

TRANSACTIONS

ADDRESS OF THE PRESIDENT, PRESTON C. BASSETT

TO BECOME A MEMBER

In 1989 we will be celebrating the one hundredth anniversary of the founding of the first actuarial organization in North America—the Actuarial Society of America. The actual founding meeting was held on April 26, 1889, at the Astor House in New York City. There were 38 charter members in this organization, all of them practicing actuaries from insurance companies in Canada and the United States. Today there are over 10,000 actuaries belonging to several actuarial organizations throughout North America. We are indeed a profession with a rich history—a profession which in the past has been able to grow and change as the environment we have worked in has also grown and changed.

Surprisingly, some of the basic issues our predecessors addressed to adapt to that changing environment are issues which we find ourselves again examining almost 100 years later.

How does an individual become an actuary? What does our education and examination system provide, both then and now? Let us examine the history of our profession, concentrating particularly on the Society of Actuaries and its forerunners, the Actuarial Society of America and the American Institute of Actuaries.

The Constitution of the Actuarial Society of America, adopted April 26, 1889, read:

ART. IX. Election of members. All candidates for membership shall be nominated to the Council by at least two members. The name of any candidate which shall be voted against by two members of the Council shall be considered as withdrawn. Each member of the Council shall be informed by the Secretary of the names of candidates at least ten days before action. Candidates recommended by the Council shall be balloted for by the members at the next meeting. Any candidate receiving three-fourths of the votes cast shall be declared elected.

In 1892 a constitutional amendment was proposed to create two classes of membership: Associate and Member. Essentially the amendment called for the following changes. To become an Associate, an individual would have to be approved by the Council, with no more than one negative vote,

and "pass such preliminary examinations as may be prescribed by the Council." In addition, an Associate would have to be 21 years of age and pursuing an actuarial career. Associates could attend meetings but could not actively participate.

Any Associate 25 years of age could become a Member upon passing a final examination prescribed by the Council. Until this examination process was proposed, the only other way to become a Member was by the unanimous vote of both the Council and all Members. If, however, the Council was not well acquainted with an applicant for Membership, it might ask that he prepare a paper to demonstrate his knowledge of actuarial science.

In support of the proposed constitutional amendment, Emory McClintock in his Presidential Address said, "It is more intelligible and definite to know that one has to learn certain things and answer certain questions than it is to know that one has to write an essay in technical form, without preliminary experience."

This proposed amendment did not pass in 1892, but it did in 1896, thus altering the original purpose of the Society to essentially the form in which it still exists today.

Our profession then not only turned a major corner toward membership qualification, but also moved toward actively recruiting candidates to become actuaries with these two significant steps:

1. Instead of an organization established only to provide a forum for practicing actuaries to discuss common interests, the Society now entered the field of education. From this point forward, the education and examination of actuarial students would become one of its primary functions.
2. Instead of membership being granted through a voting process, it now would be determined on the basis of passing examinations. This action changed the achievement of membership status from a basis of whom you know to what you know. Thus, ultimately anyone who could pass the examinations would eventually become a member.

What did these early examinations cover? The 1900 *Transactions* of the Actuarial Society of America states:

The examination for admission as an Associate has the following scope:

1. Arithmetic, Algebra and Plane Geometry, including the theory and use of Logarithms.
2. The Principles of Double Entry Bookkeeping; the Elements of Compound Interest, including Annuities Certain.
3. The Doctrine of Probabilities; the Elements of Interpolation.
4. The Application of Mathematics to Life Contingencies, including the Theory and Use of Commutation Tables, the Computation of Premiums for Term, Ordinary and Limited Payment Life and Endowment Policies, and also for Policies with

return of Premium; and the different modes of computing Reserves; all the above for single and for joint lives.

5. Practical Examples in all the foregoing subjects.
6. General Nature of Life Insurance Contracts; the outlines of the History of Life Insurance, and the source and character of the principal Mortality Tables. . . .

Any Associate, who has been such for at least one year and is 25 years of age, may apply to the Council for Membership, and if his application is approved and he passes a further examination, he will then become a Member.

The examination for admission as a Member had the following range of subjects:

1. Methods of Constructing and Graduating Mortality Tables and the use of the Formulas of Gompertz and Makeham.
2. Methods of Loading Premiums to provide for Expenses and Contingencies.
3. Valuation of the Liabilities and Assets of Life Insurance Companies.
4. The Assessment of Expenses and the Distribution of Surplus.
5. Practical Treatment of cases of Alteration or Surrender of Life Insurance Contracts.
6. Application of the Calculus of Finite Differences and of the Differential and Integral Calculus to Life Contingencies.
7. Laws of the United States and Canada relating to Life Insurance.
8. Insurance of Under-Average Lives and Extra Premiums for Special Hazards.

In reviewing these early educational requirements, one is struck by how much is the same today. Seventy years later, the Society of Actuaries syllabus through Part 7 reads as follows:

Part 1. General mathematics

Part 2. Probability and statistics

Part 3. Finite differences and compound interest

Part 4. Life contingencies

Part 5. Demography, construction of mortality and other tables, graduation, and sources and characteristics of the principal mortality and disability tables

Part 6. Life insurance accounting, valuation of liabilities, and investment of life insurance funds

Part 7. Selection of risks, gross premiums, expenses analysis, and distribution of surplus

We dropped "double entry bookkeeping" and replaced it with "life insurance accounting." This might be considered an illustration of the real changes which have occurred. While subject titles have not changed much, content has indeed changed dramatically. For example, "life insurance law" is listed in both syllabi. Would it not be interesting to review this topic over the past 70 years? On the other hand, we still have Gompertz and Makeham graduation formulas in today's examinations.

It is also interesting to note the divergency of the topics the 1900 examinations covered. In addition to mathematics and the strictly actuarial topics,

the syllabus also included accounting, insurance contracts, expenses, valuation of assets, surplus distribution, and life insurance law. The Council of the Actuarial Society apparently recognized early on that actuaries should have a broad scope of knowledge of life insurance and the operations of a life company. Some Council Members suggested the need for management skills as well. Even in those early days, being a pure technician was not enough.

By 1905, Arthur Hunter in his Presidential Address stressed the desirability of training beyond that of strictly actuarial subjects. He stated:

Even if a larger number of actuarial students were trained than the companies could find places for in the higher actuarial positions, great good would be done, because these men would seek other fields of activity within the companies, or in other branches of business, where their actuarial training would be advantageous. . . . It is not the purpose of this paper to advocate extensive technical requirements, which have only a theoretical value, but it is desirable to have examinations as broad as they can be made without keeping out desirable men.

In this same speech, Arthur Hunter advocated that more attention be paid to assisting students in their training for and passing of the examinations. He not only urged actuaries to teach students some practical knowledge of company operations but also suggested that companies establish actuarial libraries containing the reference books needed to study for the examinations. President Hunter believed that the Actuarial Society should also hold monthly meetings for those studying for actuarial examinations where lectures would be given on various actuarial topics. He proposed that these lectures could then be published in a *Text-Book of the Actuarial Society of America*. These ideas were just the beginning of actuarial classes in New York and the preparation of study notes.

To further encourage students to broaden their scope of knowledge through research and other original works, David Fackler offered a triennial prize for the best paper published by an Associate. Seventeen papers published between 1900 and 1903 competed for the prize.

Probably the next important year in the education of the actuary was 1909, when the American Institute of Actuaries was founded in Chicago. This organization, similar to the Actuarial Society of America, also provided services to the actuarial profession but for the midwestern, western, and southern portion of the United States. The examinations for Associates and Fellows were essentially the same as those of the Actuarial Society with one interesting difference. Some of the early Associateship examinations were waived if candidates successfully completed courses in mathematics through calculus at a college approved by the Board of Governors. This concept has recurred over the years and is still with us today.

Also in 1909 the first Education Committee was formed.

The education of the actuary was again an issue throughout the 1920s when four Presidents of the Actuarial Society of America discussed it in their Presidential Addresses.

In 1921 William A. Hutcheson stated that 282 students would be sitting for 380 examinations in 35 different cities. He also commended the Examination Committees for their extensive work. As an aside, I would also like to comment on the Society of Actuaries examinations. Last year, 15,414 students sat for 16,980 examinations in 210 different locations. And I certainly commend the current Examinations Committees for their extensive work.

Mr. Hutcheson also reported that in previous years Arthur Hunter had headed a committee which tried to interest universities in sponsoring Part I of the actuarial examinations. Harvard and Yale Universities were not interested, but Columbia University agreed to add more mathematics to its insurance course. The Education Committee had just published "Problems and Solutions, Associateship Examinations, Part I and II—1915 to 1919." Mr. Hutcheson complimented that group for this work and also for organizing Fellowship lectures which had just been concluded.

Earlier Mr. Hutcheson had collected statistics on the time students needed to complete the examinations—somewhat over six years. This is not much different from the average of seven to seven and a half years needed today.

In 1925 the Presidential Address of Mr. Arthur B. Wood raised the question of whether a better early selection process could be developed for students interested in becoming actuaries. He was particularly concerned about the large number of applicants who had failed Parts I and II, covering algebra, trigonometry, and analytical geometry. A study he conducted in the previous year indicated that only 25 percent of the students passed each part. His concern was whether the time and effort devoted to the examinations by the students and the Education and Examination Committees were of value.

Mr. Edward E. Rhodes in his Presidential Address the following year reported that 17 percent of the students passed Part I and 18 percent passed Part II in the previous year. While neither Mr. Rhodes nor Mr. Wood suggested lowering the standards for Parts I and II, both proposed that a better process be developed to select starting candidates. With regard to the later examinations, each gentlemen felt the objectives of the profession were being accomplished and that satisfactory numbers of students were succeeding. Two quotations from Mr. Rhodes are of interest:

I believe that I am well within reasonable limits if I say that an actuary's success

depends more upon his handling of practical questions than it does upon mathematical attainments. . .

He [the actuary] may, and probably will, and perhaps he should, forget some of the things that he learned in the course of his studies.

Mr. Arthur Pedoe in his Address in 1929 expressed the same thought:

As to the qualities that an actuary should possess, almost every prominent actuary has, at some time or other, expressed his views on this matter. On one point they all agree, namely, that the actuary is not and should never allow himself to be considered as a mere mathematician, but as one fully conversant with every phase of life insurance theory and practice.

So much for the "education" of the actuary.

As for the examinations themselves, by the end of the 1920s all the old topics remained and some new ones were added. The investment aspect of insurance operations was emphasized with the addition of two new subjects: investment of life insurance funds and elements of banking and finance. Two entirely new topics were also introduced:

1. Valuation of pension funds and calculations of cost of pension benefits.
2. General questions involving the application of actuarial principles including their application to branches of insurance other than life insurance.

After this time, the examinations changed little until the post World War II era. However, there were some significant events.

In 1935 the relationship between the syllabus of reading material and the examination questions changed significantly. Before 1935, students were told that the questions on examinations would cover a certain subject but that the syllabus might or might not specifically cover the answers. After 1935, however, all examination questions were limited to the material covered by the syllabus. This step was implemented to reduce the study load for the student.

The volume of material that the actuarial student was expected to master continually expanded as the fields of social insurance and pensions created new and expanded roles for actuaries, particularly in government and consulting organizations. In 1939 Mr. R.A. Hohaus proposed that options be given for some of the Fellowship examinations so that students could receive training.

A review of the educational history of the actuary would not be complete without commenting upon the "Beer's Committee" (H.S. Beers, Chairman) which functioned from 1943 to 1946. The Committee had a twofold purpose:

1. To suggest steps which will enable qualified students to complete the examinations in fewer years, and
2. To attract a larger number of likely candidates to the actuarial profession.

In the few years following the Committee's existence, many of its recommendations were implemented. The most significant was working with the College Entrance Examination Board to convert the first three examinations from an essay format to a multiple-choice format. These examinations, geared toward college-level courses, covered language aptitude, algebra, analytical geometry, calculus, finite differences, probability, and statistics.

In addition, contact was increased with colleges and universities regarding the opportunities in the actuarial profession.

The result was that many more students took the early examinations in college. Problems arose, however, when so many failed Part 4, the first written actuarial examination which covered interest and life contingencies. Various techniques were studied as a means of alleviating this problem, such as toughening Parts 2 and 3 and converting a portion of Part 4 to multiple-choice. Some prominent actuaries even suggested that Parts 1, 2, and 3 be dropped entirely in favor of college courses and that Part 4 become the first actuarial examination.

In 1942 the Society first gave students options on questions for the last Fellowship examination. A student could choose any three of five questions. This practice was extended to the last three Fellowship examinations the following year.

Sometime later students were allowed to select in advance two of five topics for specialization on the examinations. These topics included advanced graduation, retirement plans, agency problems, group insurance, and social insurance. All candidates had to take law. Grading and administering this type of examination became such a problem, however, that the Beer's Committee ultimately recommended that all options be dropped and that all students take the same examinations. Operations were then discontinued until 1963.

The topics covered in the examinations changed very little between 1950 and 1963. Individual accident and sickness were added in 1955, and the language aptitude test was dropped in 1960.

In 1957 another committee, this time under the chairmanship of Gilbert W. Fitzhugh, reviewed the material covered in the actuarial examinations. New and recurring concerns were identified: the number of years it took to become a Fellow was too long; new fields were developing for actuaries which required further training; pensions needed greater emphasis; and careers in new fields outside the actuarial profession were attracting many qualified mathematics students.

To combat some of these concerns, two major recommendations from this Committee were implemented in 1963. The Society returned to administering examinations twice a year, and it provided for specialization in either the Individual or Group field. At this time, pensions were included under Group;

the subject probably should have been more appropriately called Employee Benefits.

After these recommendations were implemented, about 12 years elapsed with no fundamental changes in the education requirements. Then in May 1976, a new syllabus was introduced. Its thrust placed more emphasis on actuarial principles and less emphasis on details. In addition, the four Fellowship examinations allowed for more specialization, and Part 9, covering social insurance, accounting, law, and taxation, was split for the U.S. and Canada.

Continuing to squeeze the profession were the concerns to (1) keep the total course of study within a reasonable time frame and (2) cover all the material that an actuary is expected to know.

About the same time another situation developed to further complicate our education and examination system. That was the examination and qualification of actuaries under the Employee Retirement Income Security Act of 1974 (ERISA). Adjustments were required to accommodate the Joint Board for the Enrollment of Actuaries so that pension actuarial studies would not have to pass two separate sets of examinations.

Since then, the Education Policy Committee and the Education and Examination Committees have been kept busy updating the education requirements for the profession. New topics have been added: operations research, problems of the consulting actuary, and macroeconomics to name a few. Other topics have been expanded: applied statistical methods, survival models, investment management, corporate finance, and so on. In order not to extend the overall time required to become a Fellow, many details have been dropped and the study material itself significantly curtailed. In 1976 alternative courses were provided to Canadian students, and in 1981 examinations were given in French for the first time. These variations, coupled with the various part credits allowed for the examinations, led the Society to provide 57 different examinations last year—an administrative headache to say the least.

I wanted to discuss this brief historical review on becoming a member because it gives us a framework to again examine where we are and what we should attempt for the future. I would like to propose three premises.

Number 1. There are limits on the amount of education we can expect a student to master to become a Fellow.

This is probably more significant today than it was 40 years ago. Today many more attractive fields are available to brilliant mathematics students besides the actuarial profession. Competition for top quality candidates has increased to such an extent that we probably cannot significantly increase our requirements without losing good candidates. Although we are still attracting a large number of candidates, we must continue to do so.

I do not believe, however, that we have fully introduced our profession to high school students or early enough to college students. We are doing better today, but we need to emphasize our recruiting efforts more.

Number 2. The qualified actuary must be an expert in his or her field of activity.

Early in our profession only one field of activity existed—life insurance. Compared to today, this field was relatively simple. The actuary could learn everything about the industry in a reasonable time. Today, even with limiting one's endeavors to life insurance company operations, we cannot expect a student to master all the industry details during the time he or she qualifies as a Fellow. The best we can hope for is a general knowledge of the field and special knowledge in some particular aspect or line of the business. By the way, I do not rule out management as one of these aspects.

Number 3. The fields of activity for the qualified actuary will continue to expand.

From a starting point of life insurance we have added disability insurance, casualty insurance, pensions, and health insurance to the profession. I believe the health insurance field in particular will grow significantly in the future. It is also an area in which actuaries should become more active. Our skills are also needed in many other areas. Financial planning for continuing care retirement communities is just one example of that. Suggestions have also been made that actuaries should be trained or receive more and better training in research, economics, investments, operations research, computers, management skills, communications, and others. The list can only grow.

With these three underlying premises—the amount of education we can expect a student to master to become a Fellow is limited; the qualified actuary must be an expert in his or her field of activity; and the fields of activity for the qualified actuary will continue to expand—I believe we must attack our education program at the beginning, in the middle, and at the end, if we are to meet the needs of our future actuaries.

In attacking the beginning, I think we should rely more heavily on the colleges and universities to provide basic nonactuarial education. The non-actuarial basic mathematics which our profession requires can be learned at the undergraduate level so that more emphasis could be devoted to actuarial topics during the limited examination period. For example, a student who graduates with a mathematics major from a university recognized by the Society and who has high grades in specified courses could apply to the Society for student membership. He or she would then embark on an actuarial study program.

Some actuaries have questioned, and some have opposed, this proposal when it has been discussed in the past on the grounds that the Society's requirements are more rigorous. They stress that many colleges and universities do not require the same level of competence and that their courses frequently vary, to the extent that the Society would lose control over who would qualify for this student membership. While I agree with these objections, I believe they can be overcome.

For example, our Education Committee could approve certain universities and their courses as meeting the Society of Actuaries standards. In addition, we could require specific pass marks for nonactuarial basic mathematics courses. Yes, there might be variations in the level of competence of those given the status of "Actuarial Student," but perhaps not much more than we have today under our present grading system. If this were the case, however, later examinations would certainly sort out poor students. Also, those schools with standards consistently lower than the Society's would soon learn of these shortcomings as their graduates failed our later examinations.

There has always been pressure from some universities for more recognition by the actuarial profession. Currently, Waterloo University is urging the Canadian Institute of Actuaries to waive the Society's Associateship examinations for its graduates in actuarial science.

My proposal, however, falls somewhat short of this. I believe the Society should have final say on who becomes an Associate. Also, at this time I do not advocate waiving our examinations on any actuarial subjects. I am pleased that this topic is again on the agenda of the Education Policy Committee and that a task force is restudying this issue.

For students who do not or cannot take advantage of university courses for actuarial credit, a new alternative may be available. Our Future Education Methods Committee is currently investigating new educational techniques which are being developed. One which is currently under study would permit students to take the early examinations when and where they choose, with instantaneous pass or fail. In any event, this combination of university credits and new educational techniques for the nonactuarial examinations should result in a net reduction in our members' voluntary administrative work.

In the past, we have relied heavily on volunteers in our education and examination processes. The staff in our Society office is providing more help than ever before but still cannot entirely replace our need for volunteers. I believe my suggestions will help reduce this workload.

In attacking our education program in the middle, I suggest a broad actuarial education and examination program which is applicable to all students and which covers all actuarial fields of activity. This program would require introductory courses covering life, casualty, pensions, health, and so on but

no specialization. Included here might well be courses in economics, investments, research, and management. This level of study would lead to Associateship. It appears to me that the public is accepting the Associate designation more as being a fully qualified actuary. Therefore, the requirements for Associateship should be strengthened to support this.

In attacking the end of our education program, I propose continued and even more specialization than we now have. The Associate would select a particular field of study to pursue to attain Fellowship. More than just life, pensions, and casualty could be offered. I hope that the Casualty Actuarial Society would join in this program.

Steps are currently underway which could lead to the adoption of concepts similar to those I have proposed. For example, during the coming year you will hear much more about the Flexible Education Proposal, which I heartily support, particularly for the Fellowship examinations. Under such a system, we may well have a way to implement new actuarial education concepts strongly needed for the future.

To summarize:

1. Nonactuarial topics which are available or can be made available through university undergraduate study, such as general mathematics, probability, statistics, compound interest, and economics, should be dropped from our formal study program. The Society would give credit for courses taken, where appropriate, and the candidate would be classified as an Actuarial Student.
2. Basic actuarial topics which all Actuarial Students would be required to learn, such as life contingencies, risk theory, advanced statistics and actuarial mathematics, construction of actuarial tables, philosophy of financial security programs, and introduction to design and administration of security programs, would lead to Associate of the Society of Actuaries. No specialization option would be available up to this point. The designation of Associate should be at the level that the Society is comfortable with, recognizing that the public now frequently perceives this member as a qualified actuary. Because of this, I feel that some of the current Fellowship topics should move to the Associateship examinations.

Specialization then would begin with the Fellowship examinations. Electives would also begin with the Fellowship examinations. A new Associate would elect a field of study, such as life, casualty, pensions, health, or general (for professors, for example). Within the specialty, there would be compulsory courses, such as design of plans, valuation of obligations, cost of plans, reporting, laws and regulations, marketing and consulting, and investments.

In addition, certain electives would be available. These could include

communications, advanced economics, corporate modeling, pension plan forecasting, and management skills. Credit for these latter courses could be provided either through Society-sponsored programs or programs provided by others which the Society has approved. Successfully completing required courses in the specialty plus some of the electives would result in Fellowship.

I believe that eliminating the early examinations would not only add more important actuarial topics to the education program but would also reduce the total study time needed to achieve Fellowship.

My proposals are not new. Some have been around for more than 50 years. However, the need to adopt these proposals is becoming more pressing each day. For an actuary to be fully qualified in his or her particular field, more study is required today than ever before. Specialization is required for most actuaries, and the training in the specialization can best be provided by the Society.

Our brief review of the historical development of our education and examination system has shown that our profession has always been able to evolve to meet new challenges. I believe that we are at another key evolutionary point today. I am confident that we will find the best way to keep our education and examination system in tune with the needs of today's and tomorrow's challenges.

I close by complimenting and thanking all the past and current members of the many Education and Examination Committees which have made our system work so well, resulting in a group of professionals of whom we can all be proud.