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CURRENT DEVELOPMENTS IN EDUCATION AND EXAMINATION

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1. Goals, purposes and objectives of actuarial education in general, and the Society's Education and Examination (E & E) program in particular.
2. Critique of the current E & E system.
3. Plans for and future directions of actuarial education, including the role of the academic community.

MR. MICHAEL J. COWELL: The motivation for this open forum, and its counterpart at the Orlando meeting last month, grew out of a concern that the E & E Committee was sensing about the communication of the Committee's activities to the Society's general membership and to our other publics.

While we have been given tolerably good marks on getting out study notes and giving examinations, we sensed that the Society membership generally perceived our activities in much the same way that Churchill depicted Soviet foreign policy - a riddle, wrapped in a mystery, inside an enigma. In contrast, we hope that, in addition to the numerous other communication vehicles set up recently - such as New Associates Workshops, open meetings of the E & E Committee at the Society's Annual Meeting, a "Question and Answer" column in the Actuary - this session will also help strip away much of the secrecy that many of our members feel surrounds the education and examination process.

With "Communication" as the principal theme, today's panelists will address the three agenda items, and answer the questions you may have about our E & E system - which, after all, is your education and examination program.

Each of our four panelists has volunteered more of his own personal time and effort to the Society in our E & E program over the years than many people could give on a full-time paid basis. This is one of the marks of all true professionals, which the Society is most fortunate to have and for which we are profoundly grateful; this point will be the subject of further discussion when we examine the pros and cons of an all-volunteer E & E system.

Our first panelist, Linden Cole, is an actuary with many E & E-related experiences, including his current post as the Society's Director of Education.

In length of service to our Society, Julius Vogel certainly claims the record among our panelists today. He will be discussing the relevance of our educational program from the standpoint of Chief Actuary of the world's largest insurance company, and one of the largest employers of actuaries in North America.

Our third representative, Paul Winokur, is a Canadian consulting actuary with many educational-related interests. He is a member of the Society's Education Policy Committee, and chairman of the E & E Steering Committee of the Canadian Institute of Actuaries.

No presentation on actuarial education would be complete without a representative from the academic community. In Jim Hickman we have one of the foremost academicians from one of the top university actuarial programs in the U.S., at the University of Wisconsin.

As our Recorder, we are fortunate to have another long-time member of the Society's E & E structure. Jack Paddon's extensive involvement in the Society's educational activities include 14 years on the E & E Committee, the last 2 of these as General Chairman. He is also a member of the Society's Education Policy Committee.

I'd now like to make a few comments about our first topic; the goals, purposes and objectives of actuarial education and examination.

Many of you are aware of the changes currently being implemented, and other proposed changes, to update the content of the Associateship exams. At the Board of Governors meeting in October, 1981, the E & E Committee was asked to set down a conceptual framework for the development of actuarial education in general, so that the Board would have a basis against which to judge proposed changes to the Society's E & E program.

In responding to this request, we drew heavily on previous statements of educational purpose, including one landmark report initiated some fifteen years ago by Julius Vogel, then in his last year as General Chairman of the E & E Committee. We analyzed the current environment for actuarial education in terms of social, demographic, political, economic and technological change. We attempted to describe a strategy for actuarial education that recognized the dynamic nature of these forces, and that paid attention to such factors as politics, regulation, economics and inflation, which have much more significance for today's actuaries, than these forces had on our counterparts of a generation ago.

On the technological front, we attempted to extrapolate from the rapid change of recent years the problems that tomorrow's actuaries would be expected to tackle, and the analytical and informational tools they would have at their disposal.

The education and training of actuaries has long been a staple for discussion at meetings such as this; we found references going back to the 1880's that are almost as relevant today as when they were given at meetings of the British Institute of Actuaries. We have also examined these same fundamental questions in the context of the actuary's potential roles through the end of this century. We recognize that in replacing the tool kits of yesterday's actuaries, we have to substitute skills and disciplines to prepare today's students for tomorrow's tasks, especially in areas where other occupations and professions are also involved.

We asked the perennial question of what is an actuary and - perhaps more important from a strategic educational standpoint - what does the Society want tomorrow's actuary to be 10 or 20 years hence? We are all so thoroughly steeped in the techniques of projecting financial events for 20 years or more; the E & E Committee believes that we should attempt to do the same with respect to our own profession's scope of activities.

Again, drawing on the earlier work of many people, we submitted to the Board our definition that the work of the actuary is "to apply scientific methods to cast the light of past experience and the judgement of today onto the future of financial arrangements." We expressed the actuary's three principal tasks as being to measure, to manage, and to communicate the impact of contingent events on those financial arrangements.

Our definition goes beyond the traditional role of the actuary as a passive observer and evaluator of risk, to one of an active participant in managing risk and communicating its range of outcomes to those responsible for seeing that the financial arrangements deliver what they promised. In this context, we have tried to avoid limiting our horizons merely to the relatively narrow areas of mathematics, insurance or pensions.

Finally, we suggested that an effective overall strategy for actuarial education and for the further evolution of the syllabus should be:

1. To provide an understanding of fundamental mathematical concepts and how they are applied, recognizing the dynamic nature of those concepts;
2. To provide an understanding of the socio-demographic, political, legal and economic environment within these financial arrangements;
3. To expose actuaries to a broad range of techniques that will be recognized and identified as to their application and their inherent limitations, and to introduce new techniques as they are developed;
4. To expose students to a broad range of actuarial practice, including the application of mathematical concepts and techniques to both general and special areas of actuarial practice; and
5. To develop among actuaries a sense of inquisitiveness that will lead them to exploring approaches where traditional methods and practice no longer work effectively.

MR. LINDEN N. COLE: A major objective of our Education and Examination system is to continue to attract top-flight people to the actuarial profession. We want to attract people who, as early as junior high school have already been learning about computers and who also enjoy solving math-oriented problems. We will have to compete with many other fields for their talents as they pass through the universities and begin their careers. If the actuarial examinations are perceived by them as difficult in the good sense, because the exams are challenging, hard, and taking advantage of developing technologies, we will get our share of the best students. If the exams are perceived as difficult in the bad sense, because they are archaic, require manual arithmetic, and generally fail to keep up with new developments in mathematics and statistics, we will lose many of the best students to more exciting fields.

The current E & E system relies on a very large number of volunteers, or about 1 out of every 14 Fellows at the present time. It is true that I am a salaried member of the Society's office staff, and that about half of my time is spent on E & E matters. However, the overwhelming majority of the work and all of the decisions are still the responsibility of the volunteers. This has some inherent disadvantages. The boss can always pre-empt your time, since he or she controls your salary. Since time spent on E & E affairs has to be snatched from an always insufficient amount of total free time, urgent matters tend to crowd out really important long-term matters; in particular, examinations, with their deadlines, are likely to create enough crises to keep committee members' attention from more important education improvements.

On the other hand, our volunteer system has some remarkable strengths. It would be impossible to find a group of people more dedicated and enthusiastic than our E & E Committee. Virtually all members are practicing actuaries. This committee is probably the best way for new F.S.A.'s to make professional friends outside their own companies. Our present volunteer system should be the heart of the E & E effort indefinitely, even if some routine functions are shifted to salaried staff.

The elaborate structure of the examination system, the assumption that it must be designed for self-study, the rigidity of the Course of Reading, and the volunteer nature of the E & E Committee make it inherently difficult to keep up with developing technology in mathematics and statistics. Business schools, with their M.B.A. degree as a rival to our F.S.A., offer classes in such subjects as Applied Statistics and Statistical Forecasting, with hands-on computer experience. Modelling and forecasting are crucial subjects for future actuaries, and yet they can hardly be taught by self-study programs. We are going to have to find ways to teach and test computer-oriented subjects like these, if the actuarial profession is to retain its reputation for excellence, and attract candidates whose aptitudes and skills are in these directions.

Our educational system has been caught between two important but conflicting goals in recent years. The first goal is to keep our Course of Reading up to date, in view of significant new developments in mathematical and statistical techniques, regulations, environmental changes affecting financial security programs, and so forth. The second is to have some stability in the Course of Reading, so that students coming up through the system will be able to plan their studies in a rational way, but will have the relevant tools that they need to become effective actuaries. Major upheavals, euphemistically called "transition periods", are a necessary result of major changes in the Course of Reading, which seem to be required by changes in the world around us. On the other hand, transition periods disrupt student progress, and should be avoided as much as possible.

For the future, we foresee changes in the Associateship Course of Reading coming soon, but these should not require transitional changes in the overall structure of these exams. Task Forces have been busy working on several subject areas, and their recommendations will be evaluated by the Education Policy Committee later this year. The first change is the addition of a state-of-the-art textbook on Demography, to replace Spiegelman's long-used text. Of other proposals presently circulating,

the most significant is to add some applied statistics to Part 3. This topic would be less theoretical than Part 2 statistics, and in a sense easier. It would, however, introduce our students to the use of statistics in the real world, where as a profession we are relatively weak. Many of us feel that the actuarial profession is already seriously behind some competing professions (Economists, M.B.A.'s) in our effective use of modern statistical techniques, and that it is time to start catching up.

There is more specialization coming at the Fellowship level, although it will not all come at once. However, the current structure of the Fellowship examinations should provide enough flexibility, so that new material and developments can be incorporated without ripping this structure apart and starting over with another one. It allows for some topical and national specialization in broad-based areas (especially on Parts 9 and 10) while still requiring every F.S.A. to learn some basic material in each area of actuarial specialization. Ideally, a person should achieve Fellowship by taking examinations with relevant subject matter, and not just for the prestige of the letters "F.S.A." In these specialized areas, we are hopeful that the Society can keep the basic control over who will be designated as an actuary, and who will not.

From an educational point of view, it would seem much more appropriate to go into specialty material in depth than to cover the entire actuarial field at a very shallow level. The tradeoff is demonstrated by an example. Pension actuaries now do not have to memorize every detail of insurance-oriented topics such as the life insurance company Annual Statement, as they did 20 years ago. Instead, we have added significant new pension material to the current Course of Reading. A possible drawback, however, is that pension specialty actuaries might some day be unable to sign life insurance company Annual Statements, if present regulatory trends were to continue.

We really have no choice about specialization, however. In a world of multiplying changes and complications, the only alternative to increasing specialization is less and less in-depth treatment of material in an expanding, but watered-down Course of Reading. I believe that this would be unacceptable to the entire actuarial profession, as well as the E & E Committee.

With respect to grading standards on the examinations, many people still seem to expect pass marks which pass the same proportion of students on each examination. Pass marks are not automatically set in this way, as demonstrated by the relatively low numbers of candidates passing Part 6 in 1981. Another misconception is that the E & E Committee sets passing standards, so as to limit the number of actuaries entering the profession. Doing this would be in conflict with established policy of the Board of Governors. Instead, pass marks are set to select a group with a reasonable knowledge of the syllabus, based on standards that are as consistent as possible from year to year. Thus, employers of F.S.A.'s should be able to count on them to be very good with numbers, willing to work hard to achieve difficult goals, generally informed about the entire world of financial security programs, and informed in some detail about at least one actuarial specialty field.

MR. JULIUS VOGEL: My subject is "Are the exams relevant to the actuary's daily work assignments?" My business responsibilities include a training program for actuarial students, as well as the general directing of actuarial work in a large insurance company. Although the agenda item refers to exams but not to education, I read it to mean, "Is the Education and Examination system of the Society -- considering the syllabus as well as the exams themselves -- relevant to the actuary's daily work assignments?" So far as I am concerned, the answer to this question is unequivocally yes. The actuaries coming out of the E & E pipeline are living up to our expectations in that they are able to successfully carry out their tasks in our company. These tasks generally involve managing the work of other people as well as personal technical performance. The new Fellows quickly earn the respect of their non-actuarial colleagues; in fact they do that while they are still students or Associates, and they are a credit to the actuarial profession.

However, I have to add the obligatory qualifications that:

- (1) obviously not all young actuaries are equally successful in their work; and
- (2) there are inevitably instances where the syllabus is out of date, or ahead of its time, or has been changed somewhat pointlessly, or at convenient times for the examiners rather than for the students, or for political reasons. Perhaps the exams do not ask the best questions in the most sensible way. These are serious concerns that ought to be seriously addressed. Obviously, the current E & E system is not beyond criticism or improvement.

Nevertheless, the objective of the Society's Education and Examination system is to supply an acceptable finished product -- a new FSA -- to the profession and to the business world. As an insurance company actuary whose job requires me to be interested in the quality of the finished product, I think the Education and Examination system is successfully selecting the best-qualified candidates, rather than the poor ones.

Now I want to expand a little on what I think are the qualities of an acceptable new FSA from the point of view of a large insurance company, and why I think the current Education and Examination system is attracting candidates and producing new FSA's with these qualities. What the Prudential expects from new FSA's is:

- (1) that they be intelligent, i.e., able to quickly understand new situations and analyze new problems;
- (2) that they have a good, broad understanding of the individual and group life, health and pension business, the major constraints within which these businesses operate and the major problems they confront; and
- (3) that they be willing to work hard even if the work is boring or difficult or distasteful to them.

It is fair to say that the Society's E & E system identifies people who are intelligent, informed about insurance matters, and sufficiently dedicated to work hard at distasteful tasks. Actuaries by no means have a

monopoly on these qualities in insurance companies. In every company there are marketing people, lawyers, accountants, computer people and so on who have these qualities also. But the extent to which actuaries have them is demonstrated by our ability to more than hold our own in the competition for advancement within our companies -- advancement both within the confines of actuarial and other technical work, such as computers or accounting, and also in broader areas of marketing and administration and, in some cases, investment areas.

What I've said carries with it certain implications for how the Society's Education and Examination system should be structured, both as to syllabus and as to examinations.

The syllabus should continue to cover all technical aspects of the life, health, and pension business, with special emphasis on the mathematical underpinning of the business. This is what distinguishes actuarial work from what other people do. The syllabus should, in my view, cover subject matter that is more difficult than what most MBA's have to master. We want to select for highly intelligent people. It is my personal opinion, which I believe has some support in actual studies, that math, science and engineering majors are on average the brightest undergraduates in their colleges. I think our syllabus should be so challenging that you have to be of the caliber of a good or very good math major in order to cope with it. I also believe the syllabus should be comprehensive enough that you have to be very well motivated to complete it. The exams should be fair in that the best prepared students have the best chance to pass them. I don't think any exam should be a breeze, and I doubt if any exams are.

The content of the syllabus should be oriented toward insurance and pension topics. I am not in favor of the inclusion of general subjects such as accounting or economics, except briefly as an introduction to insurance or pension accounting or insurance or pension investments.

I acknowledge that an actuary should be well informed about a lot of general things including, among others, accounting and economics. But if the E & E system works correctly, it will yield the kind of people who are likely to be well informed on their own. To take an extreme example, one of the most important things an actuary must be able to do, at least in our company, is write clearly. But I would not be in favor of including courses in English or French composition in the syllabus. I want the syllabus to consist as nearly as possible of material that is actuarial, and which distinguishes our profession from MBA's or accountants, or general managers.

This does not mean that I have a narrow idea about what is actuarial. For example, I prefer a syllabus that is increasingly oriented to subjects like computer processing, or operations research, or even investment theory if that will get us to work more closely with the investment side of the business, which I think we have to do. I want the actuary to be reasonably well-grounded in any technical area in the operation of the insurance business. Maybe the actuaries don't have to be architects or engineers and help design and maintain the buildings they work in, but they should understand and be able to help in the substantive work of just about every department that functions inside those buildings.

In very large companies, the daily work is quite specialized and new actuaries generally learn the work in a department from those who are already there. But there are small companies and consulting firms whose people sometimes rely on the material in the syllabus for guidance in their day-to-day work. This is a further argument in favor of a broad syllabus. The syllabus should recognize, as I think it does, the need to train actuaries who can be self-starters in the face of an unusual or new turn of external events.

On the other hand, of course, you can't just keep piling new subjects into the syllabus on top of what is already in it. As we put new material in, we have to rigorously weed out, or at least shorten, the older material. I like the syllabus to be demanding, but the demanding can turn into the ridiculous. As a balance, specialization is part of the answer.

Finally, let me say something personal is that I think is shared by most FSA's who like me are getting along in years. For the most part, we have had interesting, challenging, and rewarding careers. I am, of course, grateful to the actuarial profession for making that possible for me. In particular, however, I am convinced that it is the Society's E & E system which has made and I hope will continue to make the actuarial profession stand out from similar or allied professions. I cannot conceive that the actuarial profession would enjoy its present standing in the insurance and pension business without a rigorous education and examination system. We have to keep improving this system so that it can adapt to the changing environment. But the idea of a rigorous and rigorously tested syllabus that is oriented to the technical problems of the insurance and pension business remains, in my opinion, central to the ongoing success and reputation of the actuarial profession.

MR. PAUL M. WINOKUR: I believe that the new Fellowship exam structure is generally better than the one it has replaced, primarily because of the new emphasis on basic versus advanced specialty topics in exams. While we may have short-term problems in some areas of practice in ensuring that sufficient truly advanced material is available for Parts 9 and 10, in the long run I am certain that this approach will prove to be quite satisfactory. On the other hand, I must admit I have some bias in favor of the old 10 - exam structure, where students were expected to know a great deal of both Canadian and U.S., and both individual and group material. Perhaps it would be idealistic to expect this to continue to a significant extent. However, I still see some advantages to this approach.

One of my concerns is that we have never had any specialized casualty insurance material on our syllabus. I believe that it would be nice if we could have more commonality with the casualty structure throughout the Associateship exams, but again, perhaps this may be asking too much because of the degree of specialization required today.

We typically hear students complaining that they rarely have the opportunity to apply certain material, such as the risk theory study note, to the real world. Everyone complains about the great extent of memorization required in the syllabus. The exam format and the great amount of material required to complete a specific examination clearly is a discipline process which many of us feel is quite important, and which

has helped us greatly in our personal and professional lives. I would now like to give you a few examples of how the exam syllabus has assisted me in my daily work as a consulting actuary.

Recently I was asked by an investor not in the insurance industry to assist them in deciding whether or not to buy a life insurance company. This type of exercise was quite challenging in that it brought to bear all of the resources and knowledge at my disposal on very short notice, and under severe time constraints. I had to resort to my knowledge of pricing, taxation, law, and most importantly, regulation and financial reporting. There was no time available to look up study notes or text books for such information. Indeed, it would have been embarrassing to say to the client that I had to go back to my office to get certain study notes, or if I had to fumble through the company's annual statement before I could find a relevant exhibit. In addition to ensuring that I was giving the most sound advice possible under the circumstances, I had to provide my comments in layman's language, since these individuals had no in-depth knowledge of the life insurance industry. This exercise was therefore most challenging, and I would like to think that the exam process helped me a great deal.

For example, all of that "boring" stuff like annual statements can be quite useful to the practitioner in the real world. While I do not expect that we should have to memorize a great deal of this, it is nevertheless important to have the basic grounding and understanding of how the various statutory and corporate statements flow. Also, I could not purport to be an expert in all of the areas necessary to answer all of the questions on the spot. However, to the extent that the exam process exposed me to the broad range of topics I have just described, it did assist me in helping ensure that my advice was as complete as possible, or to at least know where to qualify my answers.

This leads me to comment on how to respond to the person who says, "If you got more than a grade of 6, you studied too much!" I would argue that you have never studied too much, if additional studying means you understand a broader range of topics and in greater depth.

Of course, the exam process does not teach us communication skills, and in consulting actuarial work, these skills are most important. This does not mean to say that insurance company actuaries are not required to communicate effectively, but rather it acknowledges that many clients of consulting actuaries are lay-persons who do not always have an exposure to or knowledge of insurance or pensions. I would argue that it is important for us to understand the fundamental principles of our work, so we can properly communicate these to other persons in their own specialized terms of reference, and not lose our unique expertise to other professions.

Another recent example is one where I was in court as an expert witness for the plaintiff in a fatality case. I was drawing on information from Statistics Canada concerning poverty lines, family expenditures, and other social planning figures. Both the judge, and the lawyer for the defendant, were questioning my expertise in these areas. Fortunately, I was able to state that our syllabus does cover topics such as demography and census results. I also recalled a study note on guaranteed income plans which probably discussed poverty lines. Therefore, while I acknowledged that there were indeed certain economists or social planners

who perhaps had more expertise in these areas, I maintained that I certainly worked with these reports quite often, and had enough expertise to review and explain them for the benefit of the court. This is an example of where actuaries can be challenged by experts in other field, but we can also work it the other way to our advantage.

I am pleased to tell you that the 1982 syllabus will have a study note in the area of the actuary acting as an expert witness. While at first glance, some of the principles may seem to be fundamental, the actual technicalities and various approaches available to the actuary are quite numerous. Being called as an expert witness is another situation where an actuary has to gather together all of his or her resources in a very short period of time and under pressure. The risks can be great to one's professional reputation and perhaps also the reputation of his or her employer. Good grounding from the Society's course of reading and examinations are a definite plus in this area. This includes a good foundation from being exposed to a broad range of disciplines, and from being expected to answer detailed exam questions under pressure, and answer them accurately.

One other area I would like to touch upon is the area of statistics and computers. I must admit that I have essentially not used statistics directly to a great extent since I wrote Part 2 over 10 years ago. Nevertheless, wherever I have been employed there have always been a couple of actuaries or actuarial students who have in fact taken a great interest in statistics and upon whom I could always rely for assistance. Along these lines, I believe that the move to more stochastic approaches in our examinations is extremely useful. In fact, one of the actuaries in our offices has recently used Monte Carlo simulation techniques in assisting various clients in the group insurance area. Surprisingly, many of these clients have received the results enthusiastically, as there has apparently been a gap in the type of assistance they have required in determining what their true risk is, and what their true variation in risk is for group life and LTD benefits. It would also be worthwhile to include computer-related input/output and hardware/software fundamentals on the course of study. However, I do not feel that in-depth computer programming per se is desirable for our course of reading, although the actuary should have some familiarity with this subject.

I would like to mention that for Canadians who are forced to review some U.S. study materials, and vice versa, I only wish we could do more of this. Most Canadians working for companies also doing business in the United States can certainly attest to the importance of being knowledgeable about U.S. affairs. For example, the Ontario government is now in the process of finalizing a pension benefit guarantee fund. This would be the first such fund for private pension plans in Canada. At the same time, U.S. students should be aware that the Canadian federal government is proposing the taxation of the interest build-up in deferred annuities and in permanent life insurance. We have heard rumblings that the IRS is also looking at deferred annuities quite carefully, and perhaps if the Canadian government is successful in its proposed taxation of permanent insurance interest build-ups, the IRS may follow.

It may be of interest to some of you to know that the designation, F.C.I.A., Fellow of the Canadian Institute of Actuaries, is accepted in Canada by the federal and provincial governments for signing insurance company statements and pension plan certifications. This places an additional responsibility upon the Canadian Institute to ensure that the Canadian content on the Society course of reading properly prepares potential F.C.I.A.'s for their future responsibilities.

You can probably discern from my remarks that I have some traditional views about the education system. At the same time I sympathize with the need to move to a course of reading which does allow for greater specialization. We have more laws and regulations to learn today, yet the education committees must worry about how much of the historical study materials can be deleted from the syllabus, and keep a balanced perspective for students. Whether we continue to have a volunteer system or not, these difficulties will be the same. In this regard, it is my opinion that the volunteer system, in principle, seems to be the preferred route for a professional society. Such a system, however, should be supplemented to a great extent by some full-time staff. It seems that we are moving towards a greater degree of Society staff assistance, in order to spread the work load and ensuring that the work load is distributed as equitably as possible among the members. One excellent by-product of the full time staff has been the seminar system.

MR. JAMES C. HICKMAN: A simple declarative statement in response to the third agenda item is that the present and future role of the academic community in actuarial education is indirect, but is very important.

Let me amplify this statement. The majority of the Associateship education materials were written by persons who have academic affiliations. For Parts 3, 4 and 5, most of the materials were produced by faculty with direct attachments to academic actuarial programs. The majority of the education materials for the Fellowship examinations were not written within the academic community. However, it is instructive to review the current fellowship syllabus and to observe the important role played by books by persons such as McGill, Cummins, Gregg and Lucas, Rejda, Samuelson, Cohen, Zinbarg and Zeikel, each of whom had an academic affiliation. Since relatively few people, on their own, study general mathematics or probability and statistics, on the level of the current Parts 1 and 2, it is safe to say that most actuaries have taken college courses related to their professional education. A smaller group have been part of academic actuarial programs that have covered the material on at least Parts 3, 4 and 5.

However, I do not believe that my remarks should be limited to a page count of the required actuarial readings, to classify each page as to whether it was written by a person who had or did not have an academic affiliation. Likewise, I do not believe that my assignment is to report on the fraction of students passing each examination who had university education on the topics covered.

What is the singular role that members of the academic community play in actuarial education? I believe that this role is to continually push to keep actuarial education from becoming isolated. A successful actuary soon finds that the pressure of administrative, management, and regulatory

problems makes it difficult to keep up with new ideas in mathematics, statistics, computer science, economics, finance and demography. It is to the eternal credit of a long line of members of the E & E Committee that they have balanced, as well as they have, the competing demands of their daily work with the need to keep actuarial education vital. The values of the academic community should be somewhat different. Members of this community should be concerned with transmitting existing actuarial knowledge from one generation to the next, but their singular responsibility is to keep actuarial education intellectually alive.

Let me illustrate this idea with some brief quotes and references to three recent papers by members of the actuarial academic community. The papers are on very different topics. The discussions of each paper on my list are as important as the paper. The idea contained in these papers and their discussion have been introduced into the required reading in only one case. However, it is important that ultimately the ideas in these papers should influence basic actuarial education.

1. "A New Approach to the Theory of Interest" by S. David Promislow, York University, TSA 32 (1980). To many students, the theory of interest has become an intellectually dead subject. In a period of volatile interest rates, the traditional models seem unrealistic and in a computer age the algebra to facilitate table lookup seems irrelevant. Mr. Promislow's paper, the references and discussions, all serve to rescue this subject from stagnation.
2. "The Aggregate Claims Distribution and Stop-Loss Reinsurance," H. H. Panjer, Waterloo University, TSA 32 (1980). This paper, and its superb discussions, brought into the the North American actuarial literature a new tool for solving difficult distribution problems in risk theory.
3. "On the Variance of the Mean Squared Error of Decrement Estimators," by Stuart A. Klugman, University of Iowa, TSA 33 (1981). This paper, and its valuable reference list, brought into North American actuarial literature some of the insights that statistical theory provides in the estimation of decrement probabilities.

These papers, which were influenced by the authors' teaching work, are examples of the role of the academic community in keeping actuarial education intellectually alive. This activity does not change the basic nature of actuarial science; the goal remains to bring the best possible intellectual tools to designing and managing insurance systems. Nor does this activity intend any disrespect to the pioneers who defined and developed actuarial science. One can still admire the work of George King, published in 1887, on the mathematics of life contingencies. In the words of E. F. Spurgeon, "King's work did more than simplify the progress of the actuarial student to the desired goal; it systematized and co-ordinated the presentation of the complex theory with which it dealt, thus elevating the status of a definite branch of scientific knowledge a subject which, though fully ripe for such recognition, had up to that time suffered from the disadvantage of comparative inaccessibility." However, the practice of insurance, the technology of computation, and the array of possible models have changed remarkably since life contingencies, as we know it, was defined and developed. If actuarial science is to remain

vital, these changes must be reflected in actuarial education. The most singular role for academic actuaries is to push for the necessary process of intellectual renewal.

Intellectual renewal is important for the basic reason that it is necessary if actuaries are to perform their assigned tasks. It is also needed for at least two secondary reasons. First, it is difficult to recruit innovative people to a science that appears stagnant. Second, there are no monopolies in the competitive world of ideas. Actuaries do not compete solely with other actuaries. To retain credibility with the broader scientific community, actuarial models must reflect modern thought.

Conflict between the academic community and practicing actuaries on the question of emphasis is greatest in the field of regulation. The practicing actuary often find his daily work dominated by regulatory problems. No one can dispute this fact. As a natural consequence, many practicing actuaries press for an early and strong emphasis on the topic of regulation in the course of reading for the education of actuaries. Also acting as one would expect, the academic community tends to downgrade the importance of studying regulation. They support this position by an appeal to the importance of fundamentals and asserting that is it difficult to motivate the young and inexperienced to study the details of regulation. What both sides often conveniently forget is that in the long term, technicians such as actuaries usually make, or at least strongly influence, their own regulation. The principal instruments of life insurance regulation in the United States were strongly influenced by ideas generated within actuarial science. The practice of actuarial science must be carried on within a framework of law and regulation. Each of us, especially, those in the academic community, should not view regulation as something which at most can be modified, but instead we should search continually for innovative ideas to improve and modernize regulation. And that's also part of our responsibility.

MR. DAVID L. SNELL: My background is that of an engineer rather than a math major. As I perceive it, there is a distinct difference in the orientation of the training of engineers and that of actuaries. In the engineering programs, I think the material presented is basically difficult and the exams stress mastery of basic concepts and the ability to locate and use published sources of information. In the actuarial program, I think the material is not basically difficult, but the exams stress memorizing it to a sometimes extreme level of detail. Isn't this inconsistent with our goal of getting the bright young person seeking a challenging career?

MR. LINDEN COLE: I agree that there is too much memorization required for our exams. In terms of recruiting new students for the profession, of course, the students don't find out about the memorization until it's too late, since it comes more on the later exams. Perhaps the most important difference between the actuarial and engineering courses of study is that the actuarial course of study is much broader. This breadth is viewed by the actuarial profession as a plus, rather than a minus, even though it implies somewhat shallower treatment of individual subjects. I believe that we should continue to emphasize the breadth of the profession as an advantage, while we redouble our efforts to reduce the amount of memorization on the actuarial exams.

QUESTION FROM AUDIENCE: What potential does a high score on the Actuarial Aptitude Test indicate, for someone who takes it?

MR. COLE: This test is a tool for helping employers in evaluating a student's potential to pass Part I. The test has not been revised in over 20 years and should be updated sometime during the near-term.

QUESTION: Is a typical pass mark about 47%, with a 2% standard deviation?

MR. COLE, AND MR. COWELL: Pass marks can vary widely from year to year on any given exam, depending on the relative difficulty of the exam, and how comparably well the different groups of candidates were prepared. Pass marks would tend to be higher on the Fellowship exams, but with a significantly higher standard deviation than 2%. It's unlikely that a pass mark would be much below 40%, or much above 65%, but that is by no means a significant factor. Much more significant is the degree to which the exam questions separate the prepared from the unprepared candidates.

QUESTION: How are points determined for correct answers to multiple choice questions?

MR. COLE: On exams with both multiple choice and essay questions, it's the number of multiple choice questions right, minus one-fourth the number wrong. This is to avoid getting additional points on the total exam, simply by turning in a blank multiple choice answer sheet. On 100% multiple choice exams, the score is based on the number of questions right, plus one-fifth the number omitted.

QUESTION: Based on the varying viewpoints of the five panelists, what assurance is there that the exam structure, course of reading, or both, will not drastically change again in the near future? There have, in fact, already been 3 major changes in the past 8 years.

MR. COWELL: A person is General Chairman of the E & E Committee for a maximum period of 2 years, and is more occupied with carrying out policy and following the general direction set by the Education Policy Committee, and ultimately by the Board of Governors. Besides this overall continuity on our Committee, we have just recently prepared and furnished an overall redefined strategy of actuarial education to the Board of Governors.

As one example, the E & E Committee has been implementing many of the original ideas for Associateship exams, in the 1968 Vogel-Watson committee report, little by little since that time, in a gradual process. Mr. Cole's work as a full-time Director of Education also helps to provide a greater degree of continuity than before. This does not mean, however, that the E & E Committee is planning to, nor can it keep the exams rigid and unchanging for years to come.

At the same time, the changes during recent years have generally been implemented as part of a well-defined overall plan, even though we recognize that we have not communicated this to the Society membership nearly as effectively as we should have. We hope that open forums like this one can help remedy this problem, although in these times of rapidly changing conditions, there can not realistically be any such thing as "the last reorganization."

QUESTION: Are minimum standards still enforced for each topic on certain of the exams? Is it really fair to do this, given the large volume of required study material for most topics?

MR. COWELL: As long as the standards are not arbitrary, but are based on candidates having a reasonable knowledge of each subject, they certainly should be fair. They are rarely invoked, except in a situation where a candidate (usually in an Associateship exam) could get very few or perhaps no points at all on a given subject, but still have enough points overall to pass. My best recollection is that during the past several years, only about a half dozen students (most or all of these on Part 3) have failed an exam in this way.

Students will ultimately help themselves more, especially on later exams, by thoroughly reviewing the required reading for all subjects.

QUESTION: Can't the E & E Committee do a better job of restructuring exams and providing the corresponding new study materials at the same time?

MR. COWELL: There is no perfect way to make everything fall into place for every group of students. With a volunteer committee of several hundred people, we have to use the best available educational resources at the time they become available. In the long run, it's better not to unduly hold up publication of volunteer-produced material, even though this may not always ideally mesh with changes in the exam syllabus at any given time.

I can assure you, however, that there are no foreseeable plans to add more material to the current course of reading, unless an offsetting amount of material is deleted.

QUESTION: Have the passing scores adopted by all the joint sponsors (including the Society and the Joint Board) on each of the exams for enrolled actuarial exams (EA-1 and EA-2) always been the same?

MR. COWELL: Yes.

QUESTION: What information about areas of weakness is being furnished to failing candidates?

MR. COWELL: This computer-produced information is being routinely sent to all failing candidates on Parts 3 and 5. This procedure will be extended to other exams, as committee time and resources permit. Any failing candidate on a Fellowship exam can write to the chairman of the exam committee, and he or she will be furnished, within reasonable limits, an individualized indication of areas of relative strength and weakness.

QUESTION: Will Parts 5A and 5B remain as separate exams, and be renumbered?

MR. COWELL: Yes, these two exams will almost certainly remain separate because of the large volume of material. If they remain separate it is most likely that Parts 1-5 will be renumbered 1-6 with no significant increase in exam hours.

QUESTION: How far ahead of time are exam questions set? What is done to assure that the exam is not too long, for the time allotted?

MR. COWELL: Questions are prepared 6-12 months ahead of time, and the final review is made about 3 months ahead of time.

A good indication of whether or not an exam is too long is to review the papers of the 25 or 50 best candidates, to see if they were able to finish the exam. In addition, the questions on Parts 9 and 10, which are specialty exams, are not being based as much on rote memory, but more on testing the students' ability to integrate the study material in greater depth.

QUESTION: Are separate F.S.A. designations contemplated for the different specialties on Part 9 or Part 10?

MR. COWELL: Not at the F.S.A. level. There is already enough fragmentation of the actuarial profession (sections, actuarial organizations, etc.) without further extending this into the education process. From time to time, there has been discussion about having a "Research" A.S.A. with more of a mathematical emphasis, but there are currently no plans to implement such an A.S.A. designation.