Institute of Actuaries of Australia

Hurdling or Learning?

An evaluation of the Australian actuarial qualification process

Prepared by John Shepherd

Presented to the Institute of Actuaries of Australia
2005 Biennial Convention 8 May – 11 May 2005

The Institute of Actuaries of Australia
Level 7 Challis House 4 Martin Place
Sydney NSW Australia 2000
Telephone: +61 2 9233 3466 Facsimile: +61 2 9233 3446
Email: insact@actuaries.asn.au Website: www.actuaries.asn.au

CONTENTS

1 Executive Summary

"The Institute [of Actuaries of Australia] is regarded by many of our international colleagues as having an outstanding actuarial education system."

This observation by Institute of Actuaries of Australia (IAAust) President Graham Rogers (2003) was echoed by his successor Andrew Gale a year later (2004):

"The Australian actuarial education system is recognised as world's best practice for its high quality and particular relevance to contemporary business environments."

Perhaps the Australian actuarial qualification process does compare favourably with those in the UK and North America. Is this comparison an adequate and appropriate benchmark? If all that the Australian profession wants is a qualification process that is lengthy and tough, and that limits entry to the profession, then it may be good enough to be able to say that the process is better than those overseas.

However, if the IAAust wants a qualification process that educates future actuaries, that prepares future actuaries for a working lifetime of professional practice by equipping them with the necessary intellectual, attitudinal and behavioural capacities, then the comparison is inadequate.

If the process is intended to be an educational process, then it should be evaluated in the light of what is known about effective post-school education in a professional area. This paper evaluates the Australian actuarial qualification system (Parts I and II) as an educational process, and concludes that it is not firmly grounded in generally accepted educational principles and practice. The evaluation is limited to Parts I and II because the author's teaching experience has focused on those phases.

This paper is a plea from a university teacher of future actuaries to allow the process to be an educational one. It argues that the current Australian qualification process is not essentially education. It is like a series of tough hurdles that intending actuaries must clear. The hurdles are high and tightly spaced. The "course" is difficult. The hurdlers are not told clearly just where and how high the hurdles might be. The process helps to limit entry to the actuarial profession. If what the profession wants is nothing more than a difficult process consisting of tough hurdles that limit entry then the process may be adequate.

If, however, the profession wants a qualification process that facilitates effective learning, that fosters desirable skills in students, and that develops professional attitudes and behaviour, then it needs to remove the constraints and barriers that currently prevent the process from evolving on educationally sound principles.

Desirable and innovative curriculum development is hamstrung by rigid constraints, especially on assessment, which is a key determinant of student behaviour and therefore of learning outcomes. What the student does is the most important factor in determining the quality of learning. Actuarial teachers are handicapped if they are prevented by inappropriate restrictions from positively influencing student behaviour.

Australia's actuarial qualification process could be an excellent educational program. It needs first to be more firmly grounded in sound educational practice.

2 Introduction

2.1 Author's perspective

The author has taught several thousand actuarial students (as well as thousands of students studying other majors including finance, accounting, business and economics) at Macquarie University since 1984, first as a part time lecturer, then as a full time academic since February 1987. He has also taught Computing Studies at a Sydney high school, as well as computer programming and insurance administration at several Sydney TAFE Colleges.

He has taught actuarial students also in Canada, USA, Hong Kong, Singapore, Kazakhstan and China. In 1996, he was the first person anywhere to teach the Actuarial Control Cycle subject, and he is still teaching it. He has taught Control Cycle short courses at four universities in four different cities in China.

In 1996 he was an inaugural recipient of a Macquarie University Outstanding Teacher Award. He has a Graduate Diploma in Education and a Masters in Higher Education. He has had articles published and has given conference presentations on educational topics. He has taught courses in curriculum design and assessment for Macquarie University academics from many different disciplines. His research focuses on student learning, and has included an investigation of the preferred learning styles of actuaries and actuarial students.

This background information is provided to clarify the perspective from which the author views the issues discussed in this paper. The author is a professional teacher, whose primary teaching goal is for all of his students to value and enjoy learning, to see learning as a lifelong pursuit, to be aware of their own learning strengths and weaknesses … and to learn as well as they possibly can.

2.2 Author's view of teaching

Teaching is not a process of transmitting chunks of knowledge from the mind of the teacher to the minds of students. Teaching involves helping learners to build for themselves more effective ways of viewing and understanding aspects of the world.

Thomas J Shuell (1986) captured the essence of the teaching challenge:

"If students are to learn desired outcomes in a reasonably effective manner, then the teacher's fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes … It is helpful to remember that what the student does is actually more important in determining what is learned than what the teacher does."

The views expressed here have developed over nearly two decades of teaching (and watching and listening to) students from many countries in many locations, of discussing actuarial education with students and actuaries around the world, and of watching actuarial teachers in seven countries. The author's hope is that the paper will generate discussion of, and trigger changes to, the Australian qualification process, for the benefit of future actuarial students and their teachers, ultimately resulting in a more diverse, and therefore stronger, profession.

2.3 Scope of the paper

This paper focuses primarily on Parts I and II of Australian actuarial qualification, because that (by and large) is where universities are involved, and where the author has been most involved. However, the basic principles referred to in this paper apply just as much to Part III and to Continuing Professional Development.

2.4 Disclaimer

The views expressed in this paper are the author's, and not necessarily those of the Actuarial Studies Department at Macquarie University or its other members.

2.5 Outline of the paper

We begin by analysing the "theory" of learning and teaching implicit in IAAust's qualification process (Section 3), and then discuss the characteristics of a good education system, based on what is known about how and why students learn well in higher education (Section 4). From there, Section 5 is a slight digression to explore briefly what may be the most appropriate framework for actuarial education – Problem Based Learning (PBL).

In Section 6 we identify some of the barriers to quality teaching and learning that are inherent in the current qualification system, and then (in Section 7) changes are suggested that would break down those barriers. Section 8 answers the question *"Does the educational theory on which these recommended changes are based actually work?"*, and then Section 9 concludes with a challenge for the profession.

3 IAAust's "theory" of learning and teaching

What is the IAAust's "theory" of learning and teaching? As far as the author is aware, there is no explicit statement. However, the Institute's "theory" is implicit in its approach to education, summarised in various documents dealing with the qualification process and with the role of universities within that process.

3.1 Evidence from accreditation criteria

For example, in the IAAust accreditation policy for universities offering Part I and/or Part II, the criteria do not address teaching quality at all. There are no requirements relating to the teaching qualifications, teaching experience or teaching performance of those who teach actuarial students. The only reference to qualifications is to actuarial qualifications – FIAA (or equivalent) or AIAA (or equivalent). It seems, on the basis of the accreditation criteria, that the IAAust is happy to have people who are unqualified or even incompetent teachers so long as they are actuaries!

Perhaps this policy rests on a view that everyone can teach well, or at least teach competently. This view is naïve and not grounded in reality. Anyone who has ever been a university student knows from personal experience that good teaching – even competent teaching – is not universal. Good teaching is rare, competent teaching is the norm, mediocre teaching is common, and poor teaching is far too prevalent.

Perhaps this policy rests on a view of teaching as a transmission process. Teachers give lectures and write course notes, which are soaked up by students, who thus acquire the transmitted knowledge. The more the teacher teaches, the more the students will learn. If this view was credible, it would be sufficient to put any talking actuary in front of a class. Being a content expert would be the sole requirement.

Teaching is not a transmission process. Each learner constructs their own understanding. At the end of a shared group learning experience each learner can take away a different conception of what was taught. The different constructions can arise because each learner perceives what is taught through a different system of filters, each has different expectations of and levels of interest in what is taught, and each relates what is new to a different existing knowledge "data base". An effective teacher needs to understand how and why students learn or don't learn.

If the primary objective of university courses in actuarial studies is to educate future actuaries, then the quality of teaching should be very important to IAAust. In the accreditation criteria teaching quality is not mentioned at all.

3.2 Conceptions of teaching and learning

John Biggs (1999, p21) identifies three conceptions of teaching and learning:

1 *Learning is a function of individual differences between students*

2 *Learning is a function of teaching*

3 *Learning is the result of students' learning-focused activities, which are engaged by students as a result both of their own perceptions and inputs, and of the total teaching context*

These "theories" of teaching form a hierarchy, in increasing order of sophistication. In a level 1 view, there are "good" students and "poor" students, and differences in learning outcomes are an inevitable consequence of those student differences. Teachers must know the content well, and explain it clearly. Students should attend classes, listen carefully, take notes, read the textbook, do the exercises, and regurgitate it accurately in the exam.

At level 2, knowledge is still seen as transmitted but there's a greater emphasis on teaching skills – developing a range of communication techniques for getting the message across more effectively. What the teacher does is the central focus, rather than the capacities of the students. Teaching competencies are seen as important.

At level 3, teaching is seen to support learning. There is a realization that expert teaching techniques, while important, are of no value if no learning takes place. This leads to careful consideration of just what learning means – what it means to "understand", what kinds of teaching/learning activities might enable students to reach that understanding, and what methods might be used to determine whether or not understanding has been achieved.

As Biggs puts it (1999, p24), at level 3:

"No longer is it possible to say: 'I taught them, but they didn't learn.'"

Biggs (1996) noted that teachers tend to subscribe to these three theories at different stages in their teaching careers. Beginning teachers tend to operate on the basis of a level 1 view. Some teachers achieve level 3 later in their careers. Others stay at level 1 or level 2.

3.3 IAAust's view of learning

In requiring only actuarial (ie content) qualifications of teachers in accredited programs, IAAust's thinking about learning is consistent with level 1. Is there other evidence consistent with this view?

In monitoring Part II, IAAust (2005, page 4) says that it:

"… monitors educational standards through an accreditation process that reviews syllabus coverage and marking, grade distribution and exemption level at each university."

This is consistent with level 1 thinking about learning and teaching. Has the syllabus been covered? Was the marking tough? Is the grade distribution consistent with what it has been in the past, and with that of other universities? These questions have little to do with learning outcomes.

A common focus in IAAust discussions of education in universities is the minimum standard for entry, usually expressed in terms of some index of performance at secondary school. This is typical of level 1 thinking: 'We will have a good program if we can attract "good" students. "Poor" students are unlikely to become actuaries'. There has even been discussion of a minimum entry standard as an accreditation criterion for universities. Ironically, the minimum entry standard suggested is such that, if it had applied since the inception of university actuarial programs in 1968 at Macquarie, many current Australian actuaries would have been denied entry!

3.4 Assessment

Assessing students' learning may be done for a range of good reasons. Two of the most important reasons are:

(a) formative assessment, whose purpose is to give feedback, to both students and teachers, on how learning is developing, and which may be used to improve or augment learning or teaching or both;

(b) summative assessment, whose purpose is to grade or accredit students at the end of a program of learning.

If formative assessment is to work, students must feel free to make mistakes, to reveal the flaws in their thinking and the gaps in their knowledge. If the results are to be used for grading, they will obviously be motivated to conceal their weaknesses.

IAAust seems to refer only to summative assessment in any of its documents. Either the role of formative assessment is not acknowledged, or it is dismissed as unimportant, with the term "non-assessable" being applied to some learning activities in some places. Formative assessment has a vital role by providing students with feedback on whether their learning to date has been effective and whether they need to consider modifying their approach or looking again at what they thought they had already learned.

3.5 Unhealthy focus on content

Actuarial bodies around the globe consistently make the mistake of paying disproportionate attention to syllabus content whenever they review or discuss education. The syllabus is just one part of the curriculum, and arguably not the most important. In reviews of actuarial education, however, it is always the prime focus of attention, and often the only aspect discussed, at very great length!

This obsession with content is consistent with a view of the teacher as content expert and transmitter-in-chief, and again consistent with a level 1 view of learning.

"Content" changes over time, at an ever-increasing rate. Techniques learned today will be superseded in a few years' time. As well as content knowledge, students learn transferable skills (analysis, modelling, problem solving, collaboration, etc) that are independent of, and more important than, content.

4 What makes a good education system?

A good education system is one which is conceived, designed, implemented and monitored consistently with accepted principles of teaching and learning. A good education system focuses on promoting quality learning by its students.

What are the accepted principles of teaching and learning? This paper is not the place to attempt a comprehensive survey. However, two paradigms that have very significantly influenced teaching in higher education over the last twenty five years, and that capture well the essence of sound educational practice, are:

(a) Student approaches to learning

(b) Constructive alignment

Here is a brief explanation of each paradigm.

4.1 Student approaches to learning

The notions of deep and surface approaches to learning derived from original empirical research in Sweden in the 1970's, and were elaborated by further research in both the UK and Australia. Broadly speaking, a student taking a "deep" approach to learning is engaging in appropriate learning activities, while a student taking a "surface" approach is using inappropriate learning activities.

This table of characteristics associated with each approach, reproduced from Ramsden (1992, p46), clearly outlines both surface and deep approaches:

Surface approach	**Deep approach**
• Intention only to complete task requirements	• Intention to understand
• Focus on 'the symbols' (eg words, formulae), unthinkingly	• Focus on meaning of 'the symbols'
• Focus on unrelated parts of the task	• Relate previous knowledge to new knowledge
• Memorise information for assessments	• Relate knowledge from different subjects
• Associate facts and concepts ineffectively	• Relate theory to everyday experience
• Fail to distinguish principles from examples	• Relate and distinguish evidence and argument
• Treat task as an external imposition	• Organise and structure content into a coherent whole

It is important to understand that "approach to learning" is not a stable characteristic of an individual learner (in the sense that a personality trait is stable). Students vary their approaches to learning as their learning context varies. An "approach" is a response to a student's perception of the circumstances, and is influenced by a range of factors. Highly influential factors usually include assessment, workload, approach to teaching, clarity of learning objectives and intrinsic interest in the subject.

4.2 Constructive alignment

Learning takes place in a complex environment. There are many factors interacting – student characteristics, teaching methods, curriculum, what is being learned, the institutional setting – and they form a system. If there is an imbalance in the system it will be resolved, and for many students this will often be in terms of a surface approach. For example, a test that allows students to respond in a way that is inconsistent with learning objectives (perhaps by quoting back chunks of text, or reproducing standard processes, or plugging numbers into a memorised formula), or a classroom climate that generates fear in students, will encourage many students into a surface approach.

If we want students to focus on understanding meaning, on developing high level cognitive skills like analysis and synthesis, then the learning activities we design and the assessment tasks we set have to be consistent with those objectives.

In an effective education system, all elements work to support the goal of meaningful and robust learning by each student. When there is alignment (consistency) between what we want students to learn, how we teach and how we assess, teaching is much, much more effective than when there is no alignment.

Biggs uses the term "constructive alignment" (1999, p26) to describe this consistency. The term reflects both the fact that learners create their own learning

(constructivism) and the need for learning objectives, learning activities and assessment to be aligned (consistent).

Part III of the IAAust process is beyond the scope of this paper. It is worth noting in passing, however, that constructive alignment (consistency between learning objectives, course notes, assignments, seminar activities, tutorials, exam questions and marking/grading) is always going to be very difficult to achieve when different people are responsible for the various components.

4.3 Backwash

Paul Ramsden (1992, p187) notes that:

"From our students' point of view, assessment always defines the actual curriculum."

This is just as true of all students everywhere as it is of actuarial students. What and how students learn depends to a very large extent on how they think they will be assessed. Show actuarial students a syllabus and they will push it aside and ask to see past exam papers.

This perception of the primacy of assessment persists into actuarial maturity. When asked for feedback on one of the planned modules (including learning objectives) in IAAust's proposed new Part III program, one actuary was reported to have said:

"We need … (to see) … some sample exam questions."

Most students learn what they think they will be tested on. However, in a poorly aligned system, where the learning objectives and the testing are not consistent, this will often lead to ill-directed surface learning. Many students will aim for only as much learning as they think will be adequate to satisfy the examiner. Biggs (1999, p141) calls this effect "backwash" – the student's perception of the requirements of assessment determines what is learned, not the learning objectives.

The backwash effect is a leverage opportunity for teachers. We need to design assessment tasks in such a way that they give a clear message to students that the only way to negotiate past the subject is to understand what is to be learned. If the teacher is restricted to using exams only then it is difficult to make the message clear.

4.4 Generic skills development

As well as being grounded in an informed view of student learning, a good education program will also explicitly foster the development by students of a range of generic (or transferable) skills. These will include communication skills (written, oral, listening), personal skills (self-management, independence, ethical thinking and behaviour, flexibility, reflective practice), interpersonal skills (negotiating, teamwork, peer assessment), creative (divergent) thinking, IT skills, research skills, and so on.

Educational research and evaluation has consistently demonstrated that generic skills are most effectively developed when activities designed to foster such skills are

integrated with assessment tasks in core discipline subjects. Stand-alone subjects that focus on generic skills acquisition in isolation are significantly less effective.

In the Part I curriculum there needs to be room for learning activities that address the acquisition of such skills. If IAAust wants future actuaries to develop such skills then this objective ought to be explicitly stated, and the accreditation process ought to include an investigation of how and where students can acquire those skills.

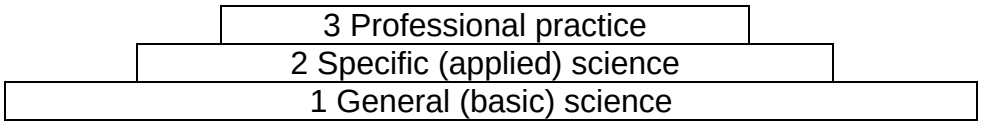
The Australian accounting profession's accreditation criteria for university programs (ASCPA & ICCA, 1996) specifically address the development by accounting students of a range of generic skills, classified into three cognitive and two behavioural areas.

Opportunities for students to develop these skills must be embedded in the core and non-core accounting curriculum. This is consistent with the outcomes of educational research which clearly and consistently show that generic skills are more effectively learned in this way than in stand-alone programs. Further, students who are asked to write about, to debate, to explain, to research, and to apply the core concepts and principles of the discipline they are studying will achieve greater and deeper understanding of what they are learning.

5 Problem Based Learning: The future of actuarial education?

5.1 "Shape" of actuarial education

Generally speaking, actuarial education has the triangular shape that medical education traditionally once had. The first or "foundation" stage deals with the underlying "hard" science deemed necessary for practitioners. For doctors, it was physiology and anatomy, with some physics and chemistry. For actuaries, it is mathematics and statistics, with some economics and accounting or finance. The second stage sees the basic science being applied in areas and ways specific to the profession (pharmacology, surgery, hepatology, etc for doctors, with pricing, estimating liabilities and valuing assets for actuaries). Only in the final stage is the real world acknowledged fully, with real world professional practice as the focus.



5.2 Problem Based Learning

In medical and paramedical education there has been a widespread shift away from this traditional curriculum structure towards education based on a Problem Based Learning (PBL) approach. While there is no unique form of PBL, all variations have in common that (Boud, 1985, p13):

"the starting point for learning should be a problem, a query or a puzzle that the learner wishes to solve"

PBL does not have a standard curriculum to which problems are added. In PBL, the problems are the curriculum. Students, typically working in teams, tackle each problem presented to them by setting out to identify, research, understand and apply the knowledge, skills, processes and other attributes they need to solve that problem. They will typically be guided by a facilitator/teacher who provides guidance on process and access to resources, but not answers.

In PBL the problems form the framework for learning. The challenge for curriculum development is to find a set of problems that together require acquisition of all the fundamental knowledge, skills and values of the profession. Advocates of PBL argue that the generic capabilities acquired by students through PBL, such as resourcefulness, personal management, critical abilities and capacity to think, are even more important than the discipline-related content learned.

PBL turns the traditional pyramidal structure upside down, and starts with authentic, non-simplified problems likely to be encountered in professional practice. No prior teaching of content is given. Students undergo some prior and parallel preparation, but it is focused on the process – the objectives and nature of PBL, teamwork and interpersonal skills, where to find and how to access useful resources, etc.

Apart from health related areas, PBL has also been implemented in engineering, earth sciences, management, environmental sciences and many other disciplines.

6 Structural impediments to quality learning

The current qualification process features a number of inherent barriers to better learning. In this section, these barriers are identified and examined in terms of their effect on teachers' freedom to design appropriate learning experiences and on the quality of students' learning. Teachers' activities and students' learning are of course closely related.

The impediments in Part I and Part II are now explained.

6.1 Part I

6.1.1 All subjects are equal, but …

In Part I exemptions are granted by IAAust on a subject by subject basis. The exemption for one IAAust subject typically depends on performance in one or two university subjects deemed to "cover" the same syllabus. Not all university subjects "count" for exemption purposes. For example, in the most popular four-year full time program at Macquarie University (Bachelor of Commerce in Actuarial Studies and Bachelor of Applied Finance), students take at least 30 subjects (semester course units), of which just 15 "count" for exemption purposes.

This of course creates two classes of subject – exemption subjects, where the result determines partly or wholly the outcome of one exemption, and non-exemption subjects where the result has no direct effect on an exemption outcome.

The mere fact that there are exemption and non-exemption subjects increases the likelihood that students will adopt a surface approach, especially in non-exemption subjects. The implicit message is that they are less important. They don't count towards qualification as an actuary. They are there to pad out the degree program so that it meets the university's requirements, but they cut no mustard with the profession.

6.1.2 Content overload

The amount of content in most Part I syllabuses is excessive. Teachers are under pressure to "cover" the syllabus, and students are under pressure to understand too many complex and difficult concepts in the time available. Students are very likely to take a surface approach when confronted by an excessive workload, so the quality of their learning suffers. An overloaded syllabus is a classic example of "education" by laying out hurdles and placing them too close together. It makes survival tough, but in an arbitrary and unfruitful way.

It is a common fallacy that more and more content makes the program more difficult and raises "standards". It "sorts out" the students. In reality it means that most students don't have the time or the opportunity to focus on understanding what they are learning, and resort to survival strategies like rote memorization (that is, they take a surface approach). Coverage is the enemy of understanding.

Content overload, when associated with a level 1 or level 2 conception of teaching, means that the syllabus will be "covered" at all costs. And the costs can be great in terms of learning quality. There will be no opportunities to integrate activities that foster generic skills development.

Understanding of content in mathematically and numerically based subjects is also enhanced by opportunities to explain that understanding to others through written assignments and oral presentations. There is a double benefit – better understanding of content plus enhanced skills.

6.2 Part II (Actuarial Control Cycle)

We look first at the IAAust's approach generally to Part II. In "Part II – Actuarial Education Program" (IAAust, 2005), we read on page 4 that:

"The Institute monitors educational standards through an accreditation process that reviews syllabus coverage and marking, grade distribution and exemption level at each university."

There is no reference here to consistency between learning objectives, teaching/learning activities and assessment. In fact, it is not possible to monitor "educational standards" by looking at just the aspects referred to. Whatever the "standards" are, they are not educational standards.

The relationship between learning objectives, learning activities and assessment tasks is not acknowledged. There is no recognition that they interact as components of a dynamic system. There is no reference to learning outcomes (in other words, what students have actually learned as a result of their activity during the subject).

The monitoring process looks at the hurdles, how high they are, how close together they are, and how many have been knocked down.

6.2.1 Student diversity

Each year's Control Cycle class includes students with a diverse range of backgrounds. Here are some typical examples:

(a) Fu Ping completed secondary school three years ago, enrolled at university, and has completed three years of his four-year double degree program in actuarial studies and statistics. His casual work experience has included tutoring high school students in mathematics, packing shelves in a supermarket and low level clerical work in his uncle's suburban accounting practice.

(b) Sita finished secondary school seven years ago. She spent the next four years completing an honours degree in statistics at university, and was then employed by an actuarial consulting firm to work in its general insurance practice. Over the last three years, she has worked on developing models for several general insurance clients in both pricing and reserving areas, and has passed all UK Part 1 subjects except one.

Given their vastly different prior experience of the actuarial world, it is inevitable that Fu Ping and Sita will have conceptions of actuarial work that differ widely in both scope and sophistication. They represent extremes on a continuum. Other students will bring intermediate experiences and conceptions.

What is the point of asking Fu Ping and Sita, and their classmates with prior experiences that are different again, to "learn" according to a fixed syllabus, and to demonstrate identical "learning" at the end of the semester or year? Each student starts at a different stage, and has different needs and interests within the actuarial domain. Sita probably already has a good appreciation of the control cycles of general insurance. She can still benefit from having her understanding confirmed by explaining (teaching) her idea of a control cycle to Fu Ping and the rest of the class.

6.2.2 Appropriate Control Cycle assessment

Control Cycle assessment needs to be freed up. Portfolio assessment and individual learning contracts would complement each other, and would fit the Control Cycle learning objectives. For a learning contract students write a proposal outlining what they wish to learn, how they will go about achieving that learning, and how they propose to evaluate their work. The teacher provides all students with a set of objectives for the subject and a list of requirements for the portfolio, and negotiates each contract individually.

Portfolio items could include literature reviews, technical papers, research reports, models developed, oral presentations, essays, articles submitted to actuarial or other journals, videos, web sites, concept maps, reflective journals, and so on.

Such activities would provide opportunities for the development of writing skills, oral communication skills, creativity, self-awareness, responsibility and self-assessment

skills. They would also make learning more satisfying, personally relevant and more enjoyable (for teachers too!).

Portfolio assessment creates additional value for students. They finish the subject with a ready-made portfolio of their work. They can show prospective employers not only a set of grades but also tangible samples of what they can do.

6.2.3 IAAust's view of Control Cycle assessment

The IAAust requirement for Control Cycle assessment is ("Part II – Actuarial Education Program", page 4) summarised as follows:

"There are two types of assessment used in the Part II (Actuarial Control Cycle) course:

- *Coursework (assignments, projects and, where applicable, class presentations)*

- *A three-hour examination at the end of each semester (at least 70% of the assessment is based on examination)*

The Institute monitors educational standards through an accreditation process that reviews syllabus coverage and marking, grade distribution and exemption level at each university."

Macquarie University's experience of trying to introduce a more appropriate assessment regime in its Control Cycle course suggests that IAAust is not interested. Nothing so radical as abolishing the exam was attempted (though a very strong case can be made for doing this) – just moving to a weighting of 60% for the exam and 40% for a range of project-style assessments. IAAust's accreditation panel pointed out that this did not comply with the rules. There was a little interest in the educational merits of the change, with one IAAust panel member conceding that such an assessment scheme would be more appropriate. The panel's formal response, however, was that there was an issue of non-compliance. Apparently learning quality was not a concern.

7 Recommendations for change

The most important reform would be to recognise that an education curriculum is much more than a list of syllabus topics and an exam. The learning model on which actuarial qualification is based, in Australia as well as overseas, is sterile. A new model is needed, based on what is known about learning and teaching.

For example, it cannot be assumed that because a particular concept or principle appears in a course syllabus, and has been the subject of one or more questions in an examination, that it necessarily follows that students who have "passed" that examination have understood and can apply that concept or principle.

IAAust can allow much-needed teaching reforms and improvements in learning quality across Parts I and II by removing its arbitrary restrictions on assessment methods. The important criterion, from a learning perspective, is whether assessment is consistent with learning objectives and learning activities. Exams are

rarely appropriate for assessing the kinds of learning outcomes that developing actuaries need to be achieving.

IAAust can raise the profile of teaching (and as a result the quality of student learning) by adding to its accreditation requirements for university actuarial programs criteria that address the quality of teaching, such as:

(a) a minimum teaching qualification for all teachers in the actuarial program (every university offers a course in university teaching at Certificate level, that would be an ideal minimum qualification base for both full time and part time teachers);

(b) evidence of a process of evaluation of teaching, involving (say) peer review of teaching, student evaluations of teaching, and an ongoing cycle of reflection, review and revision;

(c) evidence of teaching performance quality (teaching awards, promotion based on teaching excellence, student evaluations of teaching, etc);

(d) evidence of contributions to the scholarship of teaching, such as publications in educational journals, presentations at education conferences, etc;

(e) evidence of reflective practice in teaching.

7.1 Part I reforms

As far as Part I is concerned, the first change should be to break the nexus between Part 1 subjects and clusters of one or two university subjects deemed to be "equivalent" for exemption purposes.

The nexus is a barrier to the development of innovative, relevant and effective actuarial education. The nexus may have administrative advantages, but those advantages come at enormous educational cost. The nexus blocks the road to a more engaging, satisfying and interesting actuarial education experience, for both students and teachers.

How can this be achieved? It can be achieved by basing IAAust Associate (or pre-Associate) membership on completion of a degree (undergraduate or postgraduate) in actuarial studies at an accredited university. The degree as a whole would be the basis of qualification. There would no longer be exemptions for individual subjects.

I can hear the reactions already: *"This is dumbing down! This will lower standards!"*

My response is: *"Define your 'standards', and explain how they will be lowered."*

Completing an accredited university program is part or all of the entry requirements to many professions (medicine, engineering, law, accounting, etc). Such a model would be a timely innovation in North America, where the professional bodies are moving tentatively towards recognition of university study, but have not yet committed fully to a particular relationship.

As foreshadowed in Section 6.1.2, the excessive content in Part I should be reduced. This will reduce the likelihood of students taking a surface approach, and also allow tasks supporting the development of generic skills to be embedded in the curriculum.

In combination, the Part I nexus, the excess of content in Part I and the over reliance on assessment by examination act like a straitjacket, stifling curriculum innovation, influencing many students to take a surface approach to learning and making the experience less satisfying and less enjoyable than it ought to be for both teachers and students.

7.2 Part II (Control Cycle) reforms

There is much scope for increasing the learning value of the Control Cycle course to students. The overall learning objective of the ACC is for the student to build her own holistic conceptual framework of actuarial work; to be able to see the "big picture" of managing a financial product, service or scheme in the long term, and to understand the need for and relationship between such functions as risk assessment, product design, pricing, liability valuation, asset selection and management, solvency measurement, financial condition reporting, monitoring actual and expected experience, and so on.

The ACC is the kind of subject where learning is likely to flow from reading, thinking, discussing, applying, writing and explaining. It's a "learning by doing" subject. The kinds of assessment tasks required are research reports, problem solving, case studies, assignments, presentations and essays. Exams are not good instruments for assessing the kind of learning demanded by the ACC subject. In fact, exams are valid and useful assessment instruments in very few circumstances.

Control Cycle innovation can be encouraged by allowing assessment that can be varied to meet the needs of individual learners, such as learning contracts and portfolio assessment. IAAust should encourage one or more accredited universities to experiment with Problem Based Learning, and the Control Cycle subject could be a good place to start.

8 Does it work?

Does the approach to teaching and learning advocated in this paper work? What effect does it have on students' learning outcomes?

Of course it has not been tried with actuarial students in "exemption" subjects, because such an approach, particularly its implications for assessment, would not comply with IAAust requirements. However, the author has been fully implementing this approach, based on the principle of constructive alignment, for more than half a decade in a second year core finance subject (ACST201) at Macquarie University.

Feedback from students in this subject has been very positive. Many have described their experience of the subject as unique in terms of opening their minds to the possibility of learning for understanding as opposed to learning to pass an exam. They typically describe it as different, refreshing, satisfying and demanding but

enjoyable, and often say that they intend to carry over the new approach they have discovered into other subjects.

A selection of reflections by students of ACST201 is included in the appendix, to give an indication of how positively many students respond to a learning environment that consistently demands that they understand. These students are not actuarial students. Most of them would be majoring in finance, others in accounting, economics or business administration.

9 Conclusion

Is Australia's actuarial qualification process better than that of the UK and North American professions? The answer may be of interest but it is not very important. In terms of evaluating the Australian actuarial qualification process, the most important question is whether or not it educates future actuaries.

The acid test of the IAAust's attitude to actuarial education is perhaps the question of whether Problem Based Learning (PBL) could be implemented by an Australian university wanting to provide its students with the best preparation for their future actuarial careers. The answer is a clear NO. Arguably the best preparation for professional actuarial life is not possible. It would not satisfy IAAust "standards".

What final grade should we give to the IAAust qualification process? A marginal pass seems appropriate. Not a terminating pass, because there is at least, I believe, the will to do well. What is lacking is attention to the fundamental principles of education. In the author's view, this shortcoming applies also to the qualification processes in the UK and North America, so there is no great credit in being the leader in a poor quality field.

When assessed in the light of generally accepted educational principles and practice in higher education and professional education, the process is found to be short of exemption standard!



We have a choice. We can continue with a tough qualification process that impedes quality learning, or we can move towards a rigorous education system that prepares future actuaries for a world of change, challenge and complexity.

And let's be realistic. If the process continues on the current model, don't call it an education program. Keep using hurdles, keep them high and set them close together, and call it a qualification or examination process. Don't call it education!

APPENDIX

Reflections on learning, by students of ACST201 (a core finance subject)

• As odd as this may sound, I learned to understand my knowledge. Usually I am taught formulas and I learn the formula and how to apply it. However, as far as understanding the actual applications or magnitudes of variables it would be very hazy. This class has taught me to "*pause … think*" and not in a bad way because when you understand (the "*ohhhh … yeah!*" part) it's most satisfying. Why? Well when you understand the fundamentals and applications you think how did I ever get this wrong. Similar to riding a bike – once principles are understood you don't have to study it or go back and learn it. You can just hop back on the bike when you need to. So once you sit down and understand why it will cut the study time in half as you can't study what is now very straightforward and logical.

• I can only highly recommend this course as you actually learn/understand and grasp subject matter such that when you finish an exam the logic and applications will stay with you not to be erased as you pass out of the doorway. Because of this you will leave with the satisfaction of a real outcome and not a final grade on how good your memory skills are.

• What I learned from this subject is that it is possible to actually understand mathematical problems. This is a financial mathematics based course, and yet I can honestly say that I did not learn one formula over the whole semester. That is not because I didn't learn them. It was simply because there were none. I still got most of the questions right however, and I believe this is due to the fact that I actually understood the logic behind my calculations instead of just typing in numbers and hoping I'd remembered the formula correctly. This subject helped me to think about what I was doing, valuing cash flows, where they came from, effects of changing rates, and so on. I think the principles I learned from this subject will stay with me more than any set formulas I may have crammed into my head, which could so easily exit as soon as the final exam is over. I actually learned the working behind my answers!

• If I had to choose a word to describe ACST201 I would have to say it was *more*. I have found it *more* challenging, *more* stressful, *more* frustrating, *more* rewarding, *more* demanding and *more* enjoyable than my other units.

• I found applying knowledge to problems not previously encountered was of course painful. Fear of this made me work that much harder, and have to think about things. But instead of just learning steps in a process I understand it better, so the reward is greater.

• Most importantly, in this subject I developed a way of learning which will help me in other subjects, including those not specifically to do with finance. The tutorial and class tests force you to understand every stage before progressing and aid you in studying throughout the year. It gives you a better knowledge of the work and doesn't make you study so much for the final exam. It is very important to know why you work out a problem in a specified way, rather than just knowing how to do it. It makes it far easier for you to adjust your method for a slightly different circumstance and makes what you have learnt much more useful in the real world where nothing is as simple as a problem found in a textbook.

• Which brings me to another point. Even though you are doing an Arts degree, this course will be useful to you. The hardest questions, which require the highest order of knowledge, test your ability to communicate concepts. This subject is not an exercise in memorising formula and a test in calculator skills, you must understand the theoretical concepts behind the formula and behind the equations of value, and be able to explain them clearly and concisely.

REFERENCES

Australian Society of Certified Practising Accountants and The Institute of Chartered Accountants in Australia (1996), *Guidelines for Joint Administration of Accreditation of Tertiary Courses by the Professional Accounting Bodies*, Sydney: ASCPA.

Biggs, J B (1996), "Enhancing teaching through constructive alignment", *Higher Education*, 32, pp 1-18.

Biggs, J B (1999), *Teaching for Quality Learning at University: What the Student Does*, Buckingham: Society for Research into Higher Education & Open University Press.

Boud, D (1985), *Problem-based Learning in Education for the Professions*, Sydney: Higher Education Research and Development Society of Australasia.

Gale, A C (2004), "Leadership: The Courage to Commit", *Presidential Address 2005*, Sydney: The Institute of Actuaries of Australia.

Institute of Actuaries of Australia (2005), *"Part II – Actuarial Education Program"* http://www.actuaries.asn.au/PublicSite/education/Education2005/education_frameset.htm

Institute of Actuaries of Australia (2002), *"University Accreditation Policy and Criteria"* http://www.actuaries.asn.au/PublicSite/education/Education2005/education_frameset.htm

Ramsden, P (1992), *Learning to Teach in Higher Education*, London: Routledge.

Rogers, G (2003), "The Actuarial Profession: Making a Difference", *Presidential Address 2004*, Sydney: The Institute of Actuaries of Australia.

Shuell, T J (1986), "Cognitive conceptions of learning", *Review of Educational Research*, 56, pp 411-436.