ACTUARIES: A NARROW PROFESSION?

A SURVEY OF THE PREFERRED LEARNING STYLES OF AUSTRALIAN ACTUARIES

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Abstract

Over 400 members of the Institute of Actuaries of Australia responded to a survey designed to indicate their preferred learning style as well as other personal data. This paper explains the learning model underlying the survey instrument and presents a broad summary of the results, with the aim of generating discussion at the Convention of the implications of the results.

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1 INTRODUCTION: THE PROJECT

In mid-1999 all members of The Institute of Actuaries of Australia (IAAust) were invited, by mail, to complete and return a survey instrument that indicates the preferred learning style of the respondent. The aim of the project was to determine whether Australian actuaries, or identifiable sub-groups of Australian actuaries, have a distinctive learning style.

This project builds on previous research by the author into preferred learning styles of university students, including actuarial students. During 1995/96, and 1998, over 1,000 students at Macquarie University were surveyed to determine their preferred learning styles according to Kolb's Learning Style Inventory (LSI). Students intending to major in accounting, finance, economics, statistics and other disciplines were included as well as actuarial students. Results previously reported by the author (Shepherd, 1997 and 1999) showed a significant shift in preferred learning style by actuarial students as they progressed through the stages of their undergraduate program.

This paper explains the background to the LSI survey instrument, including the theory supporting its underlying learning model, and reports in broad terms on the results of the survey of Australian actuaries. The aim is to stimulate a discussion of the implications of the results during the session devoted to this topic at the 2003 IAAust Biennial Convention.

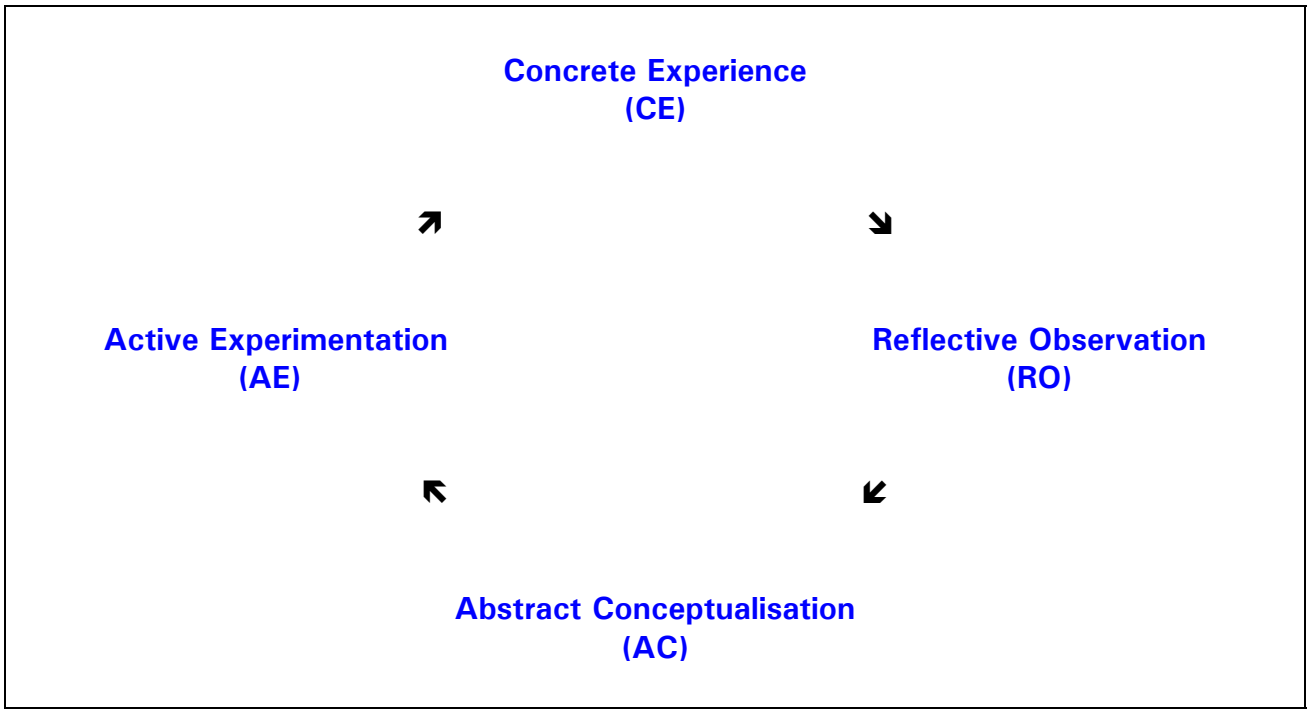
2 KOLB'S EXPERIENTIAL LEARNING MODEL

David Kolb's Experiential Learning Model (ELM) represents learning as a cyclical process requiring each of four different types of ability, or modes of learning - concrete experience abilities (CE), reflective observation abilities (RO), abstract conceptualisation abilities (AC) and active experimentation abilities (AE) (Kolb, 1981). Figure 1 shows how the four stages are conceived as part of a learning cycle, with each stage requiring different types of ability.

Learning may begin with a concrete, or immediate, experience. The learner observes or reflects on that experience. These observations and reflections are accommodated (in cognitive terms) by abstract conceptualisation; ie by distillation into a theory, concept or generalisation. The theory, concept or generalisation is then tested for validity by active experimentation (ie action), which results in further concrete experience as the process moves into another iteration of the cycle.

The four stages can be represented simply as learning from feeling or sensing (affective), learning by watching and listening (perceptual), learning by thinking (symbolic), and learning by doing (behavioural). This description of a learning cycle, in which experience is turned into concepts, which are used as guides in dealing with new experiences, is the core of the model.

Figure 1: The Experiential Learning Model (Kolb, 1981)



3 KOLB'S LEARNING STYLE TYPES

Kolb's ELM model implies that *"learning requires abilities that are polar opposites"*, and *"that the learner, as a result, must continually choose which set of learning abilities he will bring to bear in any specific learning situation"* (Kolb, 1976). Learning requires all four types of ability. However, Kolb's learning style theory proposes that a particular learner may favour, and tend to use more, one or more of the sets of abilities in preference to the others, according to how effective and comfortable he feels with each stage when learning and/or solving problems. Individual personality characteristics, academic training, career choice, current job and even current task, are cited as factors that may influence preferences. Each person in a unique way develops a learning style that has both strong and weak points. An individual's preferences may change over time.

3.1 Two dimensions of learning

Kolb suggests further that learners can be categorised along two bipolar dimensions, related to the Experiential Learning Model, shown in Figure 2.

The first dimension, represented by a "Concrete/Abstract" continuum (vertical axis), relates to how a learner perceives new information. Confronted by new situations or experiences, some people tend to sense and feel their way (CE), while others rely more on thought processes, using logic and ideas (AC). The second dimension, represented by an "Active/Reflective" continuum (horizontal axis), addresses how a learner processes new

information. Some people like to get in and experience it, to learn by doing (AE), while others prefer to watch, listen and think it through first (RO).

Kolb's theory proposes that the extremes of each dimension are mutually exclusive. For example, one cannot simultaneously perceive by both concrete experience and abstract conceptualisation. To deal with this conflict, each individual must choose how to take in new information (and how to process it), and thus she develops preferences that together constitute a learning style - the characteristic way an individual tends to perceive and process new experiences.

3.2 Four learning style types

Representing the two dimensions (Concrete/Abstract and Active/Reflective) by vertical and horizontal axes, as in Figure 2, produces a plane whose four quadrants, suggests Kolb (1984), represent four distinct learning style types - *divergers* (who favour concrete experience and reflective observation), *assimilators* (who prefer reflective observation and abstract conceptualisation), *convergers* (who tend to use abstract conceptualisation and active experimentation) and *accommodators* (who lean towards active experimentation and concrete experience).

3.3 Divergers

Divergers (CE + RO) have strong imaginative ability, and awareness of meaning and values. They can view situations from several perspectives, and perform well when alternative ideas and approaches are needed, such as in "brainstorming". Divergers are interested in people and sensitive to interpersonal issues. This style has been found often in counsellors and personnel managers and in others with humanities or liberal arts backgrounds (Kolb, 1974).

3.4 Convergers

Convergers (AC + AE) are "opposite" to divergers. Their strengths are problem solving, decision making and the practical application of ideas. They perform best in situations such as conventional intelligence tests where there is a single correct answer or solution to a question or problem.

Convergers favour hypothetical-deductive reasoning. They prefer to deal with technical tasks and problems rather than social and interpersonal issues. This style is characteristic of many engineers (Kolb, 1974).

3.5 Assimilators

Assimilators (RO + AC) prefer to use inductive reasoning in constructing theoretical models that assimilate disparate observations into an integrated explanation. Like

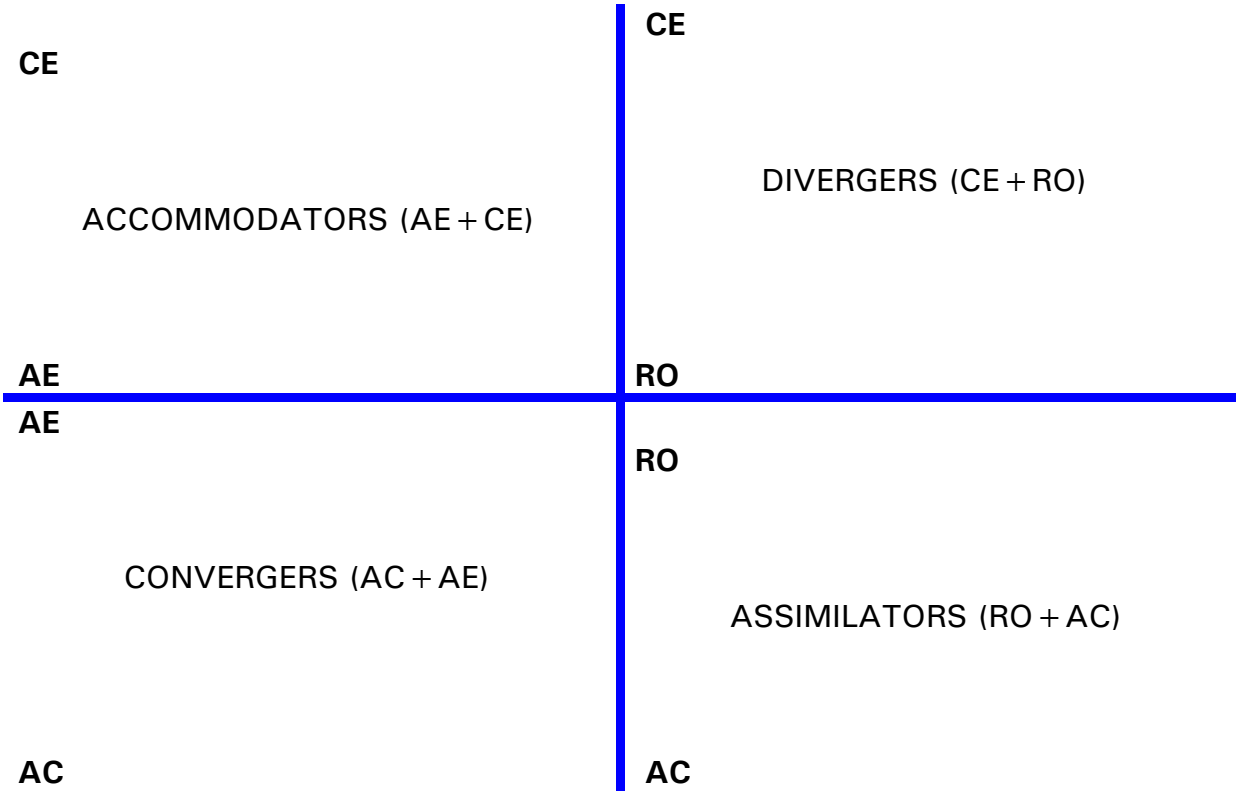
convergers, they are interested in ideas and abstract concepts; but they are less concerned with the practical applications. This learning style is more characteristic of the basic than the

applied sciences, and in industry is found most often in research and planning areas (Kolb, 1974).

3.6 Accommodators

Accommodators (AE + CE) tend to have learning strengths "opposite" to assimilators. They are people who are good at getting things done; they enjoy carrying out plans, tasks and experiments, and involving themselves in new experiences. They perform well in situations where adaptation to changing circumstances is required, and they solve problems intuitively, in a trial and error manner, relying on other people for information rather than on their own analytical ability. They may sometimes be seen as impatient and "pushy". They tend to have a practical or technical education (such as business administration) and are often found in "active-oriented" jobs like marketing or sales (Kolb, 1974).

Figure 2: Kolb's Learning Style Types (Kolb, 1984)



3.7 Personal balance on each dimension

Kolb (1984) suggests that an individual learner, influenced by experience, personality and environmental factors, will develop, over time, strengths and weaknesses that emphasise some learning styles over others. A personal balance will be found

between being reflective and being active, and between perceiving the concrete and the abstract. Each dimensional balance can be represented by a point on the corresponding axis in Figure 2 (horizontal for active/reflective, and vertical for concrete/abstract). Thus an individual's learning style preference can be represented by a point on the plane formed by the two axes. Kolb's Learning Style Inventory (LSI) is a survey instrument that generates a pair of

coordinates to place a person's learning style preference on the plane shown in Figure 2.

3.8 Balanced learning style

The intersection of the two axes (the origin) in Figure 2, then, represents a balanced and adaptive learning style.

An individual with balanced learning style preferences is able to learn in a variety of environments. The further away an individual's preferred learning style is from the intersection (origin), the more heavily dominated their learning style is by one particular stage of the process. Such an individual will encounter some situations in which new knowledge is presented in a format or a way that is not consistent with their most developed learning stage abilities. Acquiring that new knowledge will then be difficult.

4 LEARNING STYLES AND DISCIPLINES

Several researchers (Kolb, 1981; Biglan, 1973a, 1973b; Mitroff, 1982; Cullen et al, 1994) have shown that it is possible to group learning disciplines according to shared epistemological and methodological characteristics. These researchers used different approaches, but each supports the groupings shown in Figure 3. Two dimensions are used to categorise the disciplines - Active/Reflective and Abstract/Concrete. The dimensions are the same as those used in Kolb's learning style theory.

Figure 3: Disciplinary groupings (adapted from Cullen et al, 1994)

Concrete/Active (Soft/Applied) Cluster	**Concrete/Reflective (Soft/Pure) Cluster**
Commerce Demography Education Environmental Studies Geography Political Science Public Policy	English History Linguistics Philosophy Sociology
Abstract/Active (Hard/Applied) Cluster	**Abstract/Reflective (Hard/Pure) Cluster**
Applied Economics Applied Physics Art History Computing Demography Engineering	Astronomy Chemistry Classics Earth Sciences Economics Mathematics

Forestry Law Medical Research	Physics Theoretical Physics

Several authors (Snyder, 1971; Laurillard, 1979; Gibbs et al, 1980; Richardson, 1990) have implied a link between the learning styles that students adopt and their primary study discipline. Kolb (1976) was more emphatic when he reported an association between preferred learning style and undergraduate major for some American postgraduate management students.

4.1 What learning styles should we expect from actuarial students?

What sort of learning style might actuarial students be expected to prefer? Since actuarial studies is multi-disciplinary, and incorporates mathematics, statistics, demography, economics, accounting, computing and finance, the bottom left quadrant (Abstract/Active or Hard/Applied) appears to offer the best fit. Here we find economics (applied), computing, and demography. Although “mathematics” is in the bottom right quadrant, the nature of the other occupants of the hard/pure cluster strongly suggests that it is pure or theoretical mathematics which is indicated. Actuarial interest in mathematics is most definitely in its applications.

Further, actuarial studies fits comfortably with applied physics and engineering. In fact, actuaries are often referred to as "financial engineers" or "insurance engineers". So, in the light of the learning style/discipline research, it seems that actuarial students can be expected to prefer to be convergers when they learn.

4.2 What learning styles should we expect from actuaries?

What might the preferred learning style of people engaged in actuarial work be? By considering the nature and demands of actuarial work, the implications of learning style theory, and the documented learning styles of other occupations and professions, we can make a measured guess.

Actuarial work is quite varied. It can be largely technical, involving modelling and/or computations, and lots of time devoted to dealing with "figures". Many actuarial jobs may loosely fit this kind of mould, but there is considerable variation in the work performed by actuaries.

Some experienced actuaries occupy executive and senior management roles. Their main concerns will be people management, policy and goal setting, strategic planning, decision making, accountability to proprietors and maintaining control. Actuaries in these roles may be expected to be accommodators in learning style type, with dominant learning abilities in concrete experience (decision making in uncertain circumstances) and active experimentation (accomplishing the task).

A number of actuaries have marketing roles. The tendency for marketing people to prefer accommodative learning styles (Kolb, 1984, p 90) suggests that such actuaries may exhibit active/concrete orientations.

Of course, many actuaries operate as consultants, with corporate or individual clients. Such roles often involve extensive interaction with people, including investigative

interviews to determine clients' real concerns and needs or to gather information, teamwork with actuaries and other professionals, and communicating the results and implications of technical or complex analysis to non-technical audiences. These activities require personal interaction skills (concrete experience) as well as problem solving and decision making (active experimentation). Once again theory suggests that accommodators may be prevalent, with divergers also represented.

There are also, of course, actuaries whose work is largely technical in nature. These people often support the managers or the consultants by performing the pricing, reserving, solvency checking, modelling, projecting and analysing functions which inform the decision making and client advising processes. Learning style theory implies that people performing these roles are likely to be convergers, whose dominant abilities are abstract conceptualisation and active experimentation. They prefer to be applying more or less standard processes and methodologies to the solution of problems that are familiar and specific.

Firms that specialise in developing, marketing and supporting actuarial and other financial computer software may require actuaries whose work fits closely the theoretical learning style of the converger or the accommodator.

The spectrum of actuarial work also includes university academic and other research and development roles. Favouring abstract conceptualisation and reflective observation, the assimilator tends to be found in academic and research and development roles.

This discussion of the learning style preferences that actuaries might be expected to display, using learning style theory as a framework, indicates that it is unlikely that actuaries will exhibit a dominant learning style preference. Perhaps those involved in particular forms of actuarial work (eg consultants) will tend to a particular style, but overall it seems unlikely that a clearly dominant style will emerge. It seems likely that divergers will be the least-represented learning style type.

4.3 Actuarial learning styles and actuarial education

Does learning style theory imply that actuarial education should be tailored to suit the dominant learning style or styles of actuaries? Certainly not! On the contrary, the actuarial education process should support and encourage all stages of the ELM. There are a number of reasons for this:

(1) If learning is a cyclical process as the ELM implies, the stage at which learning optimally "begins" may differ from learner to learner. For example, some learners may learn best by first combining activities involving active experimentation and abstract conceptualisation and then moving on to other modes in the cycle. In geology, a lecture on a theoretical model of some aspect of the earth's crust (AC) may be linked with a computer simulation (AE) incorporating the model, then a field trip to collect relevant data (concrete experience).

Other learners may prefer, say, reflective observation and abstract conceptualisation as the best way to encounter new knowledge (eg a group discussion of a problematic social issue, followed by the reading of relevant papers proposing theoretical explanations for the phenomenon as a basis for understanding the problem better).

A flexible educational program will cater as much as possible for a range of preferences for starting points in the learning cycle.

(2) In recent years the actuarial profession has been concerned that employment opportunities for its members in traditional practice areas (especially life insurance and superannuation) were likely to contract, let alone expand at a rate sufficient to absorb new entrants. Consequently, debate has ensued on restricting supply (restricting the number of entrants to the profession) and increasing demand (stimulating the need for actuaries in, as well as the ability of actuaries to add value to, non-traditional practice areas such as health insurance and finance). If newly qualified actuaries are going to enter the so-called "wider field", it can be argued that they will be better equipped to pioneer actuarial work in new areas if they have balanced, adaptive learning style preferences. They will then be more likely to be able to adjust to the learning and problem solving demands of a wider range of possible work types and environments. In other words, it is in the best interests of the profession and especially its newer members for actuaries to have balanced learning style preferences.

(3) Some actuaries have expressed concern that by taking entrants only from the narrow band of school leavers with high TER scores the profession is unduly and perhaps unwisely limiting its corporate development. Bellis (1996, p 12) speculated on the origins of this view :

"*underlying this concern is perhaps a belief that high TER students are introverted "nerds", who have achieved their good results by neglecting to develop other facets of their personalities, and who lack creativity, the ability to communicate, and interpersonal skills*".

There appears to be no one putting forward evidence to support this concern. However, if there were some justification for it, it would add weight to the argument that the actuarial education process ought to foster the development of all stages of the learning cycle.

(4) Kolb (1976) links experiential learning theory to the lifetime process of human personal development. He envisages each individual undergoing a continuous growth process on each of four dimensions - perceptual (RO), symbolic (AC), behavioural (AE) and affective (CE). At different stages of growth, different modes of adapting may be dominant, but maturity is characterised by a harmonious integration of the four dimensions.

If this developmental link is valid, then it provides one more justification for accommodating all learning styles in an educational program. It may maximise the opportunities for personal development of individual learners.

Given that the actuarial education program should foster or at least allow the development of learning abilities for all stages of the experiential learning cycle, the question arises of how the program might be modified to achieve this. This is dealt with in Section 7 below under the heading of *Implications for Actuarial Education*.

5 RESPONDENTS: A STATISTICAL SUMMARY

There were 412 responses that could be used. Table 1 gives a statistical sketch of the respondents ("A/S" denotes actuarial studies):

Table 1: Some characteristics of the 1999 survey respondents

1 Sex:	**Males**	**Females**		
	310 (76%)	100 (24%)		
2 Membership class:	**Fellow**	**Associate**	**Student**	
	274 (67%)	69 (17%)	68 (16%)	
3 Year of birth:	**Lowest**	**Median**	**Highest**	
	1912	1966	1979	
4 Qualification route:	**Uni degree in A/S**	**Uni degree non-A/S**	**No uni degree**	
	228 (56%)	164 (40%)	18 (4%)	
5 Residence:	**NSW**	**Victoria**	**Rest of Australia**	**Overseas**
	246 (60%)	77 (19%)	29 (7%)	60 (14%)

6 Principal work area:

• Life insurance	143	35%
• General insurance	56	14%
• Superannuation	75	18%
• Reinsurance	18	4%
• Finance	12	3%
• Software/IT	11	3%
• Investment	33	8%
• Health, banking, education or retired	25	6%
• Other	36	9%

6 RESULTS

6.1 University students' preferred learning styles

First, Table 1 summarises the results of the author's investigation of university students' preferred learning styles during 1995 and 1996 (Shepherd, 1997). Note particularly the marked shift towards **converger** across Groups B (first year actuarial students), C (second

year actuarial students) and D (third year actuarial students). Note that these three groups represent three different cohorts of students (ie they are not the same students).

Table 2: Percentage distribution of university students by learning style type

Type	Group A	Group B	Group C	Group D	Group E	E (Accg)	E (Act)	All actuarial	All students
No. students included	55	60	42	43	318	188	82	227	518
Converger	29	16	33	49	27	22	40	34	28
Assimilator	22	42	38	19	31	30	38	35	31
Diverger	11	32	19	14	26	31	11	19	24
Accommodator	38	10	10	19	16	17	11	12	17

Groups key :
A - Introductory statistics (1995, 2)
B - First year actuarial studies (1995, 2)
C - Second year actuarial studies (1995,2)
D - Third year actuarial studies (1995,2)
E - First year accounting (1996,1)

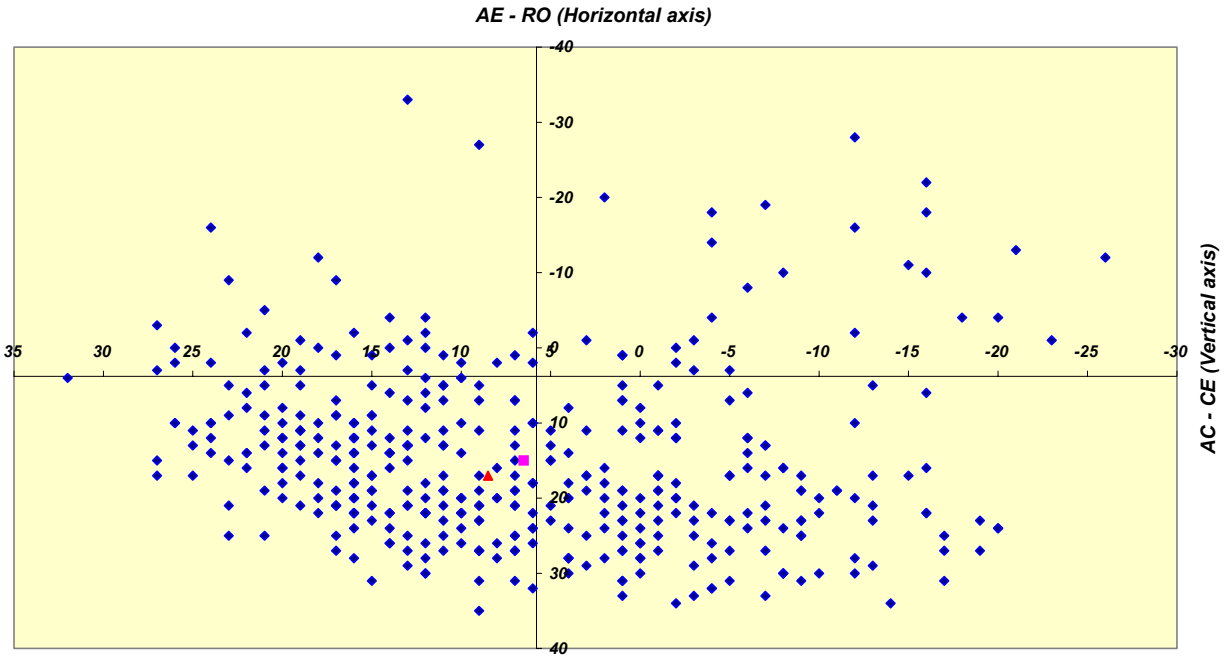
E(Accg) - Accounting students in Group E
E(Act) - Actuarial students in Group E
All actuarial - Groups B, C, D and E(Act)
All students - Groups A, B, C, D and E
(1995, 2) means "Semester 2, 1995"

6.2 Preferred learning styles of Australian actuaries

Secondly, the following tables and charts show percentage distributions of various respondent sub-groups by learning style type.

Figure 4: Distribution of preferred learning styles of Australian actuaries

LEARNING STYLE TYPE: ALL (n=412)



In Figure 4, note two features. First, the strong preference by Australian actuaries for the abstract (AC) over the concrete (CE) when perceiving new information or experience (ie the preponderance of data points below the horizontal axis). Secondly, the slight but perceptible preference for the active (AE) over the reflective (RO) when processing what is perceived.

Table 3: Distribution of preferred learning styles of Australian actuaries by sex

	n	CON	ASS	DIV	ACC
Males	310	49%	37%	6%	8%
Females	100	53%	30%	7%	10%
ALL	412	50%	35%	7%	8%

Table 4: Distribution of preferred learning styles of Australian actuaries by practice area

	n	CON	ASS	DIV	ACC
Life	143	46%	37%	8%	8%
General	56	48%	30%	11%	11%
Super	75	55%	35%	3%	8%
Reinsurance	18	56%	33%	6%	6%
Finance	12	50%	50%	0%	0%
Software/IT	11	55%	27%	18%	0%
Investment	33	49%	30%	6%	15%
* Other	25	44%	48%	0%	8%
Misc	36	56%	33%	6%	6%
ALL	412	50%	35%	7%	8%

** Other = Health + Banking + Education + Retired*

Table 5: Distribution of preferred learning styles of Australian actuaries by membership

	n	CON	ASS	DIV	ACC
Fellow	274	48%	36%	6%	10%
Associate	69	60%	29%	4%	7%
Student	68	47%	38%	10%	5%
ALL	412	50%	35%	7%	8%

Table 6: Distribution of preferred learning styles of Australian actuaries by residence

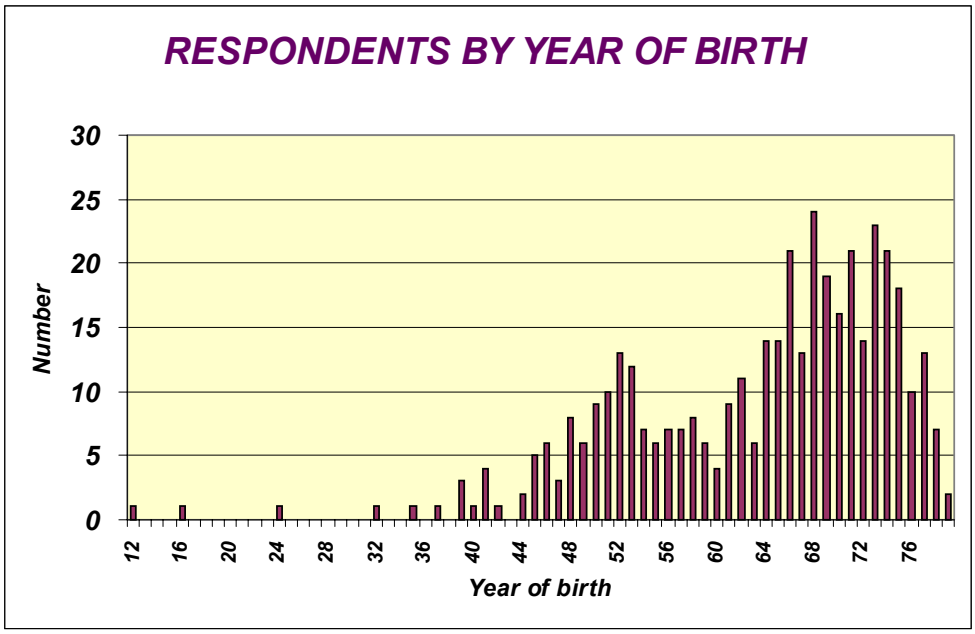
	n	CON	ASS	DIV	ACC
NSW	246	52%	35%	7%	6%
Victoria	77	43%	35%	5%	17%
Rest of Aust	29	52%	45%	3%	0%
Overseas	60	48%	33%	8%	10%
ALL	412	50%	35%	7%	8%

Table 7: Distribution of preferred learning styles of Australian actuaries by route to qualification

	n	CON	ASS	DIV	ACC
A/S (Macq)	184	53%	32%	8%	7%
A/S (Non-Macq)	44	54%	27%	14%	5%
Non-A/S (uni)	164	49%	40%	4%	8%
No uni	18	54%	46%	0%	0%
ALL	412	50%	35%	7%	8%

- *A/S (Macq) means an Actuarial Studies degree at Macquarie University*
- *A/S (Non-Macq) means an Actuarial Studies degree at a university other than Macquarie University*
- *Non-A/S (uni) means a university degree in a discipline other than Actuarial Studies*

Figure 5: Distribution of survey respondents by year of birth



7 IMPLICATIONS FOR ACTUARIAL EDUCATION

7.1 Context of learning in university actuarial subjects

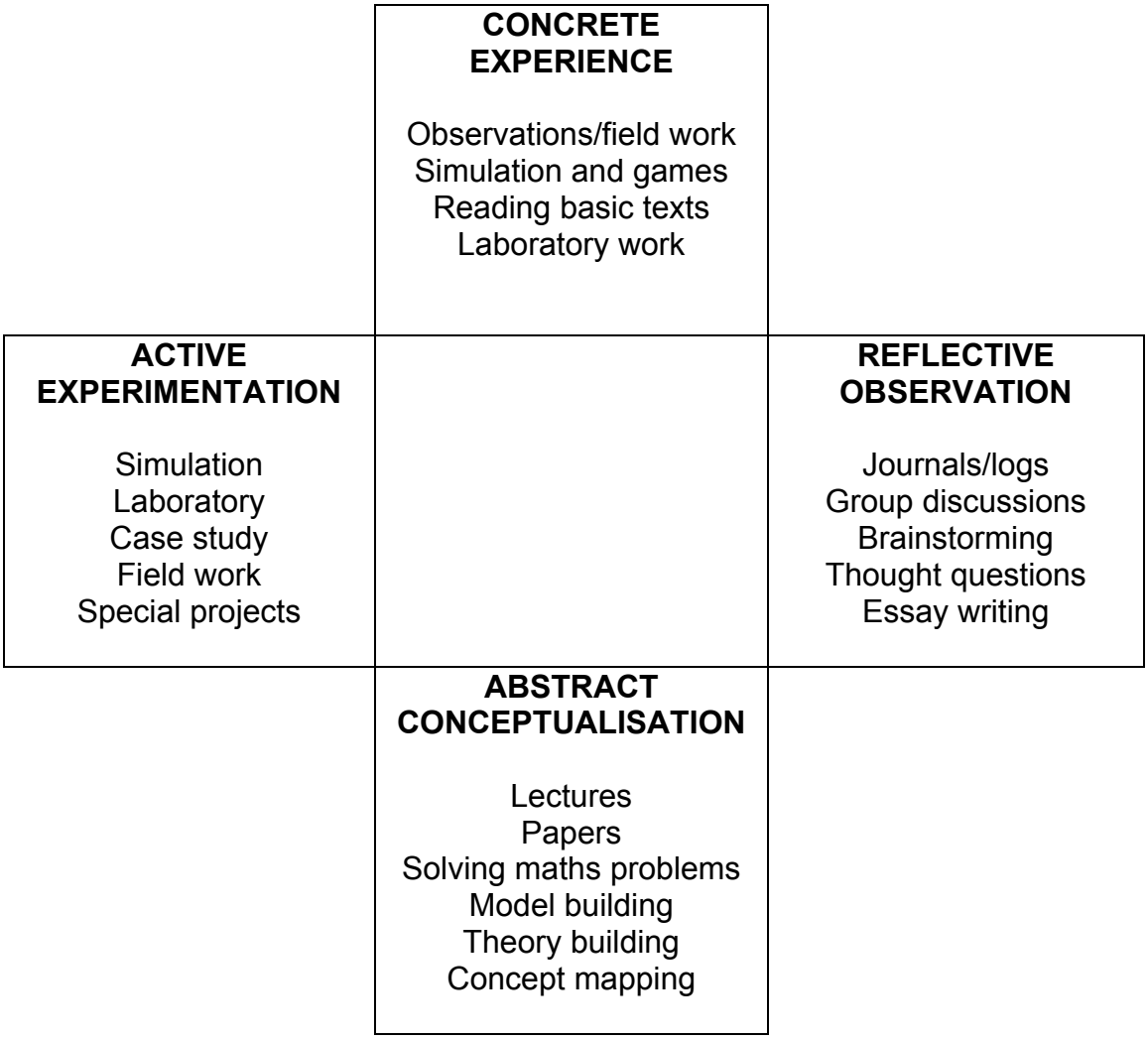
Typically, subjects in actuarial studies programs, especially in the first and second years, focus on applied mathematical content. The underlying mathematics is often not very advanced or complex. The ways in which the maths is applied, however, are often novel for the students, involving new ideas and concepts, and applications to unfamiliar areas

like insurance and superannuation. The problems presented to them as examples and as exercises are usually anything but trivial and quite difficult to solve.

The range of learning activities may include traditional lectures, tutorials during which problems are set as exercises, weekly homework assignments consisting of a number of difficult problems to solve, and occasional in-class tests. Assessment is usually weighted heavily on a traditional written final examination, consisting largely or entirely of problem-style questions having unique solutions.

In the light of this inventory of typical learning activities in actuarial course units, it is not surprising that success in terms of high grades and high GPA is associated with a preference for *converger* as learning style type. This typical mix of learning activities continues from first year into second and even, to some extent, third year. Again, it is not surprising that the average and dominant preferred actuarial learning style approaches and reaches *converger* by the end of the third year.

Figure 6: Instructional activities supporting experiential learning
Adapted from Wynd and Bozman (1996)



7.2 Teaching & learning activities and experiential learning

The types of teaching and learning activity planned for actuarial students may be an important factor in their formation of learning style preferences and in their academic success in the program. Wynd and Bozman (1996) classified a selection of common instructional activities according to the stage of the experiential learning cycle that they might best support (see Figure 6).

It is clear from the outline in 7.1 of actuarial learning activities that they strongly support the bottom (Abstract Conceptualisation) group, and to a lesser extent the left-hand (Active Experimentation) group, but that they almost ignore the other two groups (Concrete Experience and Reflective Observation).

8 MAJOR FEATURES OF THE RESULTS

The 1999 survey of IAAust members suggests that, very roughly, out of every fourteen actuaries, seven (50%) are convergers, five (35%) are assimilators, one (8%) is an accommodator and one (7%) is a diverger.

On the horizontal (active-reflective) dimension, relating to how we process or transform the information and experience we absorb, Australian actuaries are reasonably well spread, with a slight tendency towards active experimentation (AE) at the expense of reflective observation (RO).

On the vertical (concrete-abstract) dimension, relating to how we perceive new information and experience, Australian actuaries lean heavily towards the abstract (AC) in preference to the concrete (CE).

The membership of the Australian actuarial profession is, at least in terms of preferred learning style, narrowly confined. If there is strength and vitality in variability, then the Australian actuarial profession would benefit from greater diversity within its membership.

Further, there is room for Australian actuarial education to provide greater opportunities for the actuaries of the future to develop their learning abilities in the areas of concrete experience, reflective observation and active experimentation, as well as abstract conceptualisation, where they are already strong.

REFERENCES

Bellis, C.S., "A TER Analysis of the Macquarie University Actuarial Degree", *Quarterly Journal of The Institute of Actuaries of Australia* (June 1996), pp 2-21.

Biglan, A., "The Characteristics of Subject Matter in Different Academic Areas", *Journal of Applied Psychology*, Vol. 57, No. 3 (1973a), pp 195-203.

Biglan, A., "Relationships Between Subject Matter Characteristics and the Structure and Output of University Departments", *Journal of Applied Psychology*, Vol. 57, No. 3 (1973b), pp 204-213.

Cullen, D.J., M. Pearson, L.J. Saha, and R.H. Spear, *Establishing Effective PhD Supervision* (Canberra: DEET, 1994).

Gibbs, G., *Improving the Quality of Student Learning* (Bristol: Technical and Educational Services Ltd, 1992).

Gibbs, G., A. Morgan, and L. Taylor, *Understanding Why Students Don't Learn* (Milton Keynes: Institute of Educational Technology & The Open University, 1980).

Kolb, D.A., "On Management and the Learning Process"; in D.A. Kolb, I.M. Rubin, and J.M. McIntyre (Eds), *Organizational Psychology: A Book of Readings (Second edition)* (Englewood Cliffs, New Jersey: Prentice-Hall, 1974).

Kolb, D.A., *Learning Style Inventory: Technical Manual* (Boston: McBer & Co., 1976).

Kolb, D.A., "Experiential Learning Theory and the Learning Style Inventory: A Reply to Freedman and Stumpf", *Academy of Management Review* (April 1981), pp 289-296.

Kolb, D.A., *Experiential Learning* (Englewood Cliffs, New Jersey: Prentice-Hall, 1984).

Laurillard, D., "The Process of Student Learning", *Higher Education*, Vol. 8 (1979), pp 395-409.

Mitroff, I.I., "Secure versus Insecure Forms of Knowing in University Settings: Two Archetypes of Inquiry", *Journal of Higher Education*, Vol. 53, No. 6 (1982), pp 641-655.

Richardson, J.T.E., "Reliability and Replicability of the Approaches to Studying Questionnaire", *Studies in Higher Education*, Vol. 15, No. 2 (1990), pp 155-168.

Shepherd, J.A., *"Is There a Distinctive Learning Style Among Actuarial Students?"*, Unpublished Masters degree thesis, University of New South Wales (1997).

Shepherd, J.A., "Educating Adaptive Actuaries", *Actuarial Research Clearing House (ARCH)* (Schaumberg, Illinois: Society of Actuaries, 1999).

Snyder, B.R., *The Hidden Curriculum* (New York: Knopf, 1971).

Wynd, W.R., and C.S. Bozman, "Student Learning Style: A Segmentation Strategy for Higher Education", *Journal of Education for Business*, (March/April, 1996), pp 232-235.