

## **Submission to the Commission's 5 Year Productivity Inquiry: From Learning to Growth**

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Dear Productivity Commissioners,

Thank you for the invitation to comment upon the Commission's 5 Year Productivity Inquiry: From Learning to Growth.

I have a number of points and arguments to make concerning omissions from the analyses and direction of the inquiry in grappling with very serious, challenging problems. I will be making several recommendations about substantial changes to the understanding of teaching and learning, and the content of teacher education programs, changes that I believe are required to substantially improve the quality of learning and teaching in Australia.

I will be focusing upon the quality of individual student learning and teaching issues in specific ways that I believe have so far escaped examination and analysis by the Commissioners. In this the Commissioners are in good company as the OECD deliberately, and I strongly believe completely erroneously, avoids focus upon the quality of individual learning and teaching interactions in its research and recommendations. Generally, I will be arguing for the need to reinstate educational psychology as a core subject underpinning the theory and practice of teaching in teacher education curricula. Specifically, I will be focusing upon the importance of the Information Processing Model (IPM) for effective learning and teaching, and the understanding of skill learning, its stages, and processes, with this inexplicably absent from most teacher training literature and courses for decades.

In effect my submission is focused upon: 'The aim ... to change teachers' thinking, knowledge and skills about instruction in order to change classroom practice.' (Interim Report, p.18)

Many of the points I will make run contrary to current, widely held beliefs and practices. Regardless, I firmly believe that to make any real progress in improving the quality of education in Australia the problems need to be re-framed, i.e. looked at from somewhat different angles. As always, how the problems are identified or framed is critical in arriving at effective solutions.

As to my credibility and standing as a critic offering alternatives, I point out that in my evaluation of lifelong policy implementation in Australia, published in early 2009 in a high-ranking international refereed journal, many of the problems now facing Australian education in 2022 were clearly identified then (Cornford 2009, especially pp 30-36). Admittedly I did not then foresee major teacher shortages as a general problem, simply because I could not possibly have believed that administration of, and future planning for education in Australia could be so poor for so long that this situation would arise.

Further, I have had extensive, practical, hands-on involvement and management experience across key teacher skill training areas and curriculum in effective VET teacher education for over thirty years. I am author of two chapters covering unduly neglected areas in teacher education, 'Skill learning and the development of expertise' (Cornford, 2008a) and 'Social

learning' (Cornford, 2008b), written for beginning teachers and for later professional development. These cite relevant research literature extensively, have been republished in a text on adult educational psychology by an international publisher, and are a source of the comments and arguments presented later here.

I wish to commence by stating two facts, that I consider are incontrovertible at the present time, and then progress from these logically with specific suggestions regarding what needs to change in teacher education for primary and secondary schools before real improvement is possible.

### **Two Basic Facts Underlying the Following Analyses and Arguments**

1 Even with the best will in the world, no individual can learn for another.

2 The expert advice given and attempted solutions to the problems of quality learning in school education, that have been apparent since at least 2008 through comparative international test results, have not improved the situation, have been ineffectual, and thus radically different approaches must be adopted if real change and success are to occur.

Learning is of fundamental importance in the learning-teaching process, and effective learning with storage in long term memory, in reality, can only be done by the learner.

Teaching is about promoting learning, a process in which the learner exercises paramount control. This is not to say that teaching is unimportant, it is in fact very important, but it must always be conceived of as promoting learning through selection of information, organising, and presenting it in such ways as to make learning more effective. The teacher also exercises important functions as an assessor of formal and informal learning, regarding learning progress as to whether certain mandated levels and standards have been reached, and providing feedback.

To date, with the evident, unsuccessful outcomes, nearly all efforts in Australia to change have focused upon improving the quality of the teacher. This is certainly not irrelevant where attempts at raising teachers' ability to develop sensible teaching programs and ensuing mastery of subject content is concerned. However, all the evidence I believe points to the need to refocus to a considerable degree upon learning and the learner if Australia is to improve the quality of education.

I must emphasise, however, that other important aspects of teaching should not be neglected when this occurs. Too frequently there have been educational fads and fashions (see below) that have been adopted, but essentially are unbalanced in that they focus on one or only a few aspects of learning or teaching and substantially skew balance because of the particular philosophy adopted. This occurs because it seems to be thought unrealistically that it is magical cure and, if adopted, will solve all teaching problems. These fads and fashions in education, adopted without proper evidence and scientific research backing, are largely why we are in the current educational mess.

Lee Shulman (1986, 1987), an American professor of education, many decades ago perceptively summarised successful teaching as requiring: subject content knowledge; pedagogical knowledge; and pedagogical content knowledge. Subject content knowledge is possession by the teacher of knowledge, cognitive and practical skills underpinning the subject(s) being taught, and it is an essential basis for all effective teaching and learning. Pedagogical knowledge equates to the teacher knowing about and possessing a wide range of teaching skills based upon understanding the developmental psychology and cognitive capability of age groups taught. Pedagogical content knowledge is the knowledge and skill derived from successfully teaching difficult topics to students, and involves all kinds of insights into the flawed thinking and traps that students can fall into in trying to master difficult material and skills. It is what helps make an expert teacher and is only gained by experience, although tips passed to less experienced teachers by them can certainly help.

Shulman also correctly identified teaching as a specifically problem-solving activity that he argued is probably more challenging than GP medical practice. This is because teachers must make instantaneous decisions in classrooms and act, whereas doctors have the luxury of time and gaining results from scientifically rigorous tests before needing to produce a full diagnosis and prescribe treatment.

Briefly, regarding the issue of subject content, there are a number of problems that have been substantially ignored for decades since university degree qualifications for teaching became the norm. For far too long university graduates, who are recruited to teach and have passed subjects related to their specialist teaching area at university, are assumed to be equipped to teach school subject syllabus content. There is a large difference in most instances between the content of university subjects and school subjects. Proper initial teaching preparation and in-service training for teachers is needed to ensure that they possess the required knowledge and understanding of the required subject content, with gaps filled where necessary. They also need much guidance and training initially in interpretation of specific curriculum and syllabus documents, through collegiate mentoring and group decision making in the school workplace.

Libraries of lessons, covering commonly taught topics and skills prepared and used successfully by experienced, expert teachers, should be established and available to all teachers within the system using a common curriculum. It is important that teachers understand the content and teaching strategies involved in any lesson, and how to adapt these model lessons to suit individual students, classes, and situations. However, having teachers perpetually 'reinventing the wheel' in writing individual lesson plans for every lesson does not seem sensible, given clearly documented, excessive time and workload demands on teachers. This was written before substantial evidence on these matters was released by the Grattan Institute (Hunter, Haywood & Parkinson, 2022). This of course does not negate the need for teachers to possess the skills to be able to write proper individual lesson plans when models do not exist, or when modification of the model example is required.

Regarding pedagogical knowledge, educational psychology that was once considered an essential foundation in combination with theory and practice of teaching (under various titles), largely has been dropped as a core part of teacher education courses. This means that the more rigorous scientific research basis to guide decision making and selection of

strategies by teachers, has been removed. Although it was often badly taught as a discipline by those who had passed traditional psychology subjects at university, rather than a practical, applied subject, it provided important insights into how learning takes place through a range of theories of learning, and key factors in learning and teaching like motivation, stimulus response, reinforcement, forgetting, etc.

### **The Tyranny of Fashion in Teacher Education**

Faculties of Education as stand-alone faculties generally no longer exist in Australian universities and the prestige these separate faculties once enjoyed has declined substantially. This has occurred through self-inflicted damage with education schools and faculties adopting educational fads and fashions without any substantial, underpinning empirical research evidence as to their effectiveness. There is also substantial evidence that basic literacy and numeracy skills, along with critical thinking and problem solving, have not been satisfactorily developed, except in upper social and ability levels, as extensively or effectively as desired. Indicative of loss of status is those who are academics in education and teach student teachers are now referred to as 'educationalists' in the mass media – a derogatory term if ever there was one - rather than acknowledged as educators.

Currently teacher education units in universities are held in such low esteem there is talk again of relocating training back to schools again, as was also suggested in the early 1990s. Hopefully this will not occur, with realisation that doing this will result in modelling and replication of the standards and behaviours evident in schools in schools that are too often regarded as unsatisfactory. In-service education that should be playing a major role does not seem to have achieved its potential, partially because of the lack of stringent assessment and standards in offerings, along with courses needing perhaps accreditation at masters degree level equivalence.

All of this has reduced the prestige of the teaching profession, quite apart from low salaries paid to teachers, and made it less attractive when some of the brightest and most skilled are needed as teachers of coming generations.

### **Some Major Fads Permeating Teacher Education in the Last Forty Years**

The prestige of education faculties and schools of education has been significantly undermined by any number of fad educational theories and movements over the past forty years. These, despite the claims, have not produced either more effective teaching or learning outcomes. Instead, their ready acceptance by academics and teaching of them to captive student teacher intakes, without any empirical evidence as to their effectiveness, has marked their adherents as gullible and lacking the critical analytical skills they should be inculcating in beginning teachers. There has been a frankly propagandist stance adopted that has pushed out of the curriculum beginning teacher needs identified more than five decades ago in research by Florence Fuller (1969). Unsurprisingly these were sound establishment of practical teaching skills and classroom management strategies for survival in a difficult profession. What needs to be emphasised is that educational psychology, based on empirical research spanning decades into both learning and teaching effectiveness, was part of what was removed to make way for these fads based almost entirely on untested theory.

Originating in literary criticism and the art world, post-modernism for some unfathomable reason pervaded education faculties in the late 1980s like a virus. Involving language games, and challenging notions of common-sense reality, it seemed to have no useful place in education but became fashionable. None of the important areas of physics, chemistry, law and medicine were influenced by or accepted it, although advocates tried unsuccessfully to infiltrate it into these disciplines. When it died out, it left education, an area which should have some claim to intellectual rigor, looking intellectually suspect for having accepted it uncritically.

Out of post-modernism, critical theory and poststructuralism emerged disdain for empirical research and scientific method which has been the basis for scientific and technological advancement since the Renaissance. Certain streams of thinking in reflective teaching and sociology that have emerged and become influential in education have also adopted an anti-empiricist stance, mostly it would seem since empiricism challenges the worth of theorising divorced from proven, practical experience.

A number of sociologically based philosophies have influenced educational practices and curricula in teacher preparation over the past thirty years. Given the limited amounts of time for coverage of substantial amounts of material in initial teacher education courses emphasis upon sociological matters is counterproductive for a number of reasons.

Many adherents of these sociology-based philosophies are driven by a desire to remedy social inequity, indeed a worthy pursuit, but moral outrage and sociological theory are not substitutes for the inculcation of effective teachings skills for practical learning outcomes. Such practical skills enable beginning teachers to not only survive in the classroom, given the challenges many students provide, but produce superior learning outcomes that would help practically in remedying social inequities. It is ironic too that sociology, a field of study that relies so much on changes of social attitude and opinion, provides no satisfactory theory of how learning actually occurs. It should be noted too that similar teacher education efforts to substantially change society through education were tried in the wave of progressive idealism in the 1970s but failed.

Further, we were then subjected to the reflective teaching movement which coincided with cuts to educational spending resulting from the late 1980s recession, with pressures for teachers to be more effective to ensure greater employability of school leavers. In part having to do more with less seems to have been a driver of it, when what was really needed were changes to curriculum, better training of practical teaching skills and more funding for extended periods of practice teaching.

The improbability of teachers, just by thinking, being able to identify what they didn't know, problem solve, and be able to magically improve their own teaching, never seems to have occurred to those pushing this fad. Teaching trainee teachers important, basic information from fifty years of solid research in educational psychology, as a basis for problem identification and solving, never seems to have been considered. It is all much akin to pulling yourself up by your own bootstraps. The unfortunate outcome is that it resulted in a

generation of over-confident teachers, lacking in-depth knowledge of educational research findings, and being far too sure of their own abilities to get things right.

Despite reflective teaching being spread widely within education, and the existence of any number of theoretical articles praising it along with descriptions of trainee teachers enjoying it, there is no sound empirical research evidence to indicate that reflective teaching actually improves the quality of teaching performance (Cornford, 2002). Reflection is necessary but not sufficient. It is obvious teachers need to think about their professional activities in critical ways, but without a reasonable knowledge base and effective skills in critical thinking, neither effective critical analysis nor practical improvement will occur. Teachers need to be provided with bodies of relevant theory and practical skills while also being taught to engage in problem solving and critical thinking about teaching activities drawing upon this knowledge base.

Constructivism is probably the most beneficial of the education fashions. Based on the fact that humans need to be active in the learning process to create personally meaningful learning, by building onto past learning, this marks a return to the progressive education and discovery learning movement that was made fashionable by the American educator and philosopher John Dewey (1859-1952). While construction of personal meaning is important, it does not need to follow the prescription of discovery learning activities as extensively as many of its theorists and proponents maintain.

In terms of senior primary, high school, and university education, especially adult and vocational learning, the discovery learning aspects are often uneconomic and unnecessary. Even at young ages, as for example with language learning, modelling direct examples, or statements of the meaning of a word are more valuable than the child having to 'discover' it does not know the word. Constructivism's value lies in realising that personal effort and exploration are important in meaningful learning. However, after that realisation, direct teaching methods, e.g. teacher explanations or mixed method strategies along with demonstrations, are not only extremely useful and capable of promoting effective learning, but necessary. With both cognitive and physical performance skills, ingraining of incorrect aspects of skills through repetition without good models, initial expert input and subsequent guidance means the individual learner will not be able to perform effectively. This will often quickly lead to lack of personal perseverance and motivation, as well as never being able to reach possible peak performance. Re-establishment of correct parts of a skill then necessitates the difficult, time-consuming, and frustrating process for both teacher and student of repairing and restructuring the knowledge base in long term memory.

### **Information Processing Model**

Educational psychology as a basis for effective teacher education as indicated was largely removed from the teacher education curriculum at the end of the 1980s. This ensured that the Information Processing Model (IPM) of learning, based upon cognitive psychology research, and the implementation of teaching of cognitive and metacognitive learning strategies, never really became fashionable or adopted widely in western Anglo societies. Asian societies, which found cognitive psychology and the IPM distinctly in alignment with Confucian Heritage values, were sympathetic to what it offered. Hong Kong in a burst of educational development recruited cognitive psychologists to work in its universities, while

Singapore implemented HOTS (Higher Order Thinking Skills). The increasingly popular International Baccalaureate has a compulsory subject called Theory of Knowledge, which can cover some IPM issues, with the Europeans more attuned to philosophy of learning matters. Interestingly, in recognition of the need not covered by the government approved formal curricula for primary and secondary of education, many private schools have established areas of responsibility specifically for learning support and guidance.

The Information Processing Model of learning (IPM) (see Woolfolk, 1995) has been around since the 1980s. It emerged as a result of the burst of research into cognitive psychology and human thinking that underlay the development of computer technology. It is a psychological model of learning that has briefly passed in and out of fashion without its potential to facilitate superior learning ever being properly recognised and implemented in western education systems. A more recent re-discovery of the IPM is known as Cognitive Load Theory (eg, Sweller & Chandler, 1991, Sweller, 1994), and this terminology gives an indication of the IPM's essential basis.

In every area of human endeavour, knowledge of the limitations of whatever one is working with is essential for success. The IPM model is the only theory and model of learning that establishes the very real limitations of human memory, and especially its capacity, as a basis for more effective processing of information and effective learning. The IPM describes the main characteristics and capacities of human information processing, the limitations of human memory and how these can be overcome by active processing and skills developed to ensure effective storage in long term memory (LTM). LTM storage then provides potentially effective later application and use of learning. The importance of LTM as a permanent repository for knowledge for further use has been recognised through the ages.

Essentially there are three components of memory. These are conscious short-term memory (STM), which has limited capacity of 7+/- 2 units (i.e. 4-9 pieces of information) that can be held for approximately 20 seconds, subconscious LTM, of unlimited capacity where vast masses of information can be stored for a lifetime, and the metacognitive system. This last spans both subconscious LTM and the conscious STM sections, and acts to make judgements, to check and ensure that information processing memory functioning occurs effectively in line with the skills that have been learned. Of central importance with the IPM is the effort and decisions that the individual must make to process information in particular ways and store it or not store it for later, long term usage. These decisions and actions all involve personal motivation and control, which is why no other person can learn for you, and why a good teacher is always trying to motivate learners and get them active in learning.

What this model does, if properly taught, is ensure that individuals come to understand clearly that learning activities are under their own, personal control, thus destroying the general myth and a major barrier to effective learning, that somehow a teacher magically unscrews a cap on the top of their head and pours in information.

This IPM approach causes students to understand the active nature of learning, that they are responsible for their own learning, as well as how to learn more effectively after being taught how to overcome the limitations of STM build into the human memory system. Repetition in teaching and learning is necessary to hold information in STM beyond the time limit, and bring

about LTM storage, with active processing relating new information to old and constructing meaning and relationship structures. What are involved in these processes are cognitive and metacognitive learning strategies (Weinstein and Meyer, 1991, 1994).

Research into the effectiveness of teaching cognitive and metacognitive strategies to young children reaches back to the early 1980s. Evidence from research by Palincsar and Brown (1984) indicates that these strategies, if taught appropriately to even younger students, improve acquisition of reading skills. While all age groups can benefit from such teaching, the indication is that direct teaching of the IPM, with underpinning cognitive and metacognitive strategies, is most potent at adolescence when this age group becomes developmentally more cognitively mature, and conscious of their own thought and thinking processes.

Claire Weinstein and Debra Meyer (1991, 1994) spent many years doing research and developing teacher understanding and use of the IPM and cognitive and metacognitive learning strategies, and implementing them with senior high school and college students in the USA. They summed up the approach as involving Skill, Will and Self-regulation and understanding of how different subject disciplines require different types of knowledge and skills. What they also logically argued was that in a reconceptualization of the teaching role, teachers need to teach how to learn along with subject matter taught. That this can be done successfully has been demonstrated with many research studies into learning. The Palincsar and Brown (1984) study cited above, is only one of many that reveal superior learning outcomes where learners are enabled to understand more of the principles of learning, that is what they are doing and why so they can engage in problem solving, rather than there being a narrow focus upon a specific learning task per se. (While too complex to go into here, see the section on cognitive task analysis in Cornford, 2008a, pp 282-283.)

### **Practical Results Stemming from Implementation of the Information Processing Model and Teaching Cognitive and Metacognitive Strategies**

As a consultant working with the Head of Senior School at a private Sydney school, we implemented an IPM-cognitive and metacognitive learning strategy program over 8 hours. This was after brief change management sessions working with teachers to convince them of the worth of teaching using the processes, with the teachers also sitting in on presentations to the students. These involved senior high school students at Year 10 and above.

The program implemented was consciously designed to incorporate much active student learning. Key elements were exercises to illuminate different parts of memory and their functions, then direct instruction and explanation of the model, instructions on how to generate mnemonics and use other strategies to promote effective learning, with exercises used frequently to ensure active engagement and conversion of theory into actual practice.

In three successive years of HSC results at this school, the comparative state-wide school ranking then moved from 40 to 20 to 10. These changes in ranking were even better than expected, and while the pattern of these results looks unusual, this is what really occurred, with all these HSC results on the public record. After the then Head of Senior School moved to another position, his replacement did not believe that the IPM and cognitive strategy program was worthwhile and scrapped it. The school's HSC ranking then dropped back to 35,



but when it was swiftly re-introduced it moved back to 18. It should be pointed out, that in empirical experimental work, the effects from removal and then reinstatement of an intervention is one way of producing further evidence to establish the effectiveness of the intervention program.

One of the factors leading to the use of the IPM program stemmed from the problem, unfortunately quite common in private schools, of those with good HSC results being unable to cope at university and dropping out. The problem to a large degree stems from the school leavers not understanding the importance of independent learning skills and not possessing these, having been carefully guided and coached by teachers at the schools. It was not possible in the example quoted to gain evidence of the success with persistence with university studies, but anecdotal evidence suggested that those entering tertiary study after the implementation of the program were more successful there.

There were reports from a Queensland private high school, after a similar IPM program was instituted, of those going on to tertiary study advancing from 75% to 92% of students.

Understanding of how effective learning takes place, how to use strategies to store information in LTM, and how to retrieve it results in a number of positive outcomes including:

- The learner becomes active in the learning process
- Intrinsic motivation is fostered
- More personally meaningful, in-depth learning occurs because effective storing in LTM requires attention to meaning and structure
- The learner becomes more conscious of gaps in personal knowledge and understanding since linking to what is known is required for effective storage in LTM
- Learners becomes more independent thus preparing them for self-directed learning expected at tertiary study level and beyond
- Learning-to-learn skills essential for effective lifelong learning are established.

### **IPM Links to Lifelong Learning**

The rapid change of knowledge in developed countries has resulted in the need for conscious, positive attitudes to change and learning by the individual to keep abreast of continuous change (Cornford, 2009). The internationally accepted lifelong learning philosophy embodies this. It is especially important in areas like engineering, science, and the trades and professions. In these areas technology is consistently driving change and the need for adaptation to the new, with corresponding abandonment of the superseded. Australia's economy, and business and industry in competition with the rest of the world, depend upon speedy response to continual changes in technology. However, as a result of seriously mistaken government policy decisions, Australia has never properly embraced lifelong learning, and implemented supporting structures and policies, as has occurred throughout most of the developed world, although much lip service has been given here to the lifelong learning concept.

For effective lifelong learning to occur, the individual needs to possess effective learning-to-learn skills. The teaching of the IPM and cognitive and metacognitive learning strategies help

ensure the establishment of the learning-to-learn skills and strategies that are needed for effective lifelong learning to occur (Cornford, 2009).

### **Skill Learning (and the Development of Expertise)**

Skill learning pervades human learning and endeavour. Curricula in Australian primary and secondary education frequently refer to skills and skill development. Skills like reading and writing are absolutely foundational to all education, and the poor quality outcomes here have been much discussed over the past two decades. **What is absolutely extraordinary is that despite this, teacher education courses generally have not provided beginning teachers with substantial guidance on skill learning to assist in teaching and learning.** Only sports or physical education teachers are likely to have been taught about Fitts' (1968) Skill Learning Theory that has direct relevance for all practical teaching.

The reasons for this neglect I will not dwell on here: perhaps it is sufficient to state that the neglect stems from class and occupational prejudices with the school education system woefully ignorant of vocational education and training, upon which the functioning of the whole society depends.

Paul Fitts' Skill Learning Theory (1968, Cornford 2008a) was derived from observation and interviews with skilled teachers and instructors heavily involved in America's World War 2 training efforts. Areas from which information was gathered included highly complex skill categories combining both physical and cognitive elements like aircraft pilot training. The theory sets out three distinct and separate stages or phases, with major implications for distinctly different teaching approaches at each stage. The three stages are Cognitive Stage, Practice-fixation Stage, and the Stage of Automaticity.

In the Cognitive Stage the learner gains understanding of what the skill involves overall, what are the elements or parts of the skill, the correct sequencing of these elements, the timing of steps if important, as well as elementary ideas of quality as to how the skill may be judged. The second Practice-fixation stage involves the learner engaging in practice, essentially repetition to fix the skill in LTM, with feedback resulting in refinement of the mental model being formed there. The third and last stage involves automaticity, a term deliberately chosen by Fitts over notions of just automatic performance. This is where the skill has been so learned and practised, in psychological terms overlearned, that it can be produced very easily, and conscious, limited working memory is freed up to allow concentration upon other things. This then allows multiskilling, or to put it flippantly, why we can walk and chew gum at the same time, with early learning involving intense concentration, especially upon harder to remember or perform elements. Although Fitts did not consider it in these exact terms, the automaticity involves subconscious metacognitive monitoring provided by the mental model, previously formed in LTM through good initial teaching, practice and feedback, and which guides performance.

In terms of teaching, with the Cognitive Phase the focus is upon sound demonstration and explanation so that the learner comes to understand all of what is involved. Essentially, in terms of cognitive psychology what is happening is that the learner is constructing a mental model or schema stored in LTM, which as it is formed will guide the skill performance.

Typically, very early on, this requires much concentration and effort by the learner to remember each step, and the sequence, with the teacher often called on to prompt the learner or assist in recall. With the Practice-Fixation stage, the teacher needs to monitor student performance to provide feedback to ensure correct performance, otherwise incorrect elements get established in LTM and are very hard to eliminate. The teacher also needs to provide encouragement (praise, positive comments - positive reinforcement in psychological terms), as the process of practice can be long and challenging for the learner, who may get discouraged by the amount of time and effort required, and at times seemingly limited progress. With some skills, for example effective writing, the skill learning process may extend over many years. Regarding the stage of automaticity, here teaching is about coaching and providing objective feedback sometimes beyond the capacity of an individual engaging in complex processes. An example is with top tennis players who still retain coaches.

Bandura's (1977) Social Learning Theory, particularly its focus on observational learning, is important for skill learning in that it provides invaluable information on learning from models. By contrast, Vygotsky's work on concepts of scaffolding and zone of proximal development are useful and fashionable in earlier schooling but do not provide the depth of understanding of learning from modelling across all age groups as does Bandura's Observational Learning Model. Vygotsky's ideas are simply not relevant with older students and adult learners.

A very considerable amount of human learning occurs through modelling, not least via demonstrations as with Fitts' Skill Learning at the Cognitive Stage. Beginning teachers need to be exposed to good teaching models with what is shown analysed and explained, so that they come to understand the combination of strategies and skills being employed, the reasons for their employment and how they themselves may perform in similar ways. Libraries of filmed lessons, of good teachers both with individual students and classes, should be a widely available and used as a resource in conveying appropriate information to assist less skilled teachers. Their creation should not be held back by a misguided notion that they need to reflect high quality professional film production values.

While Fitts' Skill Learning Theory is about the learning processes involved for individual skills, Dreyfus and Dreyfus' (1986) Stages in the Development of Expertise also needs to be mentioned here. This theory describes the distinctly different stages that individuals go through in professional or specific specialist areas as they learn and apply clusters of skills relevant to their specialism. The stages range through Novice, Advanced Beginner, Competent, Proficient and Expert. Very few ever make it to expert, with 8-10 years required to reach this stage, which is characterised by very high-level performance and expert problem solving skills. With regard to education, Sternberg (1998) has pointed out the need to develop expert students, with metacognition an important element in this process.

Both Fitts' Skill Learning Theory stages and the Development of Expertise stages have important implications for teacher education. Each indicates that considerable time and practice are needed to build up both proficiency in each separate skill and substantial bodies of relevant skills. Unrealistic hopes are placed upon using limited amounts of time for skill acquisition in initial, formal teacher education. For too long the focus has been upon cost, and not upon what should be the real goal of ensuring the establishment of solid teaching skill repertoires and at least competent teachers.

It is time for some serious changes in teacher education, with recognition that continued professional development after teaching commencement though in-service education is required, if you want superior teaching skills demonstrated by most teachers. The unfortunate reality is that teachers with little training, limited practice teaching experience, and no solidly established repertoire of teaching skills, front classes after graduation and then receive very little constructive feedback to refine their teaching skills. Consequently, many fall back on modelling the teaching methods that they observed with their own teachers when school students. This results in generations of teachers repeating older, less effective methods and there not being improvements in learning and teaching – as is now instanced with this inquiry established to try to remedy this situation.

### **How Sound Teaching Skills Were Developed in the UTS VET Bachelor of Teaching Program**

The main focus of this submission is upon the need for improved learning and teaching in Australia, with recognition of the importance of individual learning through adoption of the IPM and cognitive and metacognitive skill teaching programs, and the importance of understanding of skill learning throughout the educational process, a key to major, necessary change. The following section is included here to provide a case study that indicates that superior, more effective teaching skills can be developed with more carefully designed teacher education programs.

It is possible to develop sound practical teaching skills with beginning teachers in a relatively limited timeframe if the principles set out in Fitts' Skill Learning Theory are adhered to. At the University of Technology, Sydney, in the Institute of Technical and Adult Teacher Education (ITATE) VET Bachelor of Teaching program we achieved this consistently. In achieving this outcome, specific attention was paid to modelling, proper explanation of skill components, and especially adequate practice and feedback. A descriptive analysis of important elements in, and how the teaching skill development program was set up and managed, follows.

While the following section describes how the program was setup and managed, there are some other factors that contributed to success that need to be emphasised. The teaching skills development subjects were underpinned by the teaching of educational psychology, with this chiefly taught by people who were experienced teachers and also often involved in delivery of the teaching skills subjects. As these lecturers were also engaged in regular visits to observe and provide feedback to the trainee teachers in their regular classes (under the in-service as opposed to preservice mode), there were direct feedback loops established as to the effectiveness of what was being taught.

Our efforts to establish trainee competence with four basic teaching methods, as elaborated below, engaged teachers in problem solving through selection of a method or methods to suit their particular lesson needs from the commencement of their training. We did not identify it as teaching for problem solving, but that was what it involved in practice. I am not aware of any school teaching skills program in Australia using these four basic teaching methods to establish as a 'toolkit' of fundamental skills. I think our success in VET with this approach warrants at least experimentation with it, if not adoption, in school teaching skill development programs.

Our classes were generally about 20 students, with the lecturer in teaching skills usually a group adviser. Because of the moderate class sizes we were able to ensure active involvement in class discussions and practical performance activities by all students.

Vocational teacher education, with which I was involved for over 30 years, was required to produce fast, effective, practical outcomes. It was essential that we established good teaching skills very quickly as we were preparing teachers for teaching real world workplace skills involving Occupational Health and Safety issues, and where death and serious injury resulting from poor teaching were real possibilities. Because of the high responsibility involved, there was understandably potentially swift feedback on our efforts from TAFE, the armed services and trainers in business and industry, our employer client groups, if things were not right.

The pressure was increased because we were involved with TAFE in in-service, as opposed to preservice training, with teachers starting classroom teaching after a brief survival skills course of two weeks. Those sent to us and employed by TAFE had generally sound subject matter knowledge which was an important practical consideration. However, what we did was certainly considered effective by the sponsoring employers with TAFE satisfaction ratings of our teachers consistently above 80% from students and employers. This is not the only evidence of our effectiveness in teacher education. After the Kuwaiti war, the Kuwaiti government selected ITATE at UTS for provision of VET teacher training services to them as they had assessed us as the best provider of these services in the world. This initially involved Kuwaiti personnel being trained in Australia, as a trial run, before we provided an offshore, fee for service program in Kuwait.

The repertoire of teaching skills established in Vocational Teacher Education was based on four foundational sets of teaching skills. What we taught initially was the Lecture Method (telling and explaining clearly), Demonstration Method (showing practical operations and skills), Discussion Method (how to conduct a guided class discussion), and Questioning (Socratic Method). Establishment of competency with these four skills effectively allowed Mixed Method lessons, a combination of any of these four as occurs very frequently in real world VET (and school) teaching.

Later in the course more sophisticated teaching approaches were covered in depth. But by teaching these four methods, and then requiring teachers to select the most appropriate for their different subject and class needs, we were starting to train them in problem solving and professional judgement. Our approach to in-class coverage of the different methods also ensured that they were further made aware of decision making and problem solving judgements, via initial selection of the method as suited to their learning objectives, lesson planning and actual presentation of the method.

What we did was make sure that our adult students understood the theory and each method's subskills, what the methods were most suitable for in terms of subject matter, learning objectives and student characteristics, what was needed to be done to present each method successfully, as well as weaknesses with the method and how to best compensate for their weaknesses. Modelling training films also were presented so that trainees had some understanding of quality teaching.

We had students practise mini-lessons of the lecture and demonstration methods, which inevitably also involved some questioning, to their peers, sometimes involving microteaching, that is videotaping of performances for replay and critique. We also focused on developing introductions to lesson skills as beginning teachers perform poorly on this skill that can perform important functions in motivating students and preparing them for the learning to follow. Constructive assessment of trainee performances by the lecturer and other trainees occurred after appropriate models for giving such feedback were provided to these teachers-in-training.

As trainee teachers in classes of approximately 20 were from different subject backgrounds, emphasis was upon selecting topics for mini-lesson presentation that would be easily understood by other observing students, and on explaining clearly and in such ways that all would be able to understand the content of the different presentations. Again elements of problem solving were introduced. In many classes there were individuals who did not have an equivalent of the HSC, but what we did with modelling, practice, and feedback worked to establish at least adequate skills for them to teach their regular classes. It should be noted too that in many cases their classes contained a fair number of adolescent students whose experiences at school had not been happy ones. Yet such was the adequacy of our inculcation of essential, basic teaching skills, this challenge was met as well.

### **Some Concluding Remarks**

Wide introduction of an IPM and cognitive and metacognitive strategy program to senior high school students and teachers would enable the revolution in learning and teaching needed in Australia to occur. An essential program of eight hours can be presented to students with a good chance of success, judging from past experience.

Apart from the potential for real improvements in the quality of student learning and engagement, once established this approach can make teaching easier for teachers through having students more actively motivated and involved in the learning process. One of the most difficult issues with current practices is the lack of student motivation for learning. With students better understanding the expectations of their active role in learning, this becomes much easier.

For change to be effective, there is also needs to be change management processes involving teachers before this. These need to ensure that there is general agreement and understanding of what is involved before actual introduction of programs to facilitate more effective learning. Involvement of teachers in schools in these experiences, and their presence in the presentation of IPM programs to students, constitute in-service courses to effect changes in teaching practices. A ripple-down effect beyond just the senior high school also likely. For teachers infants and primary schools, and junior high school, there needs to be somewhat different and carefully tailored programs developed on the implications of the IPM for their teaching. Given the extensive body of research literature that covers various aspects of cognitive and metacognitive strategies, in reading and writing especially, it should not be difficult building in concrete examples of promising and proven strategies that will help improve teaching and learning quality.

From past experience in trying to explain the IPM and cognitive and metacognitive strategies to politicians in an appearance before a federal government House of Representatives inquiry into VET in schools, I know that it can be difficult for those with no teaching experience or background in educational psychology to properly grasp and understand the power and potential of the IPM approach. The tendency is to interpret it as a minor rehash of a study skills approach which it most definitely is not. Reading of even the better explanations of IPM in texts, as with Woolfolk (1995), also do not really convey any proper understanding of the 'guts' of it, the dynamism and practical import in day-to-day learning. For this reason, while I understands that it might be bit out of the ordinary with commission inquiries, I offer to present a two hour session on the IPM to the commissioners or their assistants, should it be judged as useful to assist in a proper understanding of what it involves, and its potential for bringing about major, positive educational change in Australia.

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