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# Special Report

## Exam performance under FES

by Robert J. McKay

**T**he Society's exam system was restructured in May 1987 as the *Flexible Education System (FES)*. Since then, the Education and Examination (E&E) Committee has monitored the effect of FES on exam performance of candidates. A comprehensive analysis of Associateship results was performed following the November 1989 exams by Judy Anderson, FSA, of the Society's office with the help of Marta Holmberg, Ph.D., and Kim De Filipps. Some additional data from the May 1990 exam session are also included. This report reviews the results of that analysis.

### Summary of findings

1. The time to complete the Associateship exams (travel time) has increased under FES, from a median of 4.06 years before FES to 4.26 years under FES.
2. Travel time has increased because candidates are attempting 30% fewer credits under FES. We believe they attempt fewer credits either because they feel they must cut

back to be successful under FES or because of personal reasons.

3. Stronger candidates do not appear to be slowed down by FES.
4. Candidates attempting over 50 credits (five hours of exams under the old system) perform better than candidates attempting fewer credits. It appears, therefore, that well prepared candidates do not have to cut back on credits attempted to be successful. Consider the data on success rates by credits attempted:
  - 10-20 credits attempted  
45.2% pass rate
  - 21-50 credits attempted  
46.5% pass rate
  - 51+ credits attempted  
51.2% pass rate
5. Pass rates are higher under FES than prior to its implementation. The average effective pass rates have increased from 40% before FES to 45.5% under FES. Pass rates likely have increased because candidates can better learn material for several short exams given over a two-week period than for one long exam.

### Background

A primary responsibility of the Society of Actuaries is "to identify, educate, and qualify persons with the interest and potential to become Society members." FES was introduced in 1987 to enable the SOA to provide a more complete scope of education for future actuaries. FES accommodates changing topics and courses on the syllabus, making the system more responsive to the changing demands of the business environment.

FES also enables candidates to tailor their examination schedules to fit their professional and personal needs. Candidates are able to write more or fewer credits per session, depending on their personal situations. Fast track candidates can accelerate their progress through the system. On the other hand, FES also accommodates candidates whose personal situations or preferences lead them to write fewer credits in a session.

### Questions and responses

A number of concerns have been raised on the effect FES is having

on candidates. The rest of this report responds to the most frequently asked questions.

**Q. What effect has FES had on travel time, the time it takes a candidate to get through the examination system?**

A. Although there is not yet enough experience with FES on the Fellowship exams to provide meaningful comparisons, the Society's office has conducted studies comparing travel time to Associateship pre-FES versus FES.

Two approaches proved useful in determining the effect of FES on Associateship travel time:

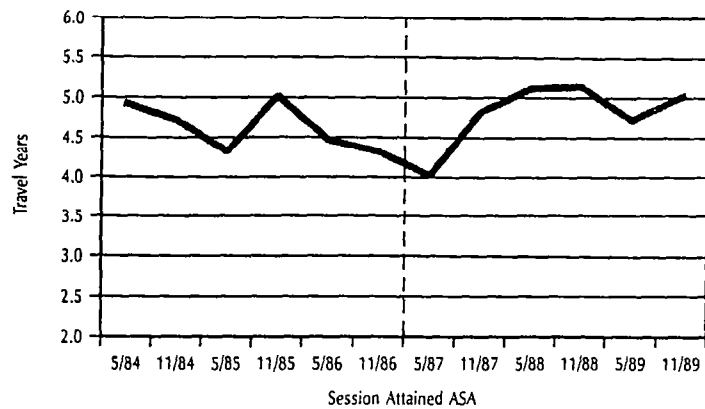
- (1) average time to Associateship among successful ASAs
- (2) cumulative credits, earned over several exam sessions, of all candidates writing Associateship exams (including candidates who are not yet Associates).

The results of these two analyses are presented below. Both methods of measuring travel time indicate that FES has increased the average time it takes to get through the Associateship examinations. It is primarily the slower-moving candidates whose travel time is increasing. The data indicate that fast track candidates, as well as the average candidates who are reaching Associateship by steady progress in the system, are not being slowed down by FES.

**(1) Average travel time to ASA**  
Graphs 1 and 2 show the travel time from first exam sitting to Associateship for all candidates who became Associates during the period 5/84 through 11/89.

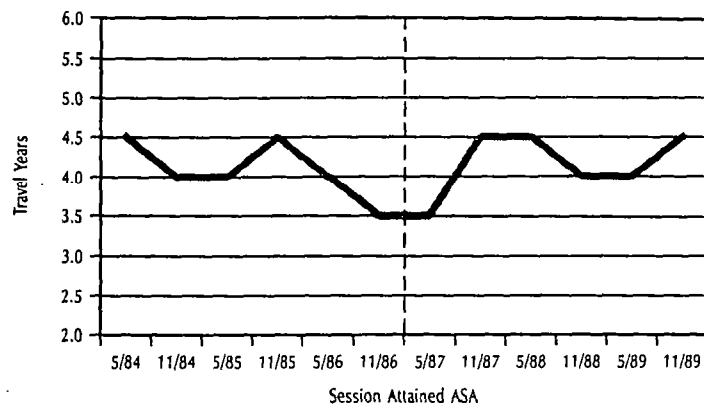
The weighted average median shows a slight increase in travel time (4.26 years versus 4.06 years). The weighted average mean produces similar

## Mean Travel Time to ASA By Session



Graph 1

## Median Travel Time to ASA By Session



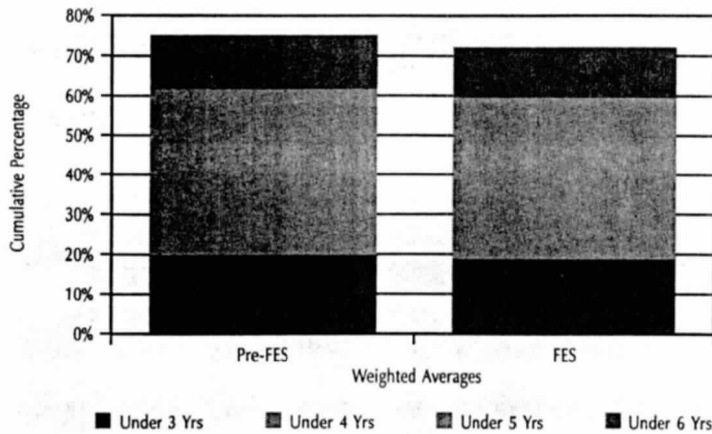
Graph 2

results: 4.89 years FES versus 4.60 years pre-FES.

Both graphs show rather erratic patterns. The more pronounced variations are due to changes in the syllabus and the resulting transition periods. For example, candidates attaining Associateship in May 1987 had the lowest mean and median travel times of all sessions analyzed. The November 1986 figures are low as well. FES was announced to

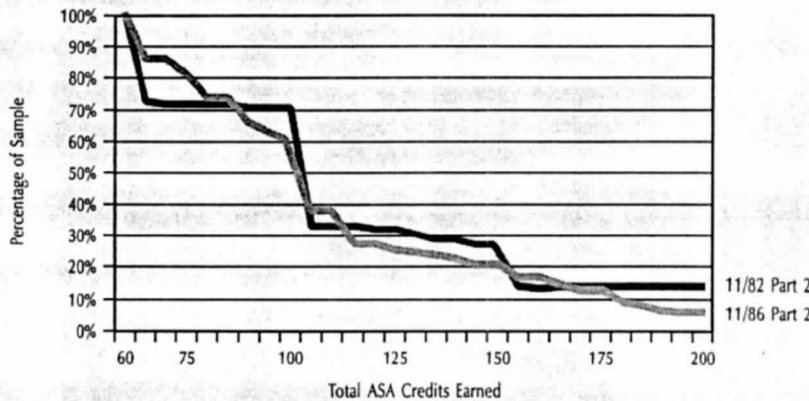
the candidates in mid-1986 and was implemented in May 1987. It appears the November 1986 candidates were well prepared and highly motivated to attain Associateship to avoid the transition to FES. The May 1987 Associates represent the strongest candidates, those who in their first encounter with FES mastered all of the separate subjects that had comprised Part 5.

## Travel Time to ASA By Session



Graph 3

## Total Credits - 4 Sessions After Part 2 20% Samples of Part 2 Pass Lists



Graph 4

### Range of travel time

Graph 3 presents the weighted average of the information used to complete Graph 1. It shows that approximately 19% of successful candidates under FES attained their Associateship in less than three years; the comparable pre-FES percentage is 20%. Forty-one percent of both pre-FES and FES ASAs attained their designation in under four years;

60% FES and 61% pre-FES did so in under five years. This graph illustrates that travel time for the pre-FES and FES populations is comparable, and implies that FES is not slowing down the fast track candidates. The only noticeable increase occurs among the slower-moving candidates. Approximately 27% of the successful ASAs under FES took six or more years to become

Associates, while the corresponding percentage for pre-FES exams was 24%.

(2) **Cumulative credits analysis**  
Travel time was also analyzed using cumulative Associate credits earned after several sessions. A 20% sample was drawn from the base population of candidates who passed Part 2 (Course 110 equivalent) in November 1982 and from those who passed the examination in November 1986. The sample comprised only candidates who had received credit for Part 1 (Course 100) as well. Thus, each of the candidates in the sample had exactly 60 of the 200 credits required for Associateship.

## Cumulative Credits after 6 Sessions (20% sample)

Credits	Pass Part 2 11/82	Pass 110 11/86
60	100%	100%
70	78%	87%
80	75%	80%
90	74%	73%
100	74%	70%
110	45%	46%
120	44%	40%
130	43%	34%
140	43%	33%
150	43%	32%
160	24%	29%
170	22%	24%
180	22%	22%
190	22%	18%
200	22%	18%

Table 1

## Average Effective Pass Rate

	Pre-FES (5/84 - 11/86)		Post FES (5/87 - 11/89)
Part 3	41.4%	120-135	46.1%
Part 4	37.2%	140-150	41.2%
Part 5	42.3%	151-165	50.4%
Average	40.0%	Average	45.5%

Table 2

## Credits Written vs Credits Achieved

Date	Attempted	Achieved	%
11/85	45.9	17.2	37
5/86	49.3	19.3	39
11/86	48.5	18.4	38
5/87	41.0	16.1	39
11/87	36.9	15.0	41
5/88	36.6	16.1	44
11/88	34.9	14.5	42
5/89	34.7	14.7	42
11/89	33.2	13.8	42
5/90	33.1	14.3	43

Table 3

Table 1 and Graph 4 display, by percentage of candidates in the sample, the number of credits earned after six sessions. For example, 74% of the pre-FES sample population and 70% of the FES sample population had earned at least 40 credits (for a total of at least 100 cumulative credits earned) over the six sessions following the 11/82 and 11/86 base dates. Twenty-two percent of the pre-FES sample versus 18% of the FES sample had earned all 200 credits required for Associateship.

Both the table and the graph show a decrease for most candidates in cumulative credits earned under FES; however, at several points FES candidates have more credits. For both FES and pre-FES candidates, there is a major drop-off at about the 100 total credit threshold. Only 45% of pre-FES and 46% of FES candidates have made it beyond 100 credits. Very few of the candidates who have not exceeded 100 credits at this point will ultimately reach the ASA level.

At the other end, the results for candidates with 150+ credits,

those approaching Associateship, are also quite similar under both systems. There is a small difference in favor of the FES candidates at the 160/170 level and a small advantage to the pre-FES candidates at the 190/200 level - this is consistent with the analysis of average time to ASA.

The difference between FES and pre-FES is greatest for the middle group of candidates, those between 100 and 150 credits. The FES candidates clearly have fewer credits after six sessions than do the pre-FES candidates. As discussed later in this report, we believe these candidates are slowing their progress because they are taking fewer credits each session than did their predecessors under the pre-FES system. They are doing this either because they believe it gives them an advantage in competing with other candidates or because the smaller FES exams represent more manageable units for these candidates who, for personal (e.g., lifestyle, parenting) or professional (e.g., work pressures) reasons, could not devote sufficient time to studying to master a full 50-credits worth of study material.

### ***Q. Have passing standards increased under FES?***

A. No. Passing standards are unchanged. A common misperception is that candidates are competing against one another, rather than against established standards, and that candidate performance causes the standards to fluctuate. This leads to the belief that examination standards are higher under FES because of competition from candidates writing only one small exam.

In fact, performance is measured against standards that

## Analysis by Number of Credits Attempted (5/87 – 5/90)

# of Credits Attempted (zeros eliminated)	% of Candidates	Pass Rate	Credits Earned
10 – 20	28.6	44.1%	5.8
25 – 35	25.6	45.8%	12.8
40 – 50	35.4	45.5%	19.9
55 and over	10.4	49.8%	33.1

Table 4

## Number of ASA Candidates by Session

Date	Number of ASA Candidates Writing 120-165
11/85	2,676
5/86	2,894
11/86	2,995
5/87	4,715
11/87	4,852
5/88	5,979
11/88	5,757
5/89	7,244
11/89	6,979

Table 5

measure adequate knowledge. Extensive data are collected and evaluated to ensure that standards remain consistent, both in the transition to FES and over each exam administration under FES.

The steadily increasing pass rates under FES, up from an average of 40.0% pre-FES to 45.5% for effective candidates, demonstrate that the increase-in-standards concern is unfounded.

Candidates are better prepared and therefore more of them are passing. (Effective candidates are those candidates who get more than one-half of the points necessary to pass an examination. An effective candidate is one whose grade exceeds zero.) This is not surprising, as the shorter, single-subject courses in the FES system enable candidates to better understand and prepare more fully for the examinations. See Table 2.

*Q. Then why are students proceeding more slowly under FES?*

A. Despite the higher pass rates under FES, travel time is increasing because students are writing considerably fewer credits per session (down from a pre-FES average of 48 to 33 in May 1990). See Table 3. This downward trend has been consistent over each session administered under FES and clearly has a direct impact on travel time through the system.

As discussed earlier, there is a perception among candidates that they are competing against one another and not against established standards. It appears that some candidates fear competition from those writing only one exam, and as a result, hesitate to attempt more credits. The response to the next question may alleviate concern among some candidates.

A second reason for the 30% decrease in credits attempted are those candidates who choose, for personal or professional reasons, to write fewer credits.

The average credits achieved per session under FES are down as well, from 18.4 pre-FES to 14.3 FES (May 1990). It should be noted that the success rates (credits achieved versus attempted) for FES sessions are consistently *higher* than for pre-FES sessions. However, the decrease in average credits attempted more than offsets the increased success rate and pulls down the average-credits-achieved.

Also, the increased success rates under FES are actually understated because the percentage of ineffective candidates has virtually doubled with FES (5.7% versus 11.2%). One strategy

adopted by some candidates is to write more examinations than they seriously study for, which inflates the ineffective rates.

***Q. Are well prepared candidates who attempt many credits at a disadvantage?***

A. No. Table 4 analyzes the success rates of candidates based on the number of credits attempted. It shows a clear trend of higher success rates for those candidates attempting more credits than for those attempting fewer credits. While there is self-selection operating here, the data nonetheless indicate that it is not necessary for the well-prepared candidate to write fewer than 50 credits to be successful in the FES system.

***Q. Has the complexity of FES caused a decline in the number of students?***

A. No. There has been a significant increase in the number of candidates writing Associateship exams (above Course 110) under FES. See Table 5. In the three-year period from November 1986 to November 1989, the number of ASA candidates has increased 133%, from 2,995 to 6,979. While FES is not responsible for the increase, the earlier concerns that potential actuaries would avoid the profession due to the system's complexity are not supported.

***Q. Do the shorter examinations increase the possibility of poor candidates guessing right and passing exams?***

A. While that is a possibility, the chances of such an occurrence are slim. Each examination is carefully devised, question by question, in such a way as to clearly separate those candidates who should pass from those who

should not. Recent changes made to further improve the reliability of the shorter examinations include lengthening all one hour ASA exams to 1½ hours while increasing the number of questions so that each exam has a minimum of 20 questions.

***Q. Have the FES exams increased minimum standards for candidates?***

A. Yes; this was a deliberate goal of the new system. Prior to FES, a candidate could show very little knowledge on one exam topic, and still pass the exam if the weak topic was offset by strong performance in other areas. This result concerned many in the profession who felt the old system did not require adequate knowledge in all areas. Breaking the exams into separate pieces eliminates this concern. Has it created another problem of too high standards? The results discussed earlier in this report, showing improved performance on FES exams, appear to counteract this concern.

**Summary**

In summary, the travel time to Associateship has increased about 5% under FES. This increase results from candidates attempting fewer credits in a session. Candidates have continued to attempt fewer credits despite the steady increase in success (pass) rates under FES. Contrary to popular belief, candidates writing more credits have actually experienced higher success rates than the candidates writing fewer credits.

Changes in the candidate population and candidate strategy also affect travel time to Associateship under FES. FES

certainly has not discouraged candidates, as we have experienced a large increase in the number of candidates in the exam system. Previously inactive candidates are returning to the system after several years. In addition, many candidates are adopting strategies that are slowing their progress through the system.

FES has brought with it significant advantages. Programs other than self-study, such as the Intensive Seminar or the Research Paper, help candidates develop skills that will be useful to them professionally. Candidates have choices that enable them to select the courses that will be most useful to them. Changes in study material and in topics covered can be made more quickly in response to changes in the business environment. These advantages, along with other elements of flexibility, outweigh concerns about travel time, given that the increase in travel time is slight, and the increase is a result not of necessity (or some aspect of the system), but of candidate choice.

**Further Actions**

We intend to continue to provide relevant information on travel time, such as suggesting employer strategies to encourage candidates to attempt more credits per session. We will continue to monitor the effect of FES on the ASA examination system. We will also analyze and communicate the experience with FES for the FSA examinations two years from now when a sufficient experience base exists.