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An Examination of the Success of Developmental Air Traffic Controllers Transferring to Lower-Level Facilities

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16. Abstract

Air traffic control specialists (ATCSs) in training (developmentals) must successfully complete field qualification training at an air traffic control (ATC) facility to become a certified professional controller at that facility. If a developmental is unsuccessful in field training but shows potential in controlling air traffic, the developmental may be allowed to transfer to a less complex, lower-level ATC facility for training.

Method and Results. We assessed training outcomes of developmentals allowed to transfer to a lower-level facility following training failure at a first facility. Type and level of facility to which the retained developmentals were transferred had an impact on success in training. Developmentals succeeded significantly more often if transferred to a small (Level 4-6) or medium (Level 7-9) airport traffic control tower (ATCT) facility than if assigned to any level of a combined ATCT/tower radar approach control (TRACON) facility, whether transferring from an en route or a terminal ATC facility. Developmentals allowed to transfer to small and medium ATCT facilities did as well as developmentals assigned to these facilities as a first facility, but again, did less well at combined facilities. Thus, the likelihood that transferred developmentals will succeed at a second terminal facility is significantly higher at ATCT facilities than at combined facilities.

Discussion. The primary difference between ATC skills needed at an ATCT or ATCT/TRACON facility is the use of radar-based control procedures. It is possible that, in many instances, the transferred developmentals were unable to master radar-based ATC. Perhaps an explanation may be the age of the transferring developmental. Researchers have consistently found an inverse relationship between age and training success in ATC.

We believe that if age is considered in making second facility assignments for transferred developmentals, field qualification training outcomes for these developmentals will improve. However, considering age in second facility assignments could have implications for career progression policies in which developmentals progress from lower- to higher-level facilities. An examination of age and success in field qualification training at a second ATC facility may be required.

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The opinions expressed are those of the authors alone, and do not necessarily reflect those of the Federal Aviation Administration, the Department of Transportation, or the federal government of the United States.

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AN EXAMINATION OF THE SUCCESS OF DEVELOPMENTAL AIR TRAFFIC CONTROLLERS TRANSFERRING TO LOWER-LEVEL FACILITIES

The purpose of this study is to examine the extent to which Air Traffic Control Specialists (ATCSs) in training (called *developmentals* if they have never been certified as an air traffic controller) succeed in field qualification training at a second air traffic control (ATC) facility, following failure at a first facility. We considered the type and level of complexity of the ATC facility from which the developmental transferred, as well as the facility transferred to following failure. The results of this research support Federal Aviation Administration (FAA) workforce planning.

BACKGROUND

ATC Facilities

ATC facilities are either en route or terminal. Controllers within terminal facilities organize the flow of air traffic in and out of airports, and en route controllers ensure the safe separation and orderly flow of aircraft both above and outside of airspace surrounding airport areas. As air traffic leaves the terminal airspace, the responsibility for control transfers to controllers at en route centers. The FAA classifies terminal facilities as airport traffic control towers (ATCTs), terminal radar approach control (TRACON) facilities, and combined ATCT/TRACONs.

The FAA assigns each ATC facility a level based on numerous factors, including the volume and complexity of air traffic within the facility's airspace. Besides indicating the amount and difficulty of the traffic controlled by the facility, the level determines the minimum and maximum salaries of the controllers who work there. The vast majority of en route centers are assigned only the highest levels: 10, 11, or 12. The terminal facilities vary more widely in volume and complexity of air traffic, with levels ranging from 4 to 12. The FAA's Controller Workforce Plan (FAA, 2015) provides a description of ATC facility options, terminal facility types, and facility levels. Because a higher level indicates that a facility controls larger amounts and more complex air traffic, training failures are highest at the higher-level facilities, en route centers and TRACONs, and lowest at the lowest-level (ATCT without radar) facilities. For example, based on analysis of data extracted from the FAA's ATC national training database (NTD), the success rate of developmentals without prior experience hired from December 2004 to December 2012 in field qualification training ranged from 56% for TRACON facilities to 84% for low to mid-level tower facilities.

ATCS Hiring

The FAA has the responsibility to ensure that an adequate number of ATCSs are hired and trained to operate safely at ATC facilities within the National Airspace System (NAS). The FAA's Office of Labor Analysis and the Office of Technical Requirements and Forecasting, Air Traffic Services Team anticipate that to maintain a workforce of 14,500 controllers through the year 2024 it will be necessary to hire approximately 10,000 new controllers (FAA, 2015). The FAA will select these new hires from populations with varying degrees of experience and education in ATC. The amount of prior experience or education a new hire has will influence the type and amount of training needed to become a fully certified professional controller (CPC). Specifically, those with no ATC experience will attend option-specific training at the FAA Academy before moving to ATC facilities where they receive training specific to that facility. Those with prior experience, usually obtained as military controllers, report directly to a facility for field-level qualification training. In the past, those with prior experience may have attended FAA Academy training before moving to an ATC facility for training.

The FAA randomly assigns new hires to the en route or terminal option before they arrive at the Academy to begin their training. Random assignment is seen as a viable approach because worker requirements for the two options are similar (Nickels, Bobko, Blair, Sands, & Tartak, 1995), although there may be small differences in the abilities needed to succeed in each option (Byrne & Broach, 2014). Academy ATC training begins with an Air Traffic (AT) Basics course that covers the fundamentals of ATC. New hires with no ATC experience or education are required to take this course, but FAA hiring authorities may waive the course requirement for new hires with some knowledge of ATC obtained though prior ATC certification (e.g., control tower operator) or education. The AT Basics course is five weeks in length. After the AT Basics course, new hires, both with and without prior education, take one of the option-specific ATC Initial Qualification training courses. The length of this course is 8 weeks for developmentals assigned to the Terminal option and 12 weeks for those in the En Route option. The Initial Qualification training course includes both classroom and simulation-based training.

ATCS Placement

Although the FAA randomly assigns new hires to the en route or terminal option when they are hired, specific facility assignments for those attending the FAA Academy are not made until they have passed Initial Qualification training. The needs of the FAA are primary in determining facility assignments available to Academy graduates. Each year, the FAA updates and publishes a Controller Workforce Plan describing ATC staffing requirements for the next 10-year period (FAA, 2015). Among other factors that determine staffing requirements is an assessment provided by each ATC facility of traffic volume and workload, annual retirements, number of developmentals in training, and number of developmentals likely to reach CPC by year-end. The FAA's Air Traffic Organization (ATO), Management Services, Technical Requirements and Forecasting Group, Air Traffic Services Team (AJG-R41) uses this and other information to determine which facilities have vacancies and how many vacancies are available to developmentals who successfully complete their Academy training. This group is responsible for technical workforce planning, prioritization, and hiring plan development for the ATO, as well as on-boarding and placement of newly hired controllers and maintainers.

Secondary factors considered in facility placement are the class rank and preference of the developmental. Near the end of Initial Qualification training, AJG-R41 personnel present developmentals with a list of ATC facilities that have vacancies in their option. The developmental who earned the highest ranking, based on scores achieved during his or her Initial Qualification training class, chooses first from among the available facilities. Facility choice proceeds in order of class rank until all developmentals are assigned to a facility. The number of vacancies available from which the developmentals may choose is usually equal to the number of developmentals in the class. On occasion, however, hard to staff facilities are included in addition to those facilities with vacancies already represented on the list.

Longitudinal Training and Performance Database

As researchers within the FAA Civil Aerospace Medical Institute (CAMI) Aerospace Human Factors Research Division, we support the efforts of AJG-R41 to maintain the ATC workforce at the appropriate strength to meet the needs of the flying public. To do so, we developed a longitudinal database that contains ATCS training performance data for developmental controllers. We use the database to respond to questions about the ATCS hiring and training program and to conduct human factors research to develop recommendations for improving controller hiring and training practices.

Training outcome measures that we use most often in our analyses are pass/fail status at the FAA Academy, status in field qualification training, or a combination of the two. Field qualification training outcomes are taken from the FAA's ATC National Training Database (NTD; FAA, 2011). Possible training outcomes in the NTD are as follows: *Completed, In Progress, Facility Fail, Transfer Lower, Transfer, and Separated – Other Reasons*. Successfully completing field qualification training results in achievement of CPC status. The outcomes *Facility Fail* and *Transfer Lower* reflect unsuccessful completion of field qualification training. Developmentals coded as *Transfer Lower* have failed field qualification training at their first facility but have been judged to have demonstrated the potential for being successful at another ATC facility, and thus are allowed to transfer to a less complex (lower-level) facility following FAA policies (FAA, 2013). Records in the NTD database allow analyses to be conducted of training outcomes by option (terminal or en route), terminal facility type (ATCT, ATCT/TRACON, or TRACON), and facility level.

Research Question

AJG-R41 requested that we use the longitudinal database to determine the extent to which developmentals allowed to transfer to a lower-level facility following failure at a first facility (*Transfer Lower)* succeed in field qualification training at the second facility. We present our analytical approach and findings in this report.

METHODS

Database

From the longitudinal database, we extracted records for newly hired developmentals who failed training at their first facility and were assigned to their second ATC facility from December 2004 through December 2012. We elected to exclude developmentals who failed training at their first facility and were assigned to an ATC facility after 2012 to increase the probability that the developmentals allowed to transfer to a lower-level facility would have had time to complete field qualification training (successfully or unsuccessfully) at the second facility. The training outcome data used in our analyses were current as of July 2015, allowing at least 31 months for developmentals to complete training at the second facility (December 2012 – July 2015). As indicated in the FAA's (2015) recent controller workforce plan, the training target time by size of terminal facility is 17 months for small (levels 4-6), 24 months for medium (levels 7-9), and 29 months for large (levels 10-12) ATC facilities.

Our sample of 613 includes all ATC developmentals originally assigned to a terminal or en route facility (December 2004–December 2012) who transferred from a

higher- to a lower-level facility (i.e., *Transfer Lower*) prior to reaching CPC status at their first facility.

RESULTS

In preparation for the analyses, we first examined the type of ATC facility from which the developmentals were transferred (first facility) in comparison with what type of ATC facility to which they were transferred (second facility).

As can be seen in Table 1, the majority of the developmentals transferring to lower-level facilities came from en route centers and moved to ATCT facilities (n = 183). The second highest number transferred from en route centers into combined ATCT/TRACON facilities (n = 107).

Table 1. First and Second Facility Types

First Facility Type	Second Facility Type				
	ATCT	Combined ATCT/ TRACON	TRACON	En Route	**Totals**
ATCT	54	20	0	0	**74**
Combined ATCT/ TRACON	78	41	0	0	**119**
TRACON	74	40	2	1	**117**
En Route	183	107	6	7	**303**
Totals	**389**	**208**	**8**	**8**	**613**

Second, we examined the level of the first facility from which the developmentals were transferred and the level of the second facility to which they were transferred. As shown in Table 2, most developmentals transferred from large (levels 10-12) ATC facilities to either small (levels 4-6; n = 316) or medium-sized (levels 7-9; n=138) facilities. Only nine developmentals transferred from large ATC facilities into other large facilities. Because of the small number of developmentals transferred into large level facilities (levels 10-12), these developmentals were excluded from further analyses.

Table 2. Facility Levels

First Facility Levels	Second Facility Levels			
	Small (4-6)	Medium (7-9)	Large (10-12)	**Totals**
Small (4-6)	18	0	0	**18**
Medium (7-9)	103	29	0	**132**
Large (10-12)	316	138	9	**463**
Totals	**437**	**167**	**9**	**613**

Excluding the eight developmentals transferring into an en route center (as shown in Table 1) and the nine developmentals transferring between large ATC facilities (as shown in Table 2), we analyzed the data to determine training outcomes at the second facility for 596 developmentals. We present the frequencies and percentages in Table 3 by the type and level of the second ATC facility.

Table 3. Training Outcome at Second Facility by Terminal Facility Type and Level

Second Facility Training Outcomes	Second Facility Types and Levels			
	Small ATCT (309)	Medium ATCT (79)	Combined ATCT/ TRACON (208)	**Totals**
Completed	257a (83.2%)	64a (81.0%)	128b (61.5%)	449 (75.3%)
In Progress	3a (1.0%)	1a,b (1.3%)	9b (4.3%)	13 (2.2%)
Facility Fail/ Transfer Lower	26a (8.4%)	10a,b (12.7%)	38b (18.3%)	74 (12.4%)
Transfer	5a (1.6%)	0a (0.0%)	8a (3.8%)	13 (2.2%)
Separated – Other Reasons	18a (5.8%)	4a,b (5.1%)	25b (12.0%)	47 (7.9%)
Totals	309	79	208	596

*Each letter denotes a subset of second facility type and level categories whose column proportions do not differ significantly from each other at the .05 confidence level.

Overall, 75.3% of the 596 developmentals successfully completed training at a second facility, with 12.4% of the developmentals being unsuccessful (*Facility Fail and Transfer Lower*). The remaining 12.3% were either *In Progress* (still in training at their second facility), had transferred to another facility for reasons unrelated to failure (*Transfer*), or left training for reasons such as retirement, resignation, or medical, or security issues (*Separated – Other Reasons*).

The proportion of developmentals who were successful or unsuccessful at the second facility varied among facility types and levels. Using a Z-test to compare the cell proportions, we found that developmentals assigned to small (levels 4-6) and medium (levels 7-9) sized ATCTs completed training successfully at a significantly higher proportion than did developmentals assigned to combined ATCT/TRACON (Levels 5-9) facilities (see Fig 1). We found other significant differences between developmentals who transferred to combined ATCT/TRACON facilities and developmentals at small ATCTs. Specifically, significantly more developmentals who transferred to combined ATCT/TRACON facilities were still in training (*In Progress*), had been unsuccessful in training at the second facility (*Facility Fail and Transfer Lower*), or left training for reasons other than performance (*Separated – Other Reasons*) than were developmentals who transferred to small ATCTs.

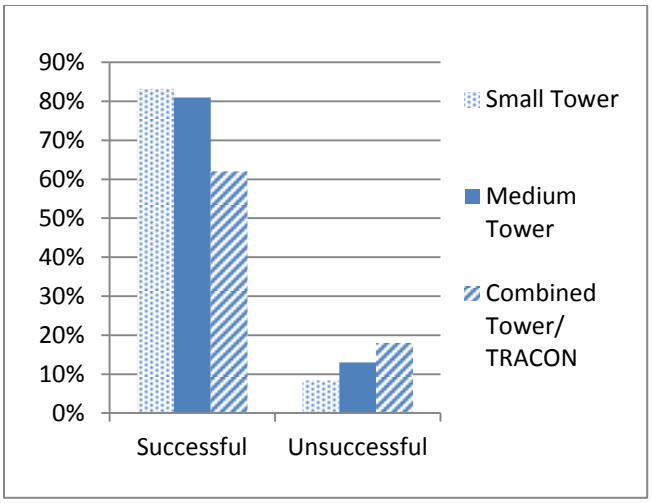

Figure 1. Successful and Unsuccessful Outcomes at Second ATC Facility

These results were also compared with training outcomes for developmentals assigned to similar type and level facilities as their first facility. Using training outcome data from the same period (December 2004 to December 2012), we found that, of 546 developmentals assigned to a small ATCT as their first facility, 444 (81.3%) were successful. Of the 401 assigned to a medium ATCT facility, 344 (85.5%) were successful. Again, using a Z-test to compare the cell proportions, we found no significant difference in proportions between those assigned to small or medium ATCT facilities as their first or second facility. However, developmentals assigned to a combined ATCT/TRACON as their first facility succeeded at a significantly higher proportion than those assigned to a combined ATCT/TRACON as their second facility following failure at a higher-level facility. Of the 1,677 developmentals assigned to a combined ATCT/TRACON as their first facility, 1,193 (71.1%) succeeded (see Figure 2).

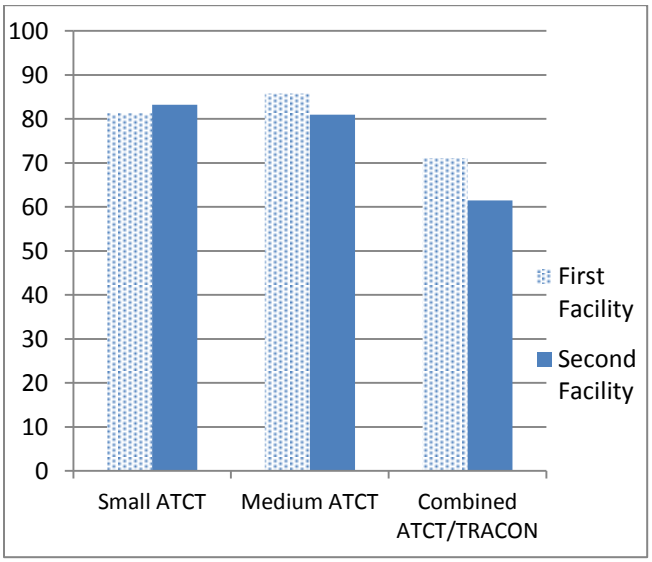

Figure 2. Training Outcomes of Developmentals at First or Second (Transfer Lower) Facilities

Another consideration is the difference in training outcomes when developmentals transfer from an en route or terminal ATC facility to a lower-level ATC terminal facility. Specifically, do developmentals transferring from en route centers succeed more or less often than developmentals transferring from terminal facilities?

Analyzing these same data as used in the previous analysis, we examined second facility outcomes separately for developmentals transferring from en route or terminal ATC facilities to lower-level terminal ATC facilities. There were 289 developmentals transferring from an en route center and 307 developmentals transferring from a terminal facility (ATCT, ATCT/TRACON, or TRACON). The only significant difference in training outcomes at the second terminal facility was in proportion of developmentals still in training (*In Progress*). Table 4 shows that as of July 2015, more developmentals transferring from an en route facility (11 developmentals) were still in training at their second facility than those who transferred from a TRACON facility (0 developmentals). As mentioned previously, the FAA's estimate of the average time to complete training at ATCT and combined ATCT/TRACON facilities ranges from 17 to 29 months, depending on the level of the facility. The developmentals who had transferred from an en route facility and were still in training had been in training for at least 31 months, which is longer than the FAA's estimate. However, there was a difference in the number of developmentals transferred from an en route rather than a TRACON facility in 2012, the final year developmentals began training at a second facility in our sample. In our sample, 51 developmentals (17.6%) were transferred from an en route facility in 2012, whereas only 15 developmentals (13.2%) were transferred from a TRACON facility in 2012. Nine of the 11 developmentals transferred from an en route facility and still in training at their second facility as of July 2015 were transferred in 2011 or 2012. Although we may want to reexamine the data when all developmentals have completed training, it is unlikely that the results will be affected, given the small number of developmentals still in training as of July 2015. So, although the difference in the number of developmentals still in training at a second facility after transferring from an en route facility is significantly different from the number of developmentals who transferred from a TRACON facility, the practical significance is low.

DISCUSSION

When developmental air traffic controllers fail to achieve CPC status at their first ATC facility, whether an en route center or a terminal facility, their training at that facility is terminated. The process for determining if

the developmental will be separated from the FAA or allowed to transfer to a less complex (lower-level) facility is then implemented (see FAA Human Resource Policy Manual EMP-1.14a (2013)). Ultimately, the ATO National Employee Services Team (NEST) makes the recommendation to either retain or not retain the unsuccessful developmental, based on an assessment of the developmental's training history and employment information. If a decision is made to retain the developmental, the NEST will also decide the type and level of ATC facility to which the employee may be transferred.

The findings in this paper provide objective data on outcomes for controllers who are allowed to transfer to a lower-level facility. Specifically, we addressed the question of how well developmentals do in training when transferred from en route or terminal ATC facilities to lower-level terminal ATC facilities.

We summarize our findings below. Developmentals in the sample we evaluated who were allowed to transfer to a less complex terminal ATC facility after failing to successfully complete training at the initially-assigned ATC facility:

1. Succeeded at a higher proportion when transferred to a small or a medium sized ATCT facility than when transferred to a combined ATCT/TRACON facility.
2. Failed at a higher proportion when transferred to a combined ATCT/TRACON facility than when transferred to a small ATCT facility.
3. Succeeded at a similar proportion at small and medium ATCTs as developmentals assigned to these facilities as a first facility, but at a lower proportion at ATCT/TRACON facilities.
4. Succeeded at similar proportions when transferred from either an en route center or high-level terminal to a small or medium ATCT, or to a combined ATCT/TRACON facility.

CONCLUSIONS

Training outcomes were examined for developmentals who transferred to lower-level ATC terminal facilities following unsuccessful training performance at a first assigned facility. Our objective was to provide feedback on the effectiveness of the FAA's policy to retain training failures if the developmental is believed to have the potential to succeed at a less complex ATC facility. Highlighting the importance of this information is the average annual cost to train an air traffic controller. Based on training costs reported from 2009 through 2013, the average cost per year to train one developmental is approximately $139,207 (FAA, 2014a).

Retaining developmentals by allowing them to transfer to a lower-level facility is a good decision, if the developmental succeeds at the second facility. If successful at the second facility, then the investment the FAA has made in providing some training to the developmental at the first facility is not wasted. In this study, 75% of developmentals allowed to transfer to a second facility were successful, and the FAA's investment in retaining the developmentals was justified. However, if the developmental fails training at the second facility, the cost to the FAA was increased, due to the time the developmental spent in training at the second facility, with no resulting benefit.

In this study, 71 developmentals of 596 failed training at their second facility, and 26 of those were allowed to transfer to a third lower-level facility. Just considering the 45 developmentals who failed training twice, the average time in training at the second facility was 2.09 years. Based on the average training cost figure, the FAA spent about 13 million dollars to train the group at the second facility. Thus, from an economic perspective, it is important that retention decisions lead to successful outcomes for developmentals given a second chance at a less complex facility.

Overall, a larger proportion of developmentals who transfer to lower-level terminal facilities are achieving CPC at ATCTs than at combined ATCT/TRACON facilities. The primary difference between the two types of facilities is the requirement that developmentals at combined ATCT/TRACON facilities learn and use radar procedures to separate air traffic. The difference in the proportion of successful developmentals may be due to challenges encountered in acquiring radar skills.

Another possible explanation is the effect of age at entry into the ATC occupation on training performance in ATC. Researchers have found age at entry to be a consistent and powerful (inverse) predictor of training performance (see Pierce, Broach, Byrne, & Beckley, 2014, for a review). Younger ATC developmentals have greater odds of succeeding in training than older developmentals, despite restrictions in the range of age, due to a maximum age at entry policy of 31 years. If applicants are younger than 31, then age cannot be considered as a factor in initial hiring. However, age may be worth considering, along with training history, in selecting the type and level of facility to which unsuccessful developmentals should be transferred. For example, age may be an important factor if a developmental is transferred into a combined ATCT/TRACON facility in which he or she will be expected to master the skill of using radar to control air traffic. If the developmental had transferred from a facility without radar or had failed radar training at their first facility, then the age at which the developmental learns radar skills at the second facility may be related to success at the second facil-

ity. The specific area of failure at the first facility should be examined closely when deciding on a second facility placement. We also recommend conducting research to examine the relationship between age and training outcomes at a second facility for developmental transfers.

These findings may also have some implications for the notion of relying on career progression to fill vacancies at more complex, radar-based ATC facilities. The question is whether new hires should be assigned to less complex terminal facilities before moving to more complex facilities versus assigning new hires directly into more complex terminal facilities. Would a successful training experience at a lower-level facility increase the probability of training success at a higher-level facility, or would delaying the acquisition of ATC skills at a more complex facility to a time when the CPC is older decrease the probability of his or her success at the second facility?

As mentioned previously, a significant amount of research has suggested that age has a substantial affect on success (Pierce, et al., 2014). It is thought that the earlier that critical skills needed to do the job of an air traffic controller are learned, the more likely are chances of success. Using a career progression strategy to fill vacancies at complex facilities could possibly delay the age at which developmentals begin to learn the skills needed to work in these complex facilities. Thus, we suggest that, before any policy changes regarding placement strategies are considered, based on the findings reported here, additional research should be undertaken to examine the relationship between age upon entry and training success at facilities of varying complexity. Research of this nature would need to examine the age upon entry effect for progressive completion at increasingly complex facilities. The interaction of age and experience at other types of facilities may be more complex. We do not know how these two factors together would affect success at progressively more complex facilities. It may be that starting training at more complex facilities at a younger age is more beneficial than first gaining experience at less complex facilities. Conversely, perhaps experience at less complex facilities helps to mitigate the effect of age at entry. However, age is only one of many factors that may affect training success at a second facility after failure at a first facility. For example, motivation of the developmental, location of the second facility, or facility training processes may also contribute to success. These and other factors warrant further investigation.

The mission of the FAA is to provide the safest, most efficient aerospace system in the world (FAA, 2014b). To do so, the FAA has proposed four strategic priorities, one of which is to build the workforce of the future by empowering and innovating with the FAA's people. This research effort supports that priority by assessing the effectiveness of the FAA's policy of allowing developmentals to transfer to lower-level facilities following failure in training at a first facility.

REFERENCES

Byrne, C.L., & Broach, D. (2014). *An evaluation of the validity of the air traffic selection and training (AT-SAT) test battery for the placement of new controllers by option* (Report No. DOT/FAA/AM-14/10). Washington, DC: FAA Office of Aerospace Medicine.

Federal Aviation Administration. (May, 2011). National Training Database Guidelines.

Federal Aviation Administration. (April, 2013). Human Resources Policy Manual, EMP-1.14a Employment Policy for Air Traffic Control Specialist in Training, Washington, DC: FAA.

Federal Aviation Administration. (2014a). *Post-hearing Questions for the Record submitted to Ms. Patricia McNall from Senator Claire McCaskill.* Hearings before the Subcommittee on Financial and Contracting Oversight of the Senate Committee on Homeland Security and Government Affairs, 113th Congress, 2nd Session, January 14, 2014. (http://www.hsgac.senate.gov/download/?id=2B709C2C-DB78-4B00-9B7F-325B940B8EF7).

Federal Aviation Administration (2014b). *Strategic initiatives 2014-2018*. Washington DC: FAA.

Federal Aviation Administration. (2015). *A plan for the future: 10-year strategy for the air traffic control workforce 2015-2024*. Washington, DC: FAA.

Nickels, B. J., Bobko, P., Blair, M. D., Sands, W. A., & Tartak, E. L. (1995). *Separation and control hiring assessment (SACHA) final job analysis report* (Deliverable Item 007A under FAA contract DFTA01-91-C-00032). Washington, DC: Federal Aviation Administration, Office of Personnel.

Pierce, L.G., Broach, D., Byrne, C.L., & Bleckley, M.K. (2014). *Using biodata to select air traffic controllers* (Report No. DOT/FAA/AM-14/8). Washington, DC: FAA Office of Aerospace Medicine.