The purpose of this analysis was to estimate and compare the potential stability and savings benefits that could result from DL-supported alternatives to current institutional training practices. We were looking for ways to analyze and demonstrate the benefits that could obtain if the Army uses DL to deliver the same professional education more efficiently. We also endeavored to select alternatives that would be consistent with other broad goals, particularly maintaining or improving some aspects of quality of life for soldiers and their families.

PURPOSE AND ANALYTICAL APPROACH

We examined professional development schooling, starting with an in-depth look at the Armor Captains Career Course, and then determined ways to generalize our findings, first to other career courses, and then to other professional development courses for both officers and NCOs. We also made estimates for some Skill Level 1 courses, although the stability effects and savings were considerably more modest. Consistent with our hypotheses regarding DL’s potential to reduce time away from home and unit and to reduce some student-related costs, we identified specific measures for these effects and estimated their values as appropriate in each segment of our analysis. We also compared values for these measures across a variety of alternative training patterns.

An example of our approach is our methodology for analyzing the potential effects of different options for converting part of the Active Component (AC) Armor Officer Advanced Course to DL. The ad-
vanced course is the longest component of captains career courses. In all alternatives, we make our estimates assuming that 25 percent of the total course is being offered through DL; this is consistent with current TRADOC plans for officer advanced courses.\footnote{In our sensitivity analysis we look at the effects of expanding the DL content, although we do not believe an option like this should be pursued until more is known about the effectiveness of DL in imparting the kinds of knowledge and skills found in advanced course programs of instruction.} We also note (as we discuss below) that 44 percent (240 hours) of the Reserve Component (RC) Armor Officer Advanced Course is asynchronous DL. In other words, 44 percent of this course is already being delivered to RC officers without direct instructor contact. Thus, even if we assume that all instructor-delivered training would have to be done as resident instruction for the AC course (i.e., that no training could be delivered by an instructor using synchronous DL), 25 percent DL content should be feasible for the AC course.

We selected a range of options to analyze. Compared with current practice, all options give the officer more time at home station and with his unit. All are consistent with TRADOC’s envisioned course conversion projections, as embodied in the list provided to us, and all are consistent as well with basic criteria of feasibility and consistency with personnel policies.

Beyond this, we wanted to develop alternatives that would give our analysis some breadth in terms of different travel patterns and different effects on quality of life. For example, it has been suggested that completing courses like the career course on a temporary duty basis might be better than the current practice of having officers (and their families, if applicable) move to the school installation for the resident course. The idea here is that if DL shortens the course sufficiently, the Army can save one permanent change of station move by having the officer attend the course on TDY. Thus, our alternatives include a mix of PCS and TDY options, enabling comparisons among additional available days, quality-of-life effects, and travel and TDY costs.

For each option we analyzed, we estimated effects on course length, time that would be needed for DL training at home station, days away from unit, days away from home station (not the same thing, as we show), and TDY or PCS costs. We then compared these measures...
across options. We also conducted some sensitivity analyses to investigate the influence of our cost factors on the results, and to examine the effects of expanding the DL content of the course.

THE ARMOR CAPTAINS CAREER COURSE

A resident professional development course for new or prospective captains has long been part of the core of the Army’s professional development program for its officers. The purpose of the formal education provided at this point in an officer’s career is to prepare him or her for company command and junior-level staff work. The current version of this practice is a combination of an officer advanced course of about eighteen weeks’ duration, and a six-week session in the Combined Arms and Service Support School (CAS3). The advanced course, whose curriculum is weighted with branch-specific material, is taught at branch schools (e.g., the Armor School at Fort Knox). Officers are assigned to their branch centers as a permanent change of station. CAS3 is a resident course at Fort Leavenworth that brings together officers from all branches and teaches staff planning and coordination for junior staff officers. Students typically attend this course in TDY mode during their tour at one of the branch schools.

The Reserve Component Course as a Model

A primary reason for our looking first at the Armor Officer Advanced Course is that the Armor School is currently running a DL-supported course for Reserve Component (RC) officers. All but two weeks of this course consists of instruction delivered using DL. The course is divided into three phases, listed in Table 3.1.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Instructional Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>DL: Web-based, asynchronous</td>
</tr>
<tr>
<td>Phase II</td>
<td>DL: Asynchronous and synchronous</td>
</tr>
<tr>
<td>Phase III</td>
<td>Resident</td>
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</tbody>
</table>
The first phase (240 hours) consists entirely of Web-based asynchronous DL. Officers can sign on to the course Web site and work on one or more segments of the material at a pace and a time of their choosing. The second phase has another 60 hours of asynchronous DL and 120 hours of synchronous instruction. The synchronous instruction is provided using DL capabilities, but it includes interaction with an instructor and other students and so must be scheduled for a set time and done at the same pace for all students. The third phase of the course consists of two weeks’ resident instruction at Fort Knox, accomplished during the student’s two-week Annual Training (AT) period or in some cases during an authorized additional two-week period.

While it is not clear that this course could be an exact model for an Active Component (AC) advanced course, we believe it illustrates the potential for some segment of advanced course instruction to be delivered using DL. In 1999 this course received an award for excellence in distance learning programming from the U.S. Distance Learning Association. The Armor School has asked the Army Research Institute to help evaluate the overall effectiveness of this course; the results of this work should help in the process of deciding how to structure and deliver any AC version.\(^2\)

**The Active Component Course**

Figure 3.1 displays the current patterns for the AC Armor Captains Career Course and compares the AC officer advanced course with the RC course described above. The Army trains about 220 officers per year in the AC course. The officers move to Fort Knox on a permanent change of station, so officers with families can be accompanied. While at Fort Knox, most (about 75 percent) of these officers also take the Tank Commander’s Course or the Cavalry Troop Commander’s Course, depending on their prospective command assignment. This

\(^2\)Officials at Fort Knox relate that preliminary results show learning in the asynchronous portions of the course has been good; “students are doubling their learning between pre-tests and post-tests.” In addition, students seem pleased with being able to do the Web-based portions of the course from home. Students have generally been able to get assistance, when requested, within 24 hours. Instructors also are generally pleased with student work. Students themselves have rated their learning as effective (most “B”, some “A” on an A-to-E scale).
course can be taken either before or after CAS3, depending on scheduling. All officers take the CAS3 segment on a TDY basis at Fort Leavenworth. The usual pattern, as shown in the figure, would be for officers to complete the Armor Officer Advanced Course at Fort Knox, and then travel to Fort Leavenworth in TDY status to attend CAS3. Most of the officers would return to Fort Knox for the Tank or Cavalry Troop Commander’s Course. Some officers would depart from Fort Leavenworth in PCS status en route to their new units, and return to Fort Knox later to complete the tank or troop commander’s course.

Thus, even the current pattern for the Armor Captains Career Course involves some TDY (and, accordingly, some limited amount of family separation). Moreover, it is important to note that with current practice, most officers attend the commander’s courses while stationed at Fort Knox for the advanced course, so no TDY is involved for the commander’s courses. But if the advanced course were to be converted to TDY, these courses would also be TDY and would add to the overall TDY cost.

**Alternatives**

As mentioned above, all alternatives involve reducing the resident portion and the overall length of the Armor Officer Advanced Course. Using the factors described earlier, we estimated the effect of converting 25 percent of the 720-hour resident course to a DL module and shortening that module by 30 percent to account for the effi-
ciency of the DL segment \((720 \times .25 = 180; 180 \times .70 = 126\) hours). Thus, each alternative includes an advanced course that requires 94 resident days,\(^3\) compared with the current 126 days (18 weeks), and a DL module that requires 126 hours (about 16 eight-hour days) of study at home station. We also looked at possibilities for changing the course from PCS to TDY mode, as well as the effects of simply shortening the course. All alternatives involve at least one PCS, as the career course sequence comes between PCS assignments. That is, even if the officer does the entire sequence in TDY mode, one PCS still takes place, with attendant costs. The difference is that with PCS courses, there are two PCS moves instead of one.

The four alternatives we considered are as follows:

Case 1. All resident requirements completed in TDY status
Case 2. Resident requirements done as three separate TDYs
Case 3. Mix of PCS and TDY-and-return, as determined based on Army requirements and officer preferences
Case 4. Current PCS pattern with career course segment shortened by including a DL module.

The Case 1 alternative was motivated simply by our intent to start with a comparison of TDY versus PCS, assuming that the DL-induced shortening of the advanced course could make a conversion to TDY feasible. In this alternative, all the courses in the sequence would be completed in a single (and lengthy) TDY.\(^4\) This case imposes significant family separation, a major disadvantage when taking into account soldier well being and quality-of-life considerations. Thus, the Case 2 alternative allows for return home between the different segments. This reduces the family separation impact somewhat by breaking up the separations, but it increases travel costs. The Case 3 alternative allows some additional flexibility between PCS or TDY, allowing the Army to help officers avoid family separations but also

\(^3\)720 – 180 = 540 hours, or 67.5 eight-hour days. This is 13.5 five-day work weeks. 13.5 seven-day weeks comprise 94.5 days.

\(^4\)Note from our earlier discussion that the Army’s career courses include CAS3, and that most Armor Captains Career Course students also complete a tank commander’s or troop commander’s course while at Fort Knox.
offering others the possibility to avoid family disruptions by taking the course TDY and moving their families once instead of twice. Case 4 avoids altogether the family separation effects by simply leaving the current PCS pattern in effect and shortening the advanced course. This change would be the easiest to make administratively.

We look at the stability enhancement effects of these alternatives and then at some PCS and TDY cost implications. As might be expected, the key factors influencing the changes in available days are total course length, fraction of course converted to DL, and the length of the DL module. We also made allowances for other activities that would consume the time of our student officers, including travel and processing time. For each option we estimated the additional days that each officer would be at home station and available for unit duties.

As we mentioned briefly before, “available at home station” and “available to the unit” are not the same thing, since the officer must devote some time at home station to studying the DL course materials. We therefore identified three different measures that capture the overall effects on officer availability. The first is total additional time on home station (in most cases we presume this would be the losing station). For example, we estimate that our first alternative increases the total time a captain can be at home station by 43 days.\(^5\)

This first measure is also relevant to soldier well being and family quality-of-life considerations, since reductions in TDY absences reduce time absent from home station and thus from family and friends. This measure shows unambiguous benefits in those cases (discussed in subsequent parts of this report) where the courses are already TDY and thus add to family separations. Unfortunately, it is somewhat misleading in cases where an alternative could increase family separations, like some of the advanced course options we discuss here. For example, the alternative cited above, which leaves the officer at home station for 43 additional days, actually increases family separation (by a not inconsiderable four-plus months) because it...

\(^5\)This includes 32 days (25 percent of 126 days) from shortening the resident course, and 11 days resulting from reduced PCS processing and travel time, since there is only one PCS. Figures for other alternatives were derived similarly.
changes the course from an accompanied PCS to an unaccompanied TDY. Since soldier well being and family quality-of-life considerations are important to the Army, we include observations on these effects and treat the degree of family separations as an additional indicator of value.

The second measure of soldier availability is additional home station time adjusted to reflect the time that should be consumed by DL course work. Measured as the raw difference between the additional days at home station and the days needed for DL study, it could be considered an upper limit to the time a student could be made available to his or her unit. Continuing with the example above, this measure tells us the officer would be available for about 27 additional days after allowing for course work.6

The third measure is an estimate of minimum additional time available for unit duties. It is based on the following assumptions:

- The student would complete all DL work in eight-hour days,
- He or she would be given the required number of duty days (in the case at hand, 16) to accomplish the study, and
- He or she would be unavailable for any other purpose on any of those days.

In our example, this measure comes to 15 days.7

The last two measures, particularly the third, are in our view conservative: they understate the potential effects of additional officer availability, especially if DL study time is scheduled judiciously. For example, the officer can be available for at least some part of every day, e.g., to attend physical training with the unit, to meet with others for counseling or planning sessions, to participate in ceremonies, and the like. Similarly, the officer could be available for longer periods on some days and could also, assuming some careful

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643 days less the 16 days needed for DL work yields 27 days. This 16 days (actually 15.75) is 30 percent less than the 22.5 residential days the DL segment replaces.

7The 43 additional days span 6 weekends. There are thus 31 (43 – 2 × 6) additional duty days available. Using 16 of these days for DL course work leaves 15 available to the unit. As we shall note shortly, this is clearly a conservative measure.
advance scheduling, attend field training. This would entail allowing for some DL study time starting as much as two or three months before the officer’s departure for the resident course. As many have pointed out to us in our interviews, such flexible scheduling will require something of a “culture change” regarding officer training time and availability. Absent such a culture change, results will more likely be near the minimum measures. Also, the Army is just beginning to staff and implement policies designed to ensure that soldiers receive the requisite time to complete their DL work. Until the effects of these policies have been evaluated, we believe it is prudent to use minimum measures, noting that careful scheduling and use of time will improve soldier availability more than these measures suggest.

A reasonable point of comparison for the increases in available days in our advanced course analyses is the average number of days an Army captain is currently assigned to his or her first post. In most cases, this is the post from which the officer will depart to attend the career course. Figure 2.1 shows that this average for all Army officers has been about 29 months. For junior officers at the point where they would be going to an advanced course, the comparable average has been similar: just over 30 months, or about 915 days. Thus, a one-month increase in time available at home station would be about a 3 percent increase in total time on station for the affected officer. Work-day comparisons would be similar: 915 total available days equate to about 600 working days, after allowing for weekends, holidays, and leave, i.e., a work-year of about 240 days. So a 15-day increase in available work-days is about a 2.5 percent increase.

Another possible comparison is with the total number of student man-years in the TTHS account. This account measures what is in essence an “overhead” count of soldiers who, because they are in one of these categories, are not available to the Army’s functional

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8This again opens the question of weekend work; treatment of this would in our view needlessly complicate the analysis. Certainly officers work on weekends periodically, particularly when field exercises span more than a week. For comparison purposes in this analysis, we would offer that weekend work schedules would apply equally to officers undertaking DL studies. An arrangement whereby an officer does DL work on a weekend when his unit is in the field is one possibility. Another is that the officer attends the field duty, which means he or she is now available more than our estimate of minimum days.
units or organizations. The TTHS account typically reflects around 65,000 man-years in these four categories, of which about 12,700 are student man-years, including about 6,200 officer student man-years.9

RESULTS OF CASE ANALYSIS

Case 1: TDY Only

Converting the advanced course segment of the Armor Career Course sequence from PCS to TDY is the simplest conversion option. In this option, officers would attend all courses on a TDY basis: the advanced course at Fort Knox, CAS3 at Fort Leavenworth, and the appropriate commander’s course (tank commander or troop commander) at Fort Knox. This adds, in effect, two TDY segments (advanced course and commander’s course) and removes one PCS move. As Figure 3.2 indicates, this option results in upwards of 40 days more time available at home station for each officer. This includes the days saved by shortening the resident portion of the course and some additional days saved in PCS processing since only one PCS occurs in this alternative. After allowing for DL study time, this option yields between 15 and 27 additional days available to the unit, depending on how duty time is apportioned and scheduled. However, this is the least favorable option from the standpoint of family well being for those officers with spouses and families, since it entails a long period of separation—upwards of four months longer than with PCS options—during the TDY courses.

Case 2: Separate TDYs for Each Training Event

This option is essentially the same as the first except that it allows for breaks in the extended TDY period: officers can return home between courses, so the major unfavorable family impact of the first case would be alleviated somewhat. But the additional family separation time would remain at more than four months; the family impact of both these options is a significant disadvantage. This draw-

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9DCSPER 170 Report through May 2000. In the most recent 12 months through May 2000, the overall TTHS account fluctuated from 57,000 to just fewer than 73,000; the average was about 65,000.
back, coupled with the added travel costs (discussed below) and time associated with multiple TDY trips, makes this the least desirable option. Figure 3.3 compares Cases 1 and 2.

**Case 3: TDY or PCS; Officer’s Choice**

In this alternative, we considered the possibility of reducing the family impact still further by allowing for personnel managers to use a mix of PCS and TDY options, attempting to accommodate officer preferences (which could go either way) within Army requirements and available resources. While we believe most officers would prefer to be accompanied rather than have long separations, some might prefer not to take their families through an additional move. It might even be possible in some cases to move families to the gaining installation. This would matter, for example, to officers with school-age children, although this is a relatively small segment of the career-course population. It would also matter in cases where employment
considerations for the spouse make TDY a better option for the student.

Although it does not provide as much in the way of stability enhancement as the first two alternatives, this alternative or the next one (PCS advanced course, but shorter) is probably the most desirable because it eliminates the disadvantages of long family separations. Figure 3.4 provides a comparison.

**Case 4: PCS, but Shortened Course**

This alternative, like the first, has the advantage of simplicity: it retains the same pattern as the current practice, but shortens the resident advanced course phase, as in the other alternatives, by substituting a DL module for one-fourth of the course requirement. It is thus the easiest change to make. It does not allow for any officers to
avoid a move for their spouses and families—but it is no worse than the current practice in that respect. Because there are two PCS moves in this alternative for all officers (except the small number who either are at Fort Knox already or are assigned to Fort Knox after the course), more days are lost to processing and travel, but again no more than in the base case (current practice). Figure 3.5 compares the alternatives.

As we will show in our subsequent discussion, all alternatives have essentially the same cost; if anything, the alternatives that expand the use of TDY travel and its attendant expenses are somewhat more expensive than those that include the current PCS pattern. Furthermore, when we account for family separation considerations, this alternative or the previous one appears to be the best choice: both either reduce or eliminate disadvantageous impacts on families, and still provide significant stability enhancement by making officers available to their units for a longer time.
AVAILABLE DAYS SENSITIVE TO DEGREE OF DL CONVERSION

As part of our sensitivity analysis, we analyzed several options regarding the size of the DL module and thus, as a derivative, the length of the residential portion and duration of the overall course. Not surprisingly, there is an essentially linear relationship between the number of days an officer is available (by all three measures) and the size of the DL module: the more a course can be converted to DL, the more the student can be available at home station. Figure 3.6 illustrates this.

The first set of bars on the left shows increases in available days derived from our second alternative, which is representative of the four options we examined. Recall that this alternative and its companions start with a 25 percent conversion of the advanced course curriculum to DL, which reduces the resident phase from 18 to a little more than 13 weeks. This particular case gives each officer 38 addi-
tional days at home station compared with the present system, which means an upper estimate of 22 days and a minimum of 12 days available to the unit. The other alternatives yield similar results, although those with PCS processing result in somewhat fewer available days, as shown previously.

By comparison, a 45 percent conversion to DL yields a larger number of available days: 61 at home station, 33 after accounting for DL study time, and a 17-day minimum estimate of available work-days. These and the previous figures should be compared for perspective with our previously derived 915 days (average on station for junior captains) and 600 days (average work-days).

The rest of the diagram simply emphasizes the magnitude and monotonic nature of this relationship. It also suggests that more DL
conversion is better. This of course is not true: the limit to conversion will come from deciding how much can effectively be converted to DL out of a curriculum that includes tactics, leadership, planning and decision-support processes, unit administration, criminal justice proceedings, and a host of other potentially complex topics. This is an area that the Army is already exploring more extensively; our analyses illustrate the potential benefits of further conversions to DL if they can be supported from the standpoint of training effectiveness. The excursions shown in this diagram all have more severe reductions in resident training time than the alternatives we discussed in the previous charts, making them less desirable from a training effectiveness standpoint unless it can be demonstrated that additional course material can be taught effectively using DL.

Assumptions about travel and processing time have some impact, but they depend only upon the choice of option (PCS versus TDY). Within a reasonable range of assumptions about processing and travel time, the impact is small and is in any case of marginal relevance to DL initiatives.

**ESTIMATING COSTS AND SAVINGS**

We turn next to a discussion of costs and savings. First, we offer a quick overview of the Army’s investment in distance learning. This investment amounts to about $630 million, covering infrastructure, expenses involved in developing courseware, fielding costs, and the management costs tied to program development and implementation. These costs have been estimated through the year 2015, but most ($440 million) are in the early and middle stages of that period. A little over $110 million was spent in 1998 and 1999; the figure for 2000 through 2007 is about $330 million. These can reasonably be considered start-up costs of the program. Additional investment costs anticipated in the later years primarily involve continuation of courseware development and future software and hardware upgrades, along with some minor residual fielding and procurement costs.\(^\text{10}\)

\(^{10}\)The source for these figures is TADLP’s Economic Analysis. The Army National Guard’s Distributed Training Program had about $220 million in costs through FY00 that are not included in these figures. The Army also has other programs, currently
The DL program—like the residential learning programs it will partially replace—will also have recurring (operating) costs in the areas of course maintenance (i.e., keeping course materials up to date), facilities maintenance, instructors, and support personnel. There is significant evidence to the effect that DL can be more cost-efficient than residential learning, but we urge caution in anticipating structural savings until more is known about DL’s implications for school support and instructional resources.

Development of the appropriate mix of instructors and support personnel to carry out resident and distance learning programs will be a complex process. Both will still be needed, albeit in somewhat reduced numbers, for the residential segments that remain in each course. Moreover, some instructors and support personnel will be needed in DL segments to conduct synchronous training as needed, to monitor student progress, provide feedback, and attend to quality assurance. Resource managers will have to remember that these and similar functions must be performed for both the residential and distance learning portions of each course, and thus that the schools and centers will need to be staffed with both requirements in mind. Also, as school officials around the Army frequently reminded us, instructors (and to a lesser extent support personnel) perform duties other than platform instruction. Most are also committed to part-time support of doctrine and training development, including development of training materials for units and organizations in the field, and all have part-time administrative duties.

Thus, while one might expect TADLP to lead to some savings in the operation and support of the Army’s schools, we believe it would be premature to count on these forms of savings. The Army should closely monitor the realization of savings and cost avoidances and compare them with the estimates in TADLP’s Economic Analysis, adjusting program implementation as necessary to capture the best payoffs.

outside the purview of TADLP, that are using or will be able to capitalize on DL technologies. These include computer-based training, DL support for the Army’s Continuing Education Program, and Army University Access Online, the new initiative to provide greater access to college courses.

11 See, for example, Rumble (1997), especially Chapters 13 and 17.
PCS and TDY Costs

We focus here on savings that can reasonably be estimated based on planned DL conversions and their effects on time spent and travel involved in institutional training. Even in these areas, as we will show, the estimates are by no means concrete. Key elements in our estimates include factors for PCS costs, TDY travel, lodging, and per diem. The other determinants are the number of PCS moves (for courses that involve PCS moves, like the advanced courses), and the duration of TDY periods.

This analysis examined cost factors related to three elements of cost in the captains career course: PCS costs, TDY travel (airfare) costs, and TDY per diem (daily lodging and food) costs. These three elements show up from top to bottom as the three segments of the bars in Figure 3.7. Although data on actual PCS costs experienced by the students of the Armor Captains Career Course were not available, these costs can be approximated using average figures for officer PCS costs, accounting for three different types of PCS moves. The costs per person in FY00 were $14,100 per rotational move, $9,100 per operational move, and $6,600 per training move. TDY travel costs, including the airfares between posts, were obtained from the Carlson-Wagonlit travel agency. TDY per diem rates for Leavenworth and Knox were estimated at $60 per day; consistent with rates for CAS3 and lodging/per diem costs at Fort Knox. Using these figures and move patterns for career course students derived from the Officer Master File, we estimated the cost of our various TDY and PCS alternatives. It is important to note again that all alternatives include some PCS and some TDY; it is the relative mix of these modes that matters. For example, our Case 1 ("All Courses TDY") still includes a PCS move from the previous unit of assignment to a new unit; this move could come either before or after attendance at the various courses.

12Training moves are from a CONUS station to a school. Operational moves are from one station to another in the same major geographical area (i.e., not overseas). Rotational moves are overseas, to or from. A move from overseas to a school counts as a rotational move, not a training move. Also, we counted moves from school as operational moves, which further biases the analysis toward higher PCS costs. Our sensitivity analyses address variations of these factors.
We found that, within a reasonable range of values for the various PCS and TDY cost elements, the costs of our alternatives are roughly comparable, as shown in Figure 3.7. Note that all cases (1, 2, and 3) where we model expanded use of TDY show increases in TDY costs that more than offset reductions in PCS costs. Note also the further increase in the TDY travel component (middle band in the bar charts) in Case 2, reflecting the additional travel associated with multiple TDYs. PCS and TDY costs for the current practice and our Case 4 are the same: the only difference between these two alternatives is the length of the advanced course component, which is done as a PCS and thus has no bearing on TDY costs in this alternative. Thus, unless TDY costs can be substantially reduced, or unless we are very low on the estimate of PCS costs (unlikely, as we shall discuss), then the PCS options (current practice and Cases 3 and 4) are more favorable from a cost standpoint. We will discuss this finding in more detail in connection with sensitivity analysis in the next few paragraphs.

![Figure 3.7—Cost Comparison of Cases](image-url)
Sensitivity of Results to Cost Factors and Course Length

The analysis underlying Figure 3.7 relies on some important assumptions about the costs associated with TDY travel and lodging, and costs of PCS moves, the length of processing and travel, and the length of the advanced course (Fort Knox) segment of the captains career course. As we pointed out above, the PCS savings from converting to TDY are generally offset by increases in TDY costs. This, again, is consistent with previous research in this area. Moreover, we have good reason to believe that the PCS cost factors being used here are at the high end of a reasonable range, since they are a composite of the costs for all officer moves. The Army does not have detailed breakouts of PCS costs for subcategories such as seniority or number of dependents. Available data showed only the cost for each general type of move (e.g., rotational, operational, training, etc.). In other words, the junior captains (and senior first lieutenants) in our analyses here are assigned the same PCS cost factor as more senior officers, who would tend on average to have more dependents and more personal property to ship. Thus, if anything, the average cost factors we were provided are high for the population we are considering.

Reasoning, accordingly, that our PCS cost factors are upper bounds, we confined our sensitivity analyses to the results that would obtain if we use lower PCS cost factors. For example, we note that the planning factors show the average cost for a training move ($6,600) to be much lower than the $9,100 for an operational move. We suspect this is because officer training moves are more heavily weighted with junior officers (i.e., primarily the three to four thousand captains who go to the career course every year) than are the operational moves (which would more closely be a composite of all officers). Thus, it might be reasonable to assume that actual operational move costs for our selected sample of captains would be closer to the training move average than to the operational move average. Similarly, we reduce rotational move costs in our sensitivity excursions, reasoning as above that our population is going to have fewer dependents and less baggage than the average for the overall population that forms the basis for the factors.

Our intent in the sensitivity analyses is to illustrate the ways in which PCS costs, TDY costs, and course lengths influence our cost estimates, and thus examine the ways in which changes in these factors could affect the relative merit of the alternatives we examined. Simply put, higher PCS costs naturally favor options with more TDY, like our Cases 1 and 2. Likewise, lower TDY costs and shorter resident courses (bigger DL component) would favor TDY options.

Carrying this basic logic a bit further, Figure 3.8 illustrates a view of the tradeoff between PCS and TDY alternatives. The solid diagonal line in this figure represents a set of points (combinations of PCS cost factors and resident course length) where the cost of a TDY alternative matches the cost of a PCS alternative, i.e., points at which we would be indifferent, from a cost standpoint, between PCS or TDY. We use here our Case 1 as the TDY alternative, and Case 4 as the PCS alternative. Points above this line, like point A, represent assumed higher PCS costs, shorter resident course length, or both. In this area, the balance tips in favor of the TDY option, at least from a cost standpoint. Below the line (point B is an example) lie lower assumed PCS costs and longer residential times, which favor the PCS option.

Figure 3.8—Sensitivity to Course Length and PCS Costs
The dotted vertical line at 94 days represents the duration of the residential portion of the Armor Officer Advanced Course in our alternatives. With this resident time and assuming our PCS cost estimates are accurate, the PCS option is slightly favored (i.e., point C falls just below the line). This is consistent with our finding that the estimated costs of all our alternatives are similar, provided one assumes that our PCS cost factors are accurate. Relaxes that assumption and allowing for the possibility of lower PCS costs, as we believe would be reasonable, tips the balance further in favor of the PCS option. Note that if PCS costs are 60 percent of our original estimate, residential time would have to be cut to about 38 days or less for the TDY option to cost less: point D. This would be more than a two-thirds reduction in residential learning time, which we do not believe would be desirable.

Figure 3.9 presents similar logic in a different fashion. Here, we look at the possible effects of making TDY options less expensive by reducing per diem rates, assuming for the moment that consolidation of lodging arrangements or making lower-cost government meals available would be feasible. This would of course make TDY options more attractive, at least from a cost standpoint. The downward-sloping solid curve in this figure represents points where the TDY alternative costs the same as the PCS alternative, assuming PCS costs are equal to our original estimate. Here, points above or to
the right of the curve represent higher TDY cost factors or longer resident phases, so this area (containing point A) favors PCS alternatives. Note that with the original PCS cost factors and the 94-day resident course, the PCS option is again favored (point A is above the curve). Reducing the resident phase (moving to point B, for example) or reducing per diem costs (moving to point C), if such changes were feasible, would make the TDY options more attractive.

Figure 3.10 recalls our earlier argument that our original PCS cost factors are most likely on the high side. The downward-sloping curve in this figure is analogous to the one in Figure 3.9, but it represents an assumption that PCS cost factors are 60 percent of our original ones. It is also important to see that anywhere in this figure, a combination of much lower per diem rates and a much shorter resident course would be needed to push the cost of the TDY option below the cost of the PCS option. Point A is illustrative.

In short, both these graphical illustrations tell us that within a reasonable range of the relevant cost factors (i.e., absent unreasonable manipulations of those factors), the PCS options we explored cost at worst about the same as the options with more TDY, and more likely less. Figure 3.11 compares the TDY and PCS costs of the base case and our alternatives, showing costs based on 100 percent PCS cost.

![Figure 3.10—Sensitivity to Course Length and TDY Costs, Assuming Lower PCS Cost Factors](image)
factors (recalling Figure 3.7) and costs with the 60 percent PCS cost factors we dealt with in the sensitivity analysis. In these bar graphs, the only things that change are the PCS cost components (top segments); note that the use of 60 percent cost factors somewhat widens the differences between the PCS-heavy and the TDY-heavy options.

**CAREER COURSES IN GENERAL**

We now turn to the possibility of extending our logic to other career courses. We use here our figures for the fourth alternative, and apply the estimated per-officer increases in available days to a career course–bound population of some 3,500 to 4,000 captains per year.\(^\text{14}\)

We employed the basic methodology used with the Armor Captains

\(^{14}\)The FY99 ACC promotion list had 4,100 names on it; FY98 had 3,500.
Career Course: 25 percent conversion to DL, with the DL portion 30 percent shorter than the resident portion it replaces. We also assumed the PCS option would be retained. Based on these figures and assumptions, we developed an estimate of about 300 to 340 additional man-years (using the total-time-on-station measure), or between 115 and 135 working man-years (using our minimum measure of duty days, converted to working years). Consistent with our previous reasoning, these effects can be larger than our conservative measures indicate, depending on how carefully officers and their supervisors can schedule DL preparation and study time around unit duties. Also, the effect on stability enhancement is greater if TDY options are chosen (less time used in PCS processing), but the negative effect on families is significant. Overall costs for student travel will also rise in the TDY alternatives, as we have shown earlier.

For comparison, recall from the treatment of our measures of available days\textsuperscript{15} that overall officer student time imposes a TTHS load of about 6,200 man-years. The relevant comparison is with on-station available man-years (300 to 340 by our estimate), so the DL options for advanced courses could reduce “actionable” student man-years by about 5 percent. Another relevant comparison, since we are dealing here with the career course student load, is with an estimate of officer days consumed by career courses. The Army does not track this statistic separately, but it is reasonable to posit that these courses currently consume about five to six months per officer, so a figure of 4,000 officers per year yields a man-year load of about 2,000. Therefore, the DL conversions could save some 15 to 17 percent of this measure of “actionable” man-years. At a time when the Army is experiencing a shortage of some 2,700\textsuperscript{16} captain man-years, this is a significant benefit. We will come back to this form of comparison later in the report when we discuss the extension of our logic to a broader set of courses.

Thus, we recommend that the Army continue to pursue the options it is examining for bringing DL modules into its officer advanced courses and reducing the overall duration of these courses. In par-

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\textsuperscript{15}See Chapter Two, and in particular Figure 2.1 and the discussion that follows.
\textsuperscript{16}2,746, according to the DCSPER’s Military Manpower Program Review for August 2000.
ticular, it should be possible to capitalize on courseware already developed to expand coverage. It should also be possible to develop a more precise estimate of actual benefits, costs, and savings. Absent major reductions in course lengths, which we do not believe would be prudent at this stage, we also recommend that the Army retain the PCS variant of these courses. If avoiding family moves is enough of a concern for some officers, the Army could experiment with a pilot program along the lines of our third alternative, where personnel managers can employ a mix of TDY and PCS, but this will raise costs slightly for officers attending in a TDY mode.