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CURRENT DEVELOPMENTS IN EDUCATION AND EXAMINATION

Moderator: JAMES J. MURPHY. Panelists: E. PAUL BARNHART, LINDEN N. COLE, BARBARA J. LAUTZENHEISER, FRANK G. REYNOLDS

1. Goals, purposes and objectives of actuarial examination and education.

2. Critique of the current system.

   a. Is the new Fellowship exam structure better than the one it replaced?

   b. Are the exams relevant to the actuary's daily work assignments.

   c. Are grading standards changing?

   d. Advantages and disadvantages of an all volunteer system.

3. Role of the academic community in actuarial education.

4. Interrelationship of the Society's E&E structure with that of other actuarial bodies.

5. Plans and future directions.

MR. JAMES J. MURPHY: As many of you know, the Society's Education and Examination Committee has been giving a great deal of attention to the content of the Associateship exams over the last several years. In order to better prepare the Society's leadership, the E&E General Officers were asked to define a conceptual framework or strategy for the development of actuarial education in order to provide a yardstick against which proposed modifications could be measured. In response to this request, Michael Cowell (General Chairman of the E&E Committee who will be moderating a forum like this in Colorado Springs) prepared A Statement of Strategy for Actuarial Education. Mike worked with me and other General Officers of the E&E Committee, Barry Watson, the Society's Vice President currently overseeing the E&E Committee and Linden Cole, Director of Education. Drafts were reviewed by the Education Policy Committee and the Executive Committee of the Board of Governors, and the final version was just recently presented to the Board at the Houston meeting. The remarks I will now make draw heavily on the statement that Mike prepared.

In considering the conceptual framework for education strategy, we looked at the current situation facing the actuary. We identified four forces of change -- social and demographic, political, economic and technological. The actuary of the past worked in a relatively stable socio-demographic environment. The future will be more dynamic and will require a flexible approach to both the work and the education of the actuary. The general political trend is to fewer limitations on the actuary's judgment with increased reliance on actuarial certification. The outlook is for the actuarial profession to become more involved in the legislative and regulatory arena and to have to defend the exercise of its judgment.

Today's actuary cannot claim to have discharged his or her duties without reflecting on the impact of inflation and the impact of today's unstable economy. In this environment the U.S. actuary can expect to be held more responsible for the asset side of the balance sheet and for the inter-relationship between assets and liabilities - a situation that is already becoming more familiar to Canadian actuaries. Finally, on the technological front, the potential range of problems that the actuary can address has been extended further in the past twenty years than in the preceding 200 by enhanced power in the tools available to our profession. We will continue to see further evolution in this area and must be prepared to take advantage of it.

Unlike the students of a generation ago, who were trained for a fairly static environment, today's actuarial student must be ready for a role that is not only a moving target but that is simultaneously being aimed at by other occupational groups. What, then, is an actuary? What will an actuary be ten years, twenty years from now? What do we want the actuary to be? These are tough questions with which the profession has been dealing continuously with varying degrees of success. It is an important question which must be dealt with in setting a strategy for actuarial education.

The General Officers of the E&E Committee have developed their own definition of the actuary. We would submit that the work of the actuary is to apply the scientific method to cast the light of experience, mirrored by the judgment of today, onto the future of financial arrangements so as to measure, manage and communicate the impact of contingent events on those arrangements. This definition suggests a role for the actuary in any arrangement involving a financial transaction, dependent on a contingent event or on a certain event in which the timing is contingent. It goes beyond the traditional view of the actuary as a passive observer and evaluater by suggesting an active role in managing the impact of contingent events and effectively communicating their expected outcome to the actuary's interested publics.

With the environment of the future and our definition of an actuary in mind, we can state a strategy for actuarial education. In a broad sense, the mathematical elements of actuarial education in the Associateship syllabus prepare the actuary to measure the impact of contingent events on financial arrangements. The practice oriented subjects in the Fellowship syllabus prepare the actuary to manage that impact in those arrangements and to communicate their predicted outcome in a dynamic environment. To that end, a strategy for actuarial education and the ongoing development and evolution of the syllabus could be summed up in the following five statements.

1. To provide the actuary with an understanding of fundamental, mathematical concepts and how they are applied, with recognition of the dynamic nature of these fundamental concepts in that they must remain consistent with developments in mathematical knowledge.

2. To provide the actuary with an accurate picture of socio-demographic, political, legal and economic environments within which financial arrangements operate, along with an understanding of the changing nature and potential future directions of these environments.

3. To expose a broad range of techniques that the actuary can recognize and identify as to their application and as to their inherent limitations, with appropriate new techniques introduced into this range as they are developed.

4. To expose a broad range of relevant actuarial practice, including current and potential application of mathematical concepts and techniques to the various and specialized areas of actuarial practice.

5. To develop the actuary's sense of inquisitiveness so as to encourage explorations in areas where traditional methods of practice do not appear to work effectively.

Thus, the overall goal of the Society's actuarial education program should be to develop actuaries trained to operate in the technical and practical environment of today but educated to recognize the changes in those environments that will affect their continued ability to judge, measure, manage and communicate the impact of contingent events on the financial planning arrangements. With this strategy in mind, I will ask Linden Cole to give some thoughts from his perspective on goals and strategies.

MR. LINDEN N. COLE: It certain is important to ask ourselves frequently what the goals of our system are - and generally, we come to the conclusion that what we are really trying to do is educate. If we could get people to master the material in the syllabus, we would not need examinations at all. We have to have the examinations to make sure that students have read the materials. When we talk in these terms, we are recognizing the fact that we want to teach students how to approach problems in general, because we do not know what the problems will be ten years down the line. Learning the techniques of solving today's problems may not help us at all, but learning approaches to problems in general may.

I would like to change the focus of the discussion, however, following a line of thought that I heard from Julius Vogel. It describes our present system as a selection process. The system selects those who will carry the label, Fellow of the Society of Actuaries. The selection process involves a long period of time and a series of examinations. I would like to ask two questions then: first, what kind of people is the system selecting, and second, what might happen if the system of selection were changed?

Our present system clearly selects people who are very good at math. There is simply no way to get through the Associateship syllabus without being very, very good at math. This emphasis has been in the actuarial profession since the very beginning and appears to be continuing. Today we had a question in one of the sessions asking why people who seem to succeed in undergraduate studies in math were failing some of our examinations. The answer is that the standards for our examinations are simply higher. The first time I ever got a C in college I was quite distressed. Well, looking back on it, I did not have a clue what was going on in the course. Based on the Society's standards, I would have failed the course. Secondly, our system selects people who are willing to plod through material which is not inherently interesting. The subject of demography leaps to mind. This happens to be a skill which can be very, very useful later on. Some of the work we have to do for our employers is also not inherently interesting. We have to plod through it. It takes a lot of time. It has to be done, and

there is no alternative. The people who are not willing to plod through all of the Course of Reading because they do not find it interesting will be useful in the companies technically, but there will be a ceiling on how far they can go. This is because they are only willing to put real effort into something if they find it interesting -- and the world is not always like that. Our system selects people who are persistent and goal-oriented. Unless you are willing to bury yourself for years to get your Fellowship, you are not going to make it. This persistence and goal orientation is another very valuable characteristic for somebody who is going to succeed with an insurance company or pension firm. Our system selects that kind of person.

Finally, our system assumes that our students will have a practical orientation. The system itself assumes that there will be several years of responsible work experience by the time Fellowship is attained.

There is an indirect effect of having a system like ours for qualification. First, actuaries who have attained their Fellowship have a strong, positive self-image. Anybody that can endure the ordeal of the exams has to be worth something, and we have proved to ourselves that we can succeed. Secondly, those who are familiar with the work of actuaries also have a strong, positive image of them because they are aware of the ordeal that has been endured. Unfortunately, some people I have talked to were more impressed with the ordeal than with the content of the examinations. That is a mistake.

It is worth noting that our public respects us, when they have heard of us, because of our uniquely stringent requirements. If we change the system to be more like those of some of the other professions, it might be well to examine what the affect on the selection process would be and how it would affect the image which our publics have of us. These indirect effects might turn out to be almost as significant as the education process itself.

Still, the ultimate goal of actuarial training has to be a high quality education. The name of the game is preparing us for successful careers. If a different and better system of education were to come along, we should probably take it, because education is the ultimate goal. Whether or not our membership would accept a system that did not involve an ordeal is another question.

MR. ROBERT RUDERMAN: One of the things that seems to be missing very much in our training is anything having to do with management. It seems that actuaries, after their Associate level, get pushed into managing people, and we do not do anything about that. I would like to see something take place with respect to management training.

MRS. BARBARA J. LAUTZENHEISER: There are lots of pieces that are missing from the Society's examination process -- management is just one of them. Communications and behavioral sciences are others. The problem is how much of that do you put in a basic education and how much of that has to go into continuing education.

In developing the Fellowship exams, we try to have two things happen. First, not have so much material that FSA stands for "Finally Studied All" as opposed to Fellow of the Society of Actuaries. Second, to have something that was flexible. It was this latter reason that we designed the basic

trunk of the actuarial tree of knowledge and then the spreading out of Canadian and U.S. and then the various primary and secondary subjects. Therefore, we have the specialization up in the branches and the basic education down below.

How much of the other things, like computer science, can you put into that basic core is unknown. The most you could do is to determine the very basics of a given subject, then develop a process of learning it, and then extend that in continuing education. There needs to be a better definition of what is basic in the same syllabus from what is continuing education.

MR. MURPHY: We have so much to provide people with in terms of the basics of our profession, and not all of our Fellows go into management. There are a number in teaching, a number in technical work, a large number of consulting actuaries, and many in government. All of these areas, to some extent, require management and a different form of management in each case. Management may be more of an inherent skill than a learned skill. To try to develop a way of teaching that to everyone, along with everything else we have to teach, provides a real problem.

MRS. LAUTZENHEISER: Let me share with you the statistics obtained from a questionnaire sent to the 1981 Fellows. It asked them what they intend to be. Only 11% said they wanted to be in management.

MR. ROY R. ANDERSON: I have a markedly different view of what should be the education of actuaries than what has been espoused, and it may have to do with why actuaries are not very well trained in management. Management of people is a right-brain operation. Actuaries are left-brain, scientific, etc. I suggest that we do not have an education program but that we have a vocational training program. We take superb mathematicians and make them even more left-brain, scientific, people. We seem very proud of our ability to analyze the data of the past and to project that data through some technique into the future. That is not what the future is going to be all about. If we are going to get into the future and serve our society, we must develop the right-brain. These techniques are those which most actuaries do not have because in college they were math or science majors and looked on the humanities as something somewhat beneath their academic ability. They later get into our actuarial courses, and we proceed to make them even more left-brained. It is no wonder that marketing executives and other areas of management look at actuaries as narrow and unrealistic and not people-oriented. I would suggest that rather than this long course in further scientific training, there be a general education course at the beginning which awakens us to the fact that there are two hemispheres of the brain.

The old Part One exam covering simple English was one of the best predictors of the future success of actuaries. Then, because more scientific material came along, we dropped English and added more science. The educational process and the Board of Governors must take a long, hard look at general education and not more of this scientific training that is already too excessive.

MR. MURPHY: Right-brain activities are very difficult to train, and from my experience in watching other actuaries and other professionals, you find there are people who can be managers with absolutely no training. They have an inherent ability to deal with people. Other people, no matter how much

training and seminars and cross-work you may give them in the area of management, cannot develop the people skills necessary to deal with the management of people. This would be a very complex area of education. It is not the typical kind of thing you train. It is almost an inherent skill that you either have or do not have. I agree with the goal, it is an excellent goal, but I do not know that the professional education process is the way to solve the problem.

MR. RICHARD L. LONDON: We have a problem in defining actuarial education. Most people know exactly what they mean by it, and I mean something different by it; therefore, we have trouble communicating. This difference is evident in the comments made by Linden and Jim. They identified the exam process as a selection process, which is an excellent thing to call it - that is the objective of it. But I would like to suggest a different term be used for what was called actuarial education. I would like to call it the curriculum, that is, a list of subjects. I insist that we make a distinction between what you are asking someone to learn and how you are going to help them learn it. Both of these things are referred to as education. We talk about the education that someone has attained, and by that, we mean the subject matter that they have learned. By education we also mean the program they have gone through to learn a given subject. The Society of Actuaries does not have an education program in the second sense of the word. When we are designing the syllabus, and identifying what subjects should be on the syllabus, and calling that education -- that is the first sense. On the other hand, I am not sure that we should have one.

MR. E. PAUL BARNHART: Having achieved Fellowship in 1960, I am a product of the old long-standing eight exam structure, including that old Part One test that Roy Anderson referred to. When I look at topic 2a of our program, I tend to regard the exam structure it replaced as "the exams I took". It was a pretty good comprehensive course of study. So, why in the world did someone have to add such new nonsense as "eigenvectors" and "eigenvortexes" (or whatever) to that fine curriculum. What has the E&E Committee done to that hallowed course of study?

Has the exam structure improved, and are today's exams relevant to the practioner's daily work? Without hesitation but with some qualification, I will say yes to both those questions. In a profession that is vibrant and progressive rather than stagnant and archaic, the knowledge, the tools and the methods must continually change and evolve - sometimes far more rapidly than any of us would really like. We just cannot afford the luxury of taking it slowly or freezing the system for a few years while everyone catches their breath and gets re-acclimated. I can only applaud most of the recent additions to the Associateship syllabus. Greatly increased emphasis on modern statistical tools and methods, time series forcasting, simulation, and analysis and measurement of risk, which is basic to actuarial training, is absolutely essential. My one real complaint is that we have been incredibly slow with much of this. Some of these topics should have been on the syllabus that I studied twenty-five years ago. We are awfully late, but we are moving in a very essential direction. The professionally competent actuary of the future, even the near future, will need to be comfortable and familiar with modern statistical tools, far more so than in the past. Let me cite just three actuarial examples out of my own experience of just the last eighteen months to illustrate what I mean.

First, I recently developed a projection of the "value of the risk" over a prospective four year period for one of the state medicaid programs.

Opponents of my conclusions hired a professional to refute my projected values. This professional was way above me in his statistical expertise, but fortunately, I was way above him in practical experience and knowledge concerning the program. He had no appreciation at all of past dramatic impacts on the experience of the program such as the expiration of the eighteen month wage-price freeze in 1974, nor of the dramatic changes in eligibility classes. Moreover, for all his high-powered statistical know-how, he made a thoughtless blunder in charging that my results contradicted a "basic mathematical law" of monotonic change in expected values. No such law existed for the case in point, and I was able to construct a very simple example of a probability distribution that clearly disproved his alleged "law". I refuted his refutation; but the point is that I was still very much outclassed in my knowledge of the tools available and potentially relevant to that subject. What saved me, fortunately, was my own superior practical experience and his own careless blunder. This case had veered alarmingly close to a lawsuit in which I could have been a co-defendant.

As a second example, one state insurance department recently adopted an interesting method of judging the "reasonableness" of rates filed for a certain health plan. It consisted of treating the universe of filed rates as a statistical sample and applying a "95% confidence limit" test to that sample. Rates above the limit were disapproved as unreasonable. The trouble was the statistical formula used was valid only for a "normal" type of symmetrical distribution. The actual sample was heavily skewed with a long tail of rates on the high side. The "95% confidence limit", as calculated, rejected almost 50% of the sample universe as unreasonable. The point in this example is that actuaries with a shallow knowledge of statistical methods can get into very big trouble by misapplying what limited knowledge they have.

My final example deals with the virtually universal trend of state regulation of individual health rates based on the sole criterion of loss ratios, with the utter disregard of such essential considerations as appropriate risk margins and provisions for contingency reserves and contribution to policyholder surplus. The point here is that existing loss ratio guidelines are as much the work of industry actuaries as of state regulators. Too many industry actuaries have given little thought to the measurement of risk and to appropriate risk margins. Our past education has been incredibly deficient in this regard.

Tenacious clinging to traditional views of what belongs in basic actuarial education is dangerous - perhaps fatally so in these times. At best, we could find ourselves left behind and left out, or else compressed into an increasingly narrow role in a modern technological society. We simply must know what modern tools are available and relevant to our tasks - I see no alternative for this.

Reasonable familiarity with statistical methods is only one need of the actuary among many, yet it has become an absolutely essential requirement if we are to survive as a credible respected profession.

With respect to adding new material, we face the problem that a more or less equal volume of old material must presumably be deleted. You can only cram so much course of study into a ten exam system. Suppose, however, that the old material is still useful and relevant to actuarial work or just cannot reasonably be dumped out at the same rate the new material is dumped in.

What this means is increasingly formal recognition of specialization and of continuing education. More formal specialization will sooner or later have to occur below Fellowship. Conceivably, some form of formal specialization above Fellowship could evolve. This would not be dealing with the requirements of basic actuarial education. The idea of post-graduate designations or degrees has some interesting possibilities. This could take the form of university granted advanced degrees which are formally recognized by the Society and the academic and scientific word. Yes, we will need names for these super-designations. The actuarial statistical expert might well be called the "Statuary". The specialist in graduation and mortality table construction could be the "Mortuary". The long-term forecaster, the estimator of the future: let's call him the "Estuary". And then there is the perfect actuary. Who would he be? Why, the "Sanctuary", of course.

Continuing education will almost certainly have to become more formalized - even mandatory in some form. The doctors have had to do it, but then, twenty-five years ago they had so much more yet to learn than we did. Doctors have come a long way, but they had so much farther to go.

Why have we been so slow to recognize these deficiencies that have existed for years in the content of our course of study? There are three possible reasons. First, those who earn their FSA's under previous courses of reading may be too reluctant to concede that there is really any need for all that new material. After all, it suggests that their own education was incomplete. Of course it was incomplete. It always will be and that is where continuing education comes in.

Second, our total E&E system and structure may have been and may still be too isolated, in-grown and parochial. We need more interface and cross-fertilization with the broad academic and scientific community.

Third, the total environment of our particular system of training students may be just too dependent on on-the-job and weekend study or crash seminars. As a result, students may not have the time, the freedom to concentrate, the leftover mental energy to master what must be learned. Whatever the real reasons, we need to attempt to identify them clearly and make our course of study keep pace with the times and with the available knowledge in relevant areas. We are now recognizing this and taking actions to achieve these objectives. Not to have done so or not to continue doing so would endanger our entire profession. That would leave our practitioners of the future ill-equipped and vulnerable (even fatally so) to challenge and encoachment from more alert and more progressive competing disciplines. The danger grows as our profession grows more visible and more public. The calamity is not (yet) inevitable. It does not (yet) have to happen. We have time, but we do not have much leisure.

MR. FRANK G. REYNOLDS: My remarks deal with both the current level of relations between the universities and the Society and with where actuarial education should go in the 1980's.

Since the University of Waterloo's role in actuarial education is unique and unfamiliar to many, a brief description of its programs may be in order. There are currently seven F.S.A.'s on the faculty. The material of the first five examinations (and selected topics beyond) are covered in regular style courses. Examination-preparation type courses for Parts 5-10 are

taught in the evenings. Thus, the faculty is involved with the material on all of the examinations.

Actuarial professors can help the Society by keeping it up to date in the mathematical and statistical areas, which are often the professor's basic field of interest. At a school such as our own, professors are also able to spot trouble areas in the study material, try out new topics and extensions of old, and help prepare study material of a summary nature for the later examinations.

The relations between the universities and the Society have improved immensely in the last two years under the leadership of Mike Cowell and Linden Cole. Both are to be commended for their work.

While great improvements have been made, there are still problems. For a university, two or more years are needed from the point a decision is made to implement a major change in the syllabus and before the students are prepared to write the examinations. For the Society, this time horizon is eight to twelve months. Because so much change has been so desperately needed in recent years and because the Society has worked on the material (in some cases) for so long, the Society has opted to implement changes as quickly as possible. This has created problems for the universities who are unable to react as quickly.

A second problem occurs with the difference in goals. Many university professors are research oriented and feel that graduate level education must go to the known limits of a particular field. The Society is concerned with professional education and must deal with a broader range of topics and, of necessity, less deeply in each. The cure is an active program of education of the professors and greater involvement (most of which has come) so that the problems can be better seen by them.

There is a real need for feedback on how a particular university's students and graduates do on each examination. This would help considerably in evaluating our actuarial programs and would increase visibility at other institutions.

In general, the Society's program to update the syllabus and to provide more involvement with the academic community are welcome advancements.

I would like to turn now to some of the problems with the E&E process and possible solutions. When I was approached to appear on this panel, the normally extremely diplomatic gentleman who called managed to hit what is, in at least a part of the academic community, a very sensitive nerve. He felt he was doing a favor by giving the academics an opportunity to explain "what the universities can do for the Society". This often used phrase put me in mind of other comments that are heard about the actuarial education and examination process.

For example:

a) A large international company recruiting on our campus had a firm presentation in which an actuary says, "One can learn more in a year working for our company than from all the actuarial examinations."

b) In trying to obtain permission to use certain semi-public discussion papers on Part 9, a refusal was justified on the basis that "the actuarial examinations should not deal with current topics but rather concentrate on matters of historical importance".

c) A statistician who has helped the E&E Committee remarked that, "The first two examinations do not test a knowledge of the material but rather mathematical aptitude."

d) Who has not heard the famous phrases "if you got more than a six, you studied too much" and "the exams ask for irrelevant, picky details".

e) Many of the Ph.D's who have moved into teaching actuarial science believe that, "Risk theory is the central theme of actuarial science. All else revolves around it. Accordingly, it is what we should concentrate our teaching efforts on."

f) Two quotations from the Education and Examination Committees - "Exactly how many pages should there be per hour of examinations?" and "What is the passing percentage for this exam?"

g) Many chief actuaries say, "We want a first rate individual with two examinations that we can train in how we do it."

h) The Professional Development Committee's reply to requests for help occasionally is, "We cannot be seen to favor one university over another, and providing you with such a prize could be construed that way."

i) Finally, a definition of an actuary as, "An actuary is someone who attempts to please everyone all of the time."

Unfortunately, each of the quotations has a germ of truth and is widely believed within the Society and/or the academic community. They point, albeit indistinctly, to the major problems of our education process.

To see what some of these problems are, it is useful to look at the education of accountants in Canada since the Second World War. In 1946, the Chartered Accountants were the dominant group, and the Certified Public Accountants were the smaller group. The CA's had a reasonable theory program developed by their own personnel and taught by local people -- both CA's and high school teachers. Their education was very strong on practical experience - typically a minimum of five years in public auditing. The CPA's countered by spending large sums of money to develop programs at a limited number of first rate universities. They made these university courses available by correspondence, backed by local university professors and a carefully selected group of practitioners who handled a limited number of practical courses. They required a university degree and three years of experience for a certificate.

Over a twenty year period, the situation changed. The CPA's had the larger student body, and the CA's students were often reduced to taking the CPA courses because they were superior in content. Finally, the two groups merged, basically with the CPA's format.

Accounting, law, medicine, and actuarial science all started out with the concept of practical experience as being central and "book learning" as secondary. Today, we stand alone. Is there something that we need to learn from the other professions?

The statements on number of pages, passing percentages, picky questions, and the definition of an actuary seem to be unrelated. However, I believe there is a way in which they are related. Our examinations try to require an intensive knowledge of a certain body of material. To require that intensive knowledge, quantity must be limited. To avoid the seemly political problems of varying passing percentages and quantities of material, we have tended to be inflexible in both areas. Do these impressions bear up under close scrutiny?

Recently, the volume of material has been ignored on Part 5. This resulted in too much material and a division of the examination. I believe this result was foreseeable and inevitable. Life contingencies, construction and graduation are topics which are simply too important not to be subject to very exacting standards of knowledge. Furthermore, the questions are not usually viewed as being too picky.

However, I have just come from teaching a Part 8 seminar. While I feel Irwin Vanderhoff and others have succeeded in meeting the criteria selected for them, and should be commended for their work, I feel the result is a disaster area. To meet the page constraints and present a reasonably balanced view of economics and money and banking, resort was made to an elementary text. Most students have had courses at a level superior to the text. To get good, discriminating questions, the examiners must focus on the level of concepts and details normally absorbed by only the finest students.

Greater education and better examinations would result by doubling or even tripling the number of pages, prescribing two, three or even four texts, writing a study note of thirty pages to tie the material together and examining by means of more long answer questions for fewer marks each. The depth of understanding could take a quantum leap forward, the complaints of pickiness would be lessened, and after a bit of experience, the student complaints on the volume would drop to the norm. Such an approach would also require some flexibility in setting the passing percentage for at least a few years.

This brings me to yet another question - why are the passing percentages so inflexible? An honest answer would be, "We do not want the political problems associated with varying the rates." Certainly, any change is going to result in such problems in the short run. But much of this problem will be a short run adjustment and should work its way through. Furthermore, the use of a moderate number of multiple choice questions from two and five years before would give a reasonable basis for comparison of the quality of students over the periods of time.

One of the problems that leads to the complaints about pickiness is that the candidates do not see the relevance of the material to the problems in the real world. The controversy over the "Measurement of Mortality" text relates to the issue. Few would deny that Gershenson's book was a major step forward, but it had its limitations. The new Batten text rectifies these limitations. However, while the students are extremely competent at an

analysis of a mortality study, they have difficulty setting up even a simple one. Surely, the baby was lost with the bath water. Similar comments that there are too many branches and no forest apply throughout the later examinations. Practical examples are desperately needed in addition to a reorientation of the exams to emphasize the solution of problems and not just the knowledge. Of course, the marking will be more complex as the answers will not be as uniform.

A particular problem we face is the "Pied Piper" syndrome. Some pressure group comes up with an idea and oversells it. This is probably happening right now with risk theory. Few serious observers question the need for upgrading the material, but is it really the whole core of actuarial science to which everything else is a minor appendage? I doubt it, but a violent swing is underway when an upgrading is probably more appropriate.

Finally, are students apprentices or management trainees? If they are apprentices, let's call ourselves a trade, forget most of the exams and concentrate on being sure the student is well trained in which drawers the tax files go. If we are a profession, let's forget the apprenticeship concept, concentrate on the theory and regard work experience, not as the primary objective, but as a supplement to the theory. Employers will be outraged in the short run, but is it surprising how they have accommodated to the cries of doom in the legal and accounting professions.

In this latter context, the universities would have a major role to play. But it would be a vastly different role than any envisioned to date. The profession would need to designate about ten universities as primary schools. The university program would need to meet criteria such as 90% of the faculty must be qualified Fellows with five years of industry experience. The courses must cover certain minimum materials, and the programs must be cooperative. The profession would still set the examinations, but these would be fewer - say three, three-hour exams for the Associateship - Construction of Tables (including graduation), Contingencies and Risk Theory, Operations Research and Projection Mathematics.

Similarly, the Fellowship material would be taught at the universities. Here again, the number of examinations would be more limited but under professional control. Using cooperative education and requiring, say, eight months of study every two to four years, would enable more students to qualify without imposing an impossible burden on the companies. Furthermore, if all schools offered the core, but only one or two the health specialty, other specialties could be developed more easily.

Such a program would require approximately $1 million a year for five to ten years, assertiveness of professional standards from the profession, a lot of work and a willingness to absorb the problems. The payoffs would be:

a) A more uniform and higher standard of knowledge on the student's part.

b) Increased flexibility to introduce new topics.

c) An enhanced standing in the academic, political and general communities.

d) Greater research.

If such a program is not developed, the present system will disintegrate under its immense weight within ten to fifteen years despite the valiant efforts of the E&E Committee.

MRS. LAUTZENHEISER: What I have heard today reinforces my conclusion that our basic problem is we cannot agree what an actuary is. The definitions range from one extreme that an actuary is strictly a technical person to somewhere in the middle where it is a person who is in management to the point that Roy Anderson made which is a person who is dealing with all of the concepts on a holistic way. We cannot agree on the definition of an actuary.

When I think about the education process, I have to say what is an actuary tomorrow, not even today. It is a very high quality of person. Linden pointed out rather specifically that it is a person who has met a selection process and who has mathematical skills, in particular, as well as logical skills. It is a person who has an extremely good memory. Answering the President of my company with, "Just a minute, I will run to my computer and get it", does not really work nor does it when you are appearing before a Congressional hearing. One needs to know what you are talking about, and you have to have a good memory. There may be other ways of teaching that, but the Society's exams, with all that detail I learned, taught me the value of good memory skills. Wading through tons of material is what I do all of the time. I have to dig out from that material the relevant pieces and put them into some sort of order. That is what we are teaching when we go through a lengthy syllabus. In fact, maybe it is easier today because the study notes put it all in one place for us as opposed to digging through Transactions, etc.

When you have a new young person that you are giving a project to, many times you cannot even define the problem, let alone give guidance on how to get to the solution. All you really see are symptoms of the problem. I do not know what the best kind of education is -- whether it is through universities or through new, more complicated techniques of extension study. We are basically using extension study right now.

The Casualty Actuarial Society's last exam actually requires you to read the National Underwriter to be familiar with current topics. You are tested on topics for which you are not even told what the syllabus is. You need to have a general idea of what is going on at the time you get that last exam.

I heard comments today in the New Associates Workshop relative to learning material that is outdated. At the same time, I also heard concerns about keeping up fast enough when the topic, like Universal Life, seems to change daily. Do you put it in current topics, do you not put it in current topics, do you test on something that is not published? I do not have the answers.

The healthy part of all of this is that we are adjusting to the changing environment. We are looking toward what is an actuary and what should the actuary be for the future. Nevertheless, I still have difficulty because I want to stay very flexible. I want to move toward the person who is more creative, more imaginative and one who is using that right brain as much as that left brain. We have to be very careful that we do not develop either a lowering of standards or impair the image that the profession now has. The profession has a very high level of standards. The Society of Actuaries is unique in that it combines both its credentials and its membership in one.

The Society has not left its licensing or its credential setting to anyone other than the Society. Other professions do that through a licensing process. They have one process for education, a governmental body that is doing the licensing and they have membership associations. The Society of Actuaries, to keep its standards where it wants them, has all those wrapped up in one. That makes us somewhat unique.

It is important that we do take a look at how we need to change, and what we have to do today in order to be able to cope with tomorrow, but we have to make sure that we keep the good that has created the image that we have. That image is one of high standards and the high levels of thinking and decision making.

MR. BARNHART: I would like to advance one further thought on the definition of an actuary. I wonder if our problem is not that each of us who tries to define an actuary tries to be too precise and comprehensive. I suspect if you ask a doctor what is a doctor, or a lawyer what is a lawyer, you would probably run into much the same kind of problem. We have a reasonably consistent idea of what an actuary is -- it is someone who deals with the financial aspects of risks and the management of those risks. We continually get hung up on the subject of defining an actuary. Perhaps we are trying to be a little too precise and all encompassing in some simple definition. Maybe we should stop trying to look at it in quite that way.

MR. MURPHY: Mike Cowell and I felt that same frustration in working on the definition of an actuary. That is a very difficult thing to do, and ours was based on an educational perspective.

I had some comments in the area of pass marks. I do not believe that we are married to any particular set of pass marks nor concerned about the political ramifications of varying them. In fact, in the not too distant past, we have experienced some significant decline in pass marks and other cases where we raised them. Most notable was the Part 6 examination last May. We felt, based on the quality of the papers presented, that the traditional level of pass mark was not warranted. We were subject to some adverse criticism for that action, but we felt it was appropriate. We will do it again if a similar situation occurs. We will also go to higher level pass percentages when the quality of students shows an improvement over the normal level. When you have adequate and consistent patterns of examination results over time and adequate and consistent quality of student performance over time, you have no reason for varying pass marks. Both those aspects have generally been consistent, although there is concern that in some areas, quality has declined.

MR. ANDERSON: If you look at our record over the past ten years, we, as actuaries, have missed the implications of heavy inflation. The deans of our profession were arguing about twenty year net costs, yet over the horizon was looming substantial rates of inflation which made a twenty year net cost somewhat academic. The implications of heavy inflation mean a restructuring of our business. If you look at the medical expense picture over the past ten years, it has been clear that there is no way of controlling medical care costs under the present system of a reimbursement, third party system. They can go through all the exercises of trying to re-introduce competition in the health care marketplace, but that is absolute nonsense. Our nation has been embroiled now for several years in a hopeless attempt to control doctors' charges. We need a restructuring of the system of

financing -- something which is markedly different from what we have in health insurance today. What we have today is not health insurance -- it is sickness insurance. If we take a look at the liability system, there were efforts ten years ago to reform it through a no-fault system. It has not worked. The lawyers now have the whole system, and it is going to go down the drain too.

Liability as an insurance as we know it is not going to last a decade. Yet, where in the Society of Actuaries, the Casualty Actuarial Society or the Academy of Actuaries is anyone getting up and talking this way and trying to do something about it. Jim Anderson had a beautiful paper several years ago and identified Cannibal Life. He had some foresight, but thousands of actuaries sat around defending the old system. I suggest that we have to develop young people (or old people for that matter) who can see beyond what they have learned in the past and can think differently and, most importantly, understand the realities of the present.

Unfortunately, we continue to use the old rules and the old techniques that we have learned. I do not want to give up the training we do get as actuaries as mathematicians. That is something we should be proud of. I do not suggest that you have to train people -- there is a big difference between training and education. We should have, as part of the syllabus, a reading course where students learn things like systems analysis and what systems are all about. The only systems we know are our own systems -- insurance. We keep it in that box of insurance, and we do not understand how super-systems work on sub-systems. We need a whole course of study on other systems, but we do not all have to become super statisticians. We do not have to be an expert in every phase of actuarial "science".

MR. MURPHY: From my own experience through the exams and in the early years of the E&E Committee, I think there has been and still is quite a bit of looking backward in our training. In the beginning, the actuary was doing everything by looking backward to decide how to look forward. The emphasis in the training was on looking backward and, to some extent, that has perhaps affected our approach to looking forward. The direction that we are taking now (and unfortunately it cannot be done overnight) is to try to put a perspective on the future. We should try to get materials developed in our educational process that will help the actuary not forget the past but put it in perspective and, hopefully, be able to apply it to future problems. We would then have the ability to identify and recognize future problems. Topics like forecasting techniques are clearly futuristic oriented and yet technical. We need to look at the practical applications of those areas. It is not an easy process, and it is not one that should be done in a revolutionary way. It is one that we have to evolve carefully.

MR. BARNHART: I am not trying to say that all actuaries ought to be professional statisticians. What actuaries should have is enough exposure to statistics and enough awareness so that they can at least recognize where to go for something and that there is something that can help. For example, I keep forgetting how to calculate a standard deviation, and I have to go back and look the thing up all over again, but at least I know those things exist. Actuaries need to at least be informed of where to go for help and where to look things up.

MR. DONALD S. BOGER: The new program is very good. The Fellowship exams are much improved, but I think if we are going to call this an education

process, then we should be offering most, if not all, essay exams. Most students spend enough time on Part 6 and 7 to memorize 1,700 pages to the point where they can recall a picky paragraph. That shows that the student has a strong understanding of the basic material which the Society recognizes most people can answer. They are now at the point where, to get a spread of scores, they have to memorize what I consider to be the trivial points of the theory as opposed to the basics. That is the area I have the greatest complaint with.

We could eliminate Part 1. If students are not strong in math, Part 4 will identify that.

MR. COLE: The present thinking of the General Officers is that essay exams should be increased. Parts 9 and 10 are already 100% essay, Part 8 will be moving toward more essay in 1983. There will be two hours of essay questions introduced on Part 7 in the Fall of 1982, and some long answer problems are being considered for Parts 3, 5a and 5b.

MR. REYNOLDS: As a former exam chairman for four years, I am afraid I am just totally in disagreement. It has been my experience that somebody can write an essay examination, do well on it, and know absolutely nothing. Multiple choice questions are extremely good for the added fact that it is not possible to second guess the examiner. I have seen cases where students look at a study note and observed that they had a question on that study note last year and conclude that they will not have one on it this year. The abuse of essay questions and the essay exams is just so great that we should not have any essay examinations at all.

MR. MURPHY: Essays are easier to write and easier to grade. They lend themselves to memorization for answering them. What we need to do is develop the essay question that I refer to as the thought question. These are questions that require the student to demonstrate that he can apply what he has learned. That is the direction that we want to go, particularly in Parts 9 and 10. What we really need, long term, is a compromise between both essay questions and multiple choice questions. There are kinds of topics that just do not lend themselves to essay, and there are kinds of topics that just do not lend themselves to multiple choice.

MR. LONDON: Having been a educator for fifteen years, I have had a bit of experience of setting and marking exams. I agree that it is easier to make up and grade the list type question. But, let me make a revolutionary suggestion -- do not have a syllabus. Obviously, we have to tell the students the subjects that they are going to be examined on. Students should be asked for demonstrations of knowledge and understanding of a particular subject, not of a particular text book.

MR. REYNOLDS: Very few people think well under examination conditions. It would be nice to ask and test the ability of students to think. I have seen, however, many new Fellows on the examination committees come up with what looks to be a beautiful question that requires students to think. They are always a total disaster in terms of the students' performance. Students who have the ability to think in the office very frequently do not have the ability to think under the intense pressure of examination conditions.

MRS. DEBORAH POPPEL: If we required a thesis or a paper from everybody, we could test to see if they are creative. We could see if they are good

thinkers. I know that means somebody has to grade them, but given the choice, we could find graders who would rather grade an original research paper than grade a thought-type question.

The Part 8 Committee several years ago had put together some very creative questions, but I heard so much negative feedback from the students. They had been taught the rules of the game where you memorize and do not think. Then this Part 8 exam appears, and these otherwise intelligent people were just falling apart.

MR. COLE: We had a question on the Part 10 exam last May that was not quite directly from the syllabus. It involved a pension funding method which was not specifically in the list of covered pension funding methods. I had a couple of very heated phone calls objecting to that. It was a marvelous question because if you understood how pension funding methods worked, it was not that hard. If you had simply memorized, however, you were completely stuck.

We had a different pattern of people doing well and doing badly on that question. The people who did well on that question are probably better students than the people who did well on the memory questions. If results did not correlate with the total score, this did not mean that it was a bad question.

MR. BARNHART: Part of the problem with broad scope essay questions may be with our volunteer system and the graders in that system. One reason for the reliance on list questions is because the grader has to have a crutch. He may not be an expert on the question himself and is forced to rely on that crutch to be able to grade it in an objective manner. The grader could be a problem in the whole process. In our volunteer system, graders are busy people who are working hard, and they just do not have the time to keep up to date and broaden their own academic and professional knowedge of the very questions they put on exams. I am not being critical about that. I guess it is just one of these necessary problems that exist with the system as we operate it.

MR. DANIEL J. FITZGERALD: One of the directions that the E&E Committee has taken, with a measurable degree of success over the recent years, is to staff the exam committees with people who are working in those fields on which they are writing exam questions. We have a directory that we maintain of people who have indicated an interest in working on the E&E Committees, and from those lists we select those people who have either a current interest in a given field or are actively working in that field. These people can go beyond the syllabus itself. They can bring in the experience from their practical knowledge of working in that field. We do not always have a 100% match with the people who are on the committees and the fields in which we are examining, but the course the E&E Committee is taking is to select people who are as much of an expert as possible and who are willing to volunteer their time to work on the committees.

MR. BARNHART: My comments about graders dates back to the time when I was serving as consultant on health insurance to the E&E Committee. I would review the model answers and was appalled to find how little some of the question writers knew about the subject on which the question was written. That was around seven or eight years ago.

MR. FITZGERALD: My comments are certainly more of the recent assignments to the E&E Committee. Your observations for seven or eight years ago are more accurate, but we have made very specific attempts to assign people who have had experience in the fields to those parts of the exams which we feel they can make the maximum contribution.

MR. ANDERSON: I can remember being on a Part 8 exam committee, and the great anguish in grading the written answers was in trying to figure out whether the student really knew the subject or not. He is writing under pressure, and you cannot figure out whether he really knows it or not.

One of the problems with essay questions is that it requires imagination. When you start getting imaginative, that is a right-brain exercise. You cannot turn that on and off like a light switch. You have to have time for reflection. The same student will take an exam one day and do wonderful, and the next day he will flunk it because he is not turned on. The only thing I can see for essay questions is where you can take it home and submit it later. Let's not try to accomplish everything with exams. Let's not say that for everything we want to educate people in, they have to pass exams on that material.

MR. REYNOLDS: A disaster I experienced as a question writer was with an actuary who was with the Federal Department of Insurance. He was on the Part 9 committee and persisted in writing questions that basically were current, hot topics that the Department was having trouble with. His questions certainly were relevant, thought-type and covered by the material. The student reaction was not very favorable, although I certainly agreed with what he was trying to do.

MR. COLE: I predict that five years from now there will be much more emphasis on the subjects of asset selection and asset management. Economics will be gone because it is an undergraduate subject. We will have much more emphasis on new developments in statistics. There will be a stronger emphasis on forecasting, both economic forecasting and demographic forecasting.

One major problem of the future is that we are competing with other attractive fields for the same group of students. We want the kind of person who starts writing computer programs in the third grade. That is the type we are after; that is our kind of person. We want them to be more than just technicians, but that is the kind of person who has always been attracted to our profession. The same aptitudes that make them good actuaries are going to make them successful in these other fields, and we are competing with those fields for these people. It is going to be important to make sure that we get our share. The number of beginning students in the actuarial exams has been dropping for about five years.

Finally, we have yet to come to terms with the revolution involved with the computer. How on earth can we say that we are teaching statistics when we do not require hands-on computer experience? If you go to business school, there are computers, and at night those students do their homework with the computer. New students can do much more powerful things than I did when I was starting out as a student. Our MBA counterparts are getting that kind of training. Professional economists are getting that kind of training. We are not getting that kind of training, and these other professionals could surpass us if we are not careful because they have better tools.

A recent quotation from Nobel Prize winner Herbert Simon caught some of the implications of the computer revolution. What does the verb "to know" mean? He says it used to mean having information stored in your memory. That is what it used to mean to know something. Now he says it means the process of having access to information. If that is true, our exam system which still places such a high premium on memory is behind. We missed the revolution, and if that is true, we had better catch up.

MR. MURPHY: What does the future hold for the Society's E&E process? I see the next several years being more evolutionary in nature than the more revolutionary changes we have seen in the past. It will be a period of fine-tuning and improvement in educational material. Of course, we will continue to keep the syllabus as up to date as possible in this rapidly changing world of ours.

To better manage this evolutionary process, we are now using a task force concept. Specific major topic areas are assigned to task forces which include expert practitioners and academics. These task forces carefully review existing materials in an area and recommend what changes, if any, should be made. We currently have three very active task forces coming to final recommendations with respect to some key Associateship examination topics. There is a task force studying demography, one studying operations research and statistical methods, and one studying numerical methods and graduation. Their recommendations will complete a very concerted effort to thoroughly review the Associateship syllabus which we began about three years ago. The conceptual direction of these efforts was established in the late 60's by Messrs. Fibiger, Miller, Plumley, Watson and Vogel, then General Officers of the E&E Committee.

In the Fellowship exam area, we have continued to fine-tune both our materials and their assignment to specific examination parts. We have established two task forces to study the areas of group insurance and reinsurance. We have also established an ad hoc review group looking carefully at our underwriting syllabus. We will be considering the establishment of additional task forces in the future in such areas as individual health, pensions, and the practical application of mathematical topics from the Associateship exams. The Fellowship syllabus which was in place only a few years ago provides a very flexible framework within which we can evolve our actuarial education system. One of the reasons we made those changes was to provide a system that would lend itself to future evolutionary change.

We are working on several textbooks for actuarial education. The most notable of these is the new contingencies textbook or perhaps textbooks. The authors now envision two volumes. We expect to be using materials from their work as study notes and have already introduced their risk theory material. The study note process will provide time to refine the materials prior to publication of textbooks. Again, this is an evolutionary process. Other areas where textbook-like efforts are underway include pension mathematics, where we hope to have new material in study note form this year, as well as new material for financial reporting.

A couple of years ago the E&E Committee established the Education Committee as a major subcommittee. This committee's primary role is to continually review and upgrade our educational materials, with a heavy emphasis on the study notes used in our examinations. This process is continually being

refined with input from various sources. We feel we are now in an excellent position to continually monitor our syllabus. The development of a strategy for actuarial education which I discussed earlier provides us with a very sound basis on which to evaluate our direction.

Last, but not least, we plan to continue to open up the E&E process through communications with the membership and the students and be responsive to their concerns. We think the future is very bright for our profession, and we want our educational process to provide our current and future members with a very sound basis for participating in that future.