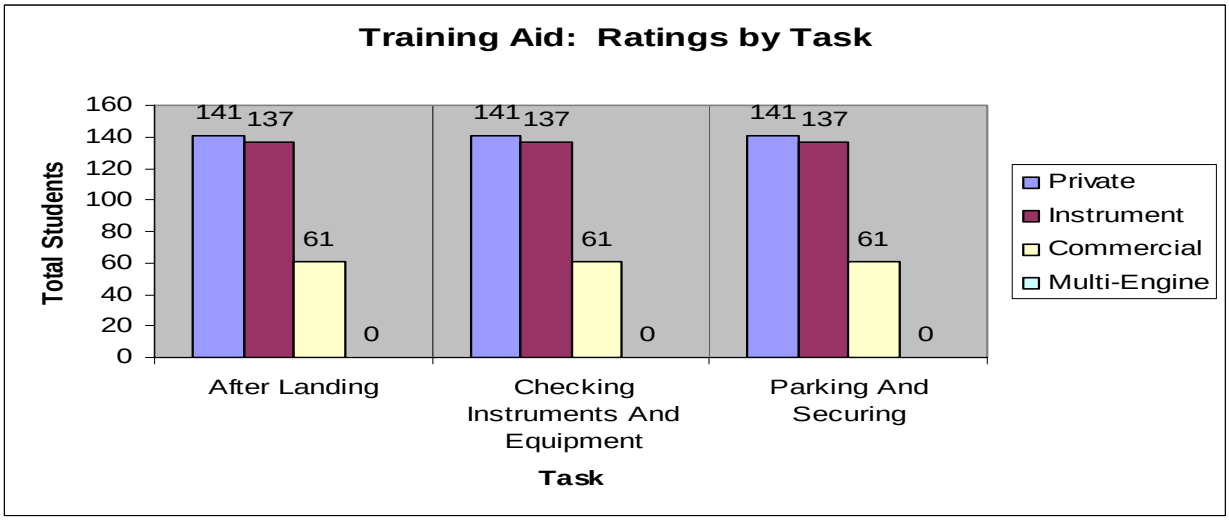


Area of Operation: Postflight Procedures- Tasks

Enrollments: Private 3630; Commercial 2188; Instrument 2465; Multiengine 975.

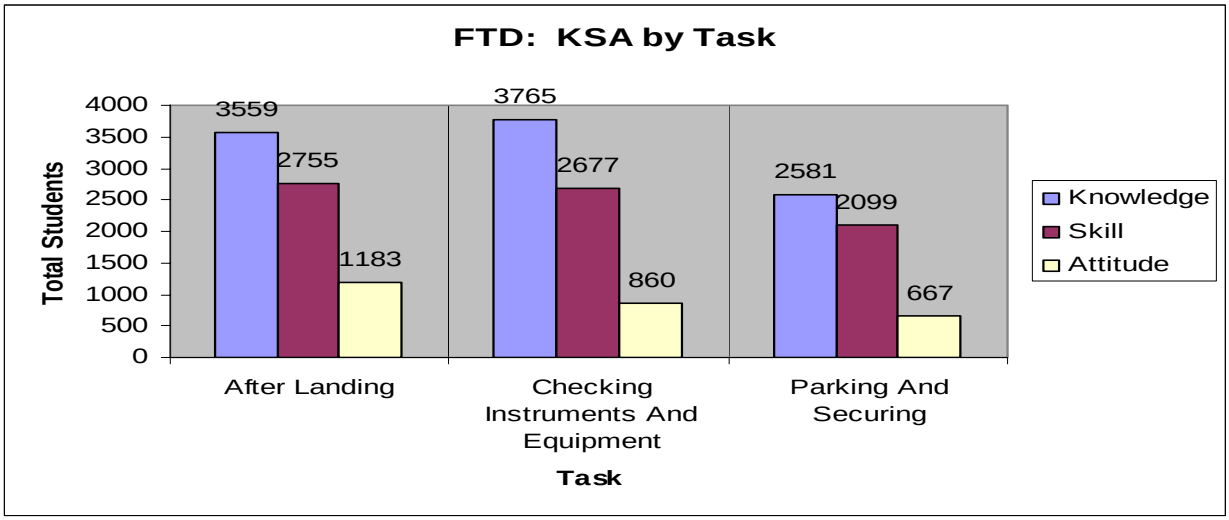


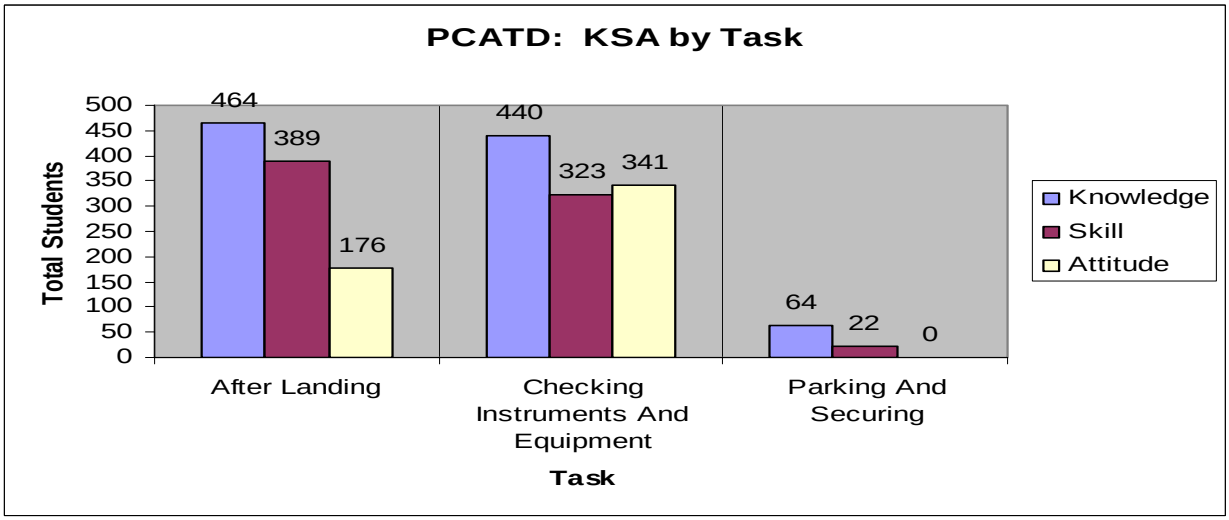


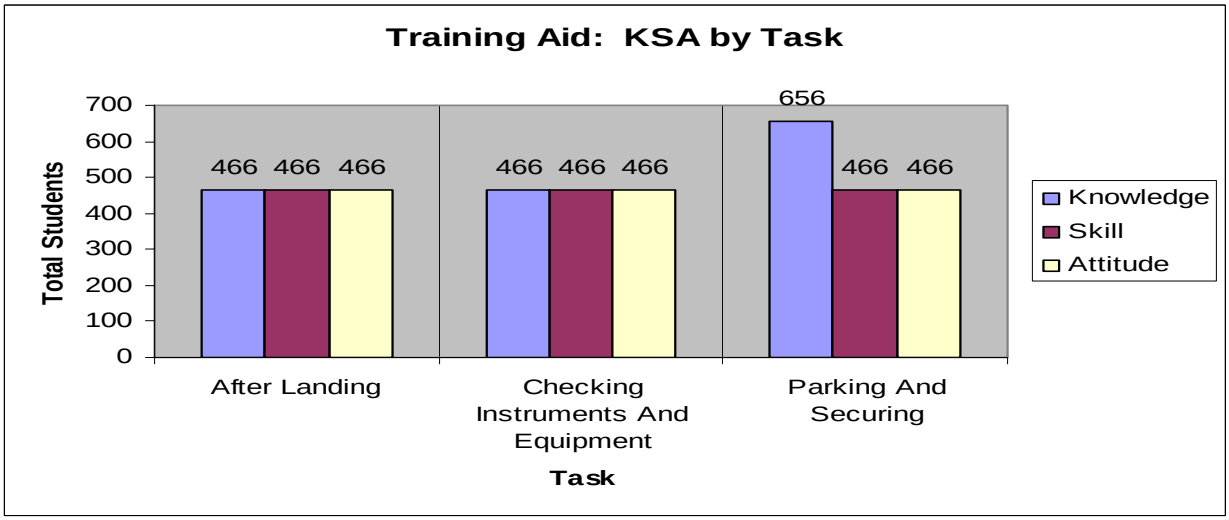


Area of Operation: Postflight Procedures - KSAs

Total Enrollment: 9258







Part II

Appendix A

Flight Training Device Certification Levels

Mfg	Model	FAA_Lvl	SumOfQty
AST	200	1	2
AST	200	3	1
AST	201	1	3
AST	201	3	1
AST	300	0	1
AST	300	1	28
AST	300	2	1
AST	300	3	2
AST	300	U*	10
AST	Hawk	1	1
AST	Hawk	3	8
AST	Hawk	U*	1
ATC	112H	U*	1
ATC	610	1	18
ATC	610	U*	19
ATC	710	1	10
ATC	710	U*	4
ATC	810	1	8
ATC	810	U*	8
ATC	920	1	1
ATC	920	U*	1
CPT	MU-2B	U*	1
Emulation Systems	200	U*	1
Emulation Systems	Unknown	U*	1
Flight Safety	BE58	5	4
FLIGHTMATIC	FLIGHTMATIC	U*	1
FLYIT	FLYIT	U*	1
FRASCA	125	1	1
FRASCA	131/2	1	5
FRASCA	131/2	2	1
FRASCA	131/2	3	2
FRASCA	131/2	U*	14
FRASCA	141/2	0	2
FRASCA	141/2	1	78
FRASCA	141/2	2	10

Mfg	Model	FAA_Lvl	SumOfQty
FRASCA	141/2	3	19
FRASCA	141/2	U*	41
Frasca	142	U*	2
FRASCA	241	1	6
FRASCA	241	5	1
Frasca	242	U*	1
FRASCA	242/J/T	1	20
FRASCA	242/J/T	2	2
FRASCA	242/J/T	3	2
FRASCA	242/J/T	5	1
FRASCA	242/J/T	U*	3
FRASCA	Bell 206/407/427/412	1	4
FRASCA	C-90B	U*	1
GAT	1	1	15
GAT	1	U*	2
GAT	2	1	3
GAT	2	2	1
GAT	3	1	3
Mechtronics	Ascent	U*	1
Mechtronics	CRJ	6	1
Mitsubishi	Motus 322i	2	1
Mitsubishi	Motus 6	2	2
Mitsubishi	Motus 6	U*	4
Mitsubishi	Motus 621	U*	1
Vector Systems	Venture P71	1	2
Vector Systems	Venture P72	1	1

*Certification level either unknown or unreported.

Part II

Appendix B

Complete list of Devices Reported

Mfg	Model	Type	Sum Of Qty
American Mega Trends	Virtual Pilot Pro	Training Aid	3
ASA	Asa	PCATD	29
ASA	On Top	PCATD	2
ASA	On Top	Training Aid	3
ASA	On-Top	PCATD	1
Aspire	ARC 6100	Training Aid	1
AST	200	FTD	3
AST	201	FTD	4
AST	300	FTD	42
AST	Hawk	FTD	10
ATC	112H	FTD	1
ATC	610	FTD	37
ATC	710	FTD	14
ATC	810	FTD	16
ATC	920	FTD	2
ATT	Elite	PCATD	103
ATT	Elite	Training Aid	6
AzureSoft	Elite	PCATD	1
Boeing	B-727	FFS	3
CPT	MU-2B	FTD	1
Diamond	Katana	Training Aid	1
e-group publishing, inc.	Comm 1 VFR/IFR	Training Aid	8
Emulation Systems	200	FTD	1
Emulation Systems	Unknown	FTD	1
Flight Safety	BE58	FTD	4
FLIGHTMATIC	FLIGHTMATIC	FTD	1
FLYIT	FLYIT	FTD	1
FRASCA	125	FTD	1
FRASCA	131/2	FTD	22
FRASCA	141/2	FTD	150
Frasca	142	FTD	2
FRASCA	241	FTD	7
Frasca	242	FTD	1
FRASCA	242/J/T	FTD	28
FRASCA	B737-400	FFS	1

Mfg	Model	Type	Sum Of Qty
FRASCA	Bell 206/407/427/412	FTD	4
FRASCA	C-90B	FTD	1
GAT	1	FTD	17
GAT	2	FTD	4
GAT	3	FTD	3
Honeywell	KLN89B	Training Aid	1
IFT	PRO	Training Aid	2
Jeppesen	FS-200	PCATD	13
Jeppesen	FS200AC	PCATD	66
Jeppesen	JT20 3030	PCATD	1
Mechtronics	Ascent	FTD	1
Mechtronics	CRJ	FTD	1
Microsoft	FS2000	Training Aid	71
Microsoft	FS98	Training Aid	4
Mitsubishi	Motus 322i	FTD	1
Mitsubishi	Motus 6	FTD	6
Mitsubishi	Motus 621	FTD	1
PFC	Cirrus	PCATD	22
PFC	Elite	PCATD	3
PFC	Unknown	PCATD	1
Unknown	Unknown	PCATD	1
Vector Systems	Venture P71	FTD	2
Vector Systems	Venture P72	FTD	1