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ABSTRACT
        This paper introduces the design for a study to
investigate application of a cognitive apprenticeship approach to
preservice teacher education. The research will be informed by and
build upon the findings of a previous Master of Education
dissertation. In particular, the study seeks to investigate answers
to the following research question: To what extent does the cognitive
apprenticeship model improve the nexus between the propositional and
procedural knowledge of beginning teachers? The plan for the
investigation is an interventionist one in which, in addition to
"normal" requirements of the preservice teacher education program,
six final year students will undertake supplementary instruction
modelled on the principles and reflecting the teachings of cognitive
apprenticeship. Data on participants' personal constructs of teaching
and learning will be collected through personal journals, stimulated
recall interviews, and the elicitation of successive individual
Repertory Grids. A proposed timeline (1994-1996) including research
procedures is provided. (Contains 50 references.) (LL)

RECONCEPTUALISING PRE-SERVICE TEACHER EDUCATION:

THE APPLICABILITY OF A COGNITIVE APPRENTICESHIP MODEL.

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1.0   Background to Proposed Study

While the literature continues to debate the effectiveness of the contribution of preservice teacher education to the developing knowledge base (propositional and procedural) of beginning teachers, teacher education is undergoing extensive restructuring in countries such as United States, United Kingdom and Australia. However recent reforms in teacher education appear to be predominantly policy driven and focus on structural concerns, rather than the ways different models of teacher education approach knowledge in the teaching and learning process.

Examination of the different preservice teacher education models and related induction programs currently provided in Australia has to date, been limited to comparisons of structural features. During the ten months from November 1989 to August 1990 three substantial commonwealth reports were released, which focus on the reform of teacher education (Schools Council,- 1989; Speedy, 1989; Ebbeck, 1990). The discussions and recommendations of these reports focus on structural concerns of teacher education reform such as: selection procedures; program length; duration and timing of the practicum component; and the implementation of inservice induction programs. Although reference is made to improving the pedagogical quality and content of preservice courses, only the Speedy Report (1989) details the pedagogical principles (as they refer to future mathematics and science teachers) to be included in model preservice teacher education programs.

Tisher and Wideen (1990), in their international review of research in teacher education, conclude there is a lack of balance between theory and practice:

> *Teacher educators do not always practise what they preach; inservice education is often unrelated to school issues and inefficiently carried out; preservice programs do not always produce effective teachers; the socialising effects of schools militate against what is done in college pre-service training courses; trainees emerge from programs with negative attitudes to pupils; practice-teaching supervisors have no clear idea as to their role; and practice teaching is less effective than we generally believe* (Tisher and Wideen, 1990:255).

In their recommendations for future research Tisher and Wideen (1990) suggest that the preservice teacher education curriculum be subject to greater scrutiny in an aim to provide information about the relevance and effectiveness of the content and timing of components of preservice programs. Such research should take account of recent research relating to the knowledge that should be part of the beginning teachers' knowledge base (Shulman, 1986). They also call for more attention to be concurrently given to "understand trainees' and teacher educators' cognitive frameworks to

discover how trainees learn about teaching and how educators teach about it" (Tisher and Wideen, 1990:264).

The literature reveals that current preservice teacher education programs are clearly failing to facilitate and empower the transformation of the naive preservice teacher education student into an intelligent, reflective classroom practitioner. Recent studies suggest that such empowerment does not necessarily accompany graduation from university, nor participation in authentic practice as a beginning teacher (Grossman, 1990, 1992; Nelson, 1992; Ryan, 1992; Kane, 1993b). Preservice teacher education programs allow propositional knowledge to be encountered independent of its situation of use, and as a consequence contribute to the ever increasing gulf between propositional and procedural knowledge (Brown et al., 1989). Such programs serve to separate, and at times alienate the "thinking" about teaching (university) from the "doing" of teaching (classroom practice) and result in teacher education institutions being engaged in 'knowledge telling' rather than 'knowledge transforming'.

Faced with the increasingly complex demands of the classroom, beginning teachers resort to teaching as they were taught, as they have observed or as seems appropriate, with little reference to, or acknowledgment of, the pedagogical principles underlying the practice or the intended learning outcomes for the students (Russell, 1989; Cole, 1989; Kane, 1993b). The propositional knowledge encountered in the preservice university courses remains inert and untapped as beginning teachers appear unable to interpret classroom situations in pedagogically appropriate ways. Beginning teachers remain locked in apprenticeships of observation, modelling their classroom practice on the overt behaviours of more knowledgeable others and thus ignoring the crucial element, 'the intentionality of the practice' (Kennedy, 1987).

After successfully completing a pre-service teacher education program that addresses many of the dilemmas faced by practitioners daily in their classrooms, beginning teachers apparently by-pass their pedagogical knowledge for less valid and less effective alternatives. This writer suggests that there is a need to reconceptualise teacher education to ensure preservice teacher education students are provided with, or encouraged to develop, a means through which they can interpret, model and reflect upon the thinking and intentions which drive expert practice rather than clone the overt behaviours alone. It is suggested that this can be achieved through the integration of the concepts of situated cognition and in particular, cognitive apprenticeship into preservice teacher education programs.

Central to the view of situated cognition is that 'knowledge is created and made meaningful by the context and activities through which it is acquired' (Prestine & LeGrand, 1991:62). This is in sharp contrast to the decontextualised learning typical of current teacher education programs which comprise the transfer of prescribed, institutional-based propositional knowledge which is at odds with what we know constitutes good teaching

and learning. Collins et al. (1989) propose a model of cognitive apprenticeship in which the learning is inextricably linked to the context and the activity of expert practice. Three principles underlie the cognitive apprenticeship model: a) making explicit the normally implicit cognitive and metacognitive processes experts use to solve complex tasks; b) propositional knowledge is encountered in authentic contexts to demonstrate how experts solve problems; and c) self correction and self monitoring skills are developed through the reflection and collaborative problem solving of novice and experts (Prestine & LeGrand, 1991).

Cognitive apprenticeship aims to formulate explicitly the strategies and skills underlying expert practice through adoption of a six level teaching approach: modelling; coaching; scaffolding; fading; articulation; and reflection (Collins et al., 1989:481). Through a cognitive apprenticeship approach to teacher education the modelling of both expert practice and the thinking behind the practice is supported by the expert guidance and feedback (coaching and scaffolding), and the gradual removal of support (fading), as the student is provided with repeated opportunities to apply their conceptual understandings in a diverse range of authentic practice situations.

The present decontextualised manner through which beginning teachers encounter much of the conceptual knowledge of teaching has restricted their professional development to the first level of learning - 'modelling'. Further this modelling is restricted to the overt behaviours of teachers, leaving the novice to intuit the thinking and principles underlying such behaviours. Through the cognitive apprenticeship approach student teachers become active (rather than passive or reactive) learners who understand the purposes and uses of the theoretical and conceptual knowledge of teaching by engaging in practice in environments that reflect the uses to which their knowledge will be applied in the future (Collins et al., 1989). Extending the contexts of learning to a range of situations allows for the decontextualising of knowledge enabling the neophyte to apply their knowledge in varied contexts in the future. The aim is for students to internalise useful conceptual models which they can then utilise to interpret and solve the many and varied classroom situations they may encounter in the future.

In summary, to date the cognitive theories encompassed by situated cognition and cognitive apprenticeship have been applied successfully to elementary and college learning (Lampert, 1986; Palincsar & Brown, 1984, 1989; Scardimalia & Bereiter, 1985 & Schoenfeld, 1989) and models have been proposed for post graduate programs for educational administrators (Prestine & LeGrand 1991). It is the writers intention to investigate the application of a cognitive apprenticeship approach to preservice teacher education. It is intended that this study will be informed by and build upon the findings of a previous study conducted by the writer and reported in her Master of Education, Honours dissertation (Kane, 1993b). In particular the study seeks to investigate the answers to the following research question:

> **To what extent does the cognitive apprenticeship model improve the nexus between the propositional and procedural knowledge of beginning teachers?**

2.0   Research Design

The design most appropriate for this investigation is an interventionist one where in addition to the 'normal' requirements of their pre-service teacher education program participants will undertake supplementary instruction modelled on the principles and reflecting the teaching methods of cognitive apprenticeship.

2.1   Sample

Six final year Bachelor of Education students will be selected at random from the Social Education major teaching area enrolments (predicted enrolment N=60). Students will be invited to participate in ten (10) one hour 'cognitive apprenticeship' sessions in addition to their normal coursework requirements.

2.2   Cognitive Apprenticeship Intervention

Fifteen one hour sessions will be designed according to the principles underlying cognitive apprenticeship which ensure that:

> a) the normally implicit cognitive and metacognitive processes experts use to solve complex tasks are made explicit and taught;
> b) propositional knowledge is encountered in authentic contexts to demonstrate how experts solve problems; and
> c) self correction and self monitoring skills are developed through the reflection and collaborative problem solving of novice and experts (Prestine & LeGrand, 1991).

Although the precise nature of the intervention will in itself be part of the PhD study, some examples follow which indicate the likely content of the program. The intervention program is likely to include:

- an emphasis on the modeling of the <u>cognitive and metacognitive processes</u> experts use in the teaching and learning process;
- group discussions that focus on course readings to assess the participants levels of understanding (schema) of theoretical knowledge and concepts involved in teaching and learning;
- the use of case studies through which the instructor will articulate and model the normally tacit problem solving processes, the application of theoretical concepts and reflection on decision making, involved in expert practice;
- case studies, practice based problems and/or critical incidents from the participants own practicum experiences which will be discussed from different perspectives to encourage participants to articulate and reflect upon their own practice based knowledge and problem solving processes;
- visiting experts engaging in 'think aloud' protocols while demonstrating expert practice and problem solving in simulated and authentic classroom situations;
- video recordings of expert and novice practice utilised as stimulus for group reflections, discussion and debate from a range of theoretical and pedagogical perspectives; and
- opportunities for participants and experts to practice in a range of authentic classroom situations and subsequently engage in dialogue between theory and practice, novice and expert.

These sessions will employ the six level teaching approach involved in cognitive apprenticeship: modelling; coaching; scaffolding; fading; articulation; and reflection (Collins et al. 1989) which will serve to provide a sequenced framework for participants knowledge aquisition.

2.3   Data Collection

Data on the participants personal constructs of teaching and learning will be collected through the elicitation of successive individual Repertory Grids throughout the year and participant Personal Journals.

Repertory Grids Interviews, based on Kelly's (1955) Personal Construct Theory, seek to identify the personal constructs that guide individual situational behaviour. Corporaal (1991) argues that the suitability of this technique lies in its commitment to eliciting, as neutrally as possible, the ways in which the participants construe that part of their world of interest to the researcher. Repertory grids serve to access the implicit theories of the participants through utilising their own conceptual apparatus resulting in a two dimensional numerical matrix capable of statistical analysis.

Studies by Diamond (1985), Zuber-Skerritt (1988) and the writer, Kane (1993a), have demonstrated the suitability of Repertory Grids in tracing the developing nature of student teachers' personal constructs of teachers and teaching. Repertory grids are particularly suited to the longitudinal nature of this study as the participants' personal constructions of reality, though idiosyncratic, are subject to change over time and are manifest in the personal constructs and rankings elicited in successive grids. Repertory grids are a synchronic device allowing researchers to picture and understand the way in which their participants construe the process of teaching at a particular point in time and further the grids serve to maintain the integrity of the participants' perspectives free from corruption by the researchers interpretations.

In this study repertory grids will be elicited from the participants at six instances throughout their final year of their pre-service teacher education. Following the convention of Zuber-Skerritt (1988) and to maintain comparisons between the writers previous study (Kane, 1993b), the approach to be taken in this study involves reference to two good teachers and two poor teachers in addition to the subjects themselves (presently and how they would want to be in the future), to give rise to six elements of the matrix.

The participants generate their "constructs" through comparisons of randomly selected groups of three of the elements (triads), focusing on the similar attributes of two and in what way the third is different. Participants are required to rate all six teachers (elements) on a five point scale for each of the constructs generated according them a rating of 1 to 5 depending on whether they are more like the pair description, (emergent construct) or the isolate description (implicit construct). The resultant grids are subject to cluster analysis using Shaw's (1984) Planet program which provides quantitative analysis of how the participants construe effective teaching.

Participants Personal Journals have been used by researchers predominantly in relation to teachers' thinking and decision making with regard to planning (Clark & Peterson, 1986). Personal journals have also been utilised in the form of dialogue journals in pre-service teacher education courses where they enable participants to articulate their conceptions of teaching and reflect on their development as teachers and on their classroom action during practicum experiences (Zeichner & Liston, 1987; Bolin, 1988; 1989; Kane, 1992; 1993a)

The use of personal journals in this study is guided by the study's intention to ascertain the extent to which participation in cognitive apprenticeship sessions assists participants to recognise, understand and be able to articulate linkages between their propositional and procedural knowledge. The use of personal journals reflects the belief that what teachers (novice and expert) do is directed by their thinking and further that they are the only witnesses to their own cognition (Solas, 1992). The personal journals provide a means of 'tapping into' the thinking behind the intended and actual practice of the participants. Guided by the principles underlying this study the practice of

keeping personal journals will be initially modelled in the group sessions and opportunities for ongoing feedback and dialogue to clarify issues raised in personal journals will be available in both individual and group contexts.

Participation in the cognitive apprenticeship sessions will provide an opportunity for participants to reflect upon and articulate their hitherto implicit beliefs and principles which guide their practice and decision making through modeling the cognitive processes of experts engaged in practice. Personal reflections on their own and collaborative problem solving processes and practice and will be recorded in the participants personal journals. These journals will reflect the participants development and application of conceptual understandings in a diverse range of practice situations.

A common problem of self report studies utilising personal journals is that of 'lack of response' (Gay, 1990) where journals may be of low priority in the face of an already heavy workload and entries made irregularly and retrospectively. In this study it is intended that the keeping of personal journals will be in the first instance modelled by the instructor and further an ongoing dialogue in the participants' journals between novice and novice and novice and expert will be actively encouraged throughout the year. This will also address the concern that personal journals may become records of 'pious bias' relating only what the participant perceives the researcher wants to hear.

In addition to the repertory grid and personal journals methods to collect data on the personal constructs of the participants, this study will utilise personal stimulated recall interviews of the participants during their practicum experiences.

Stimulated Recall Interviews involve a range of interview techniques which aim to gain access to the practitioners thoughts during classroom practice. Video tapes of classroom lessons are viewed as soon as possible after the lesson to enable the teacher to recollect and articulate the thoughts and decisions (cognitive processes) engaged in during the lesson. Interviews can be structured or unstructured and involve either or both the participant or the researcher in stopping the tape at any time to question or comment on the cognitive processes behind the observed practice and decision making. Interviews are audiotaped and subsequently transcribed for analysis.

Stimulated recall interviews have been criticised as to their effectiveness and reliability in accurately reflecting the interactive thoughts of teachers (Yinger, 1986; Keith, 1988). The most significant criticism raised by Keith (1988) questions the availability of interactive thoughts for recall as it is suggested that much of a teachers' classroom practice in automatic and thus by nature implicit and not available for recall. Keith (1988:13) concludes that 'stimulated recall primarily produces a record of a participant's reasoning

about the video stimulus and only secondarily about thinking related to the original event'.

While noting these concerns and attempting to address them to some degree through triangulation of data collection this study is guided by the experiences of Marland and Osborne (1990) who propose that overt behaviours are best understood in terms of the cognitive processes that precede and accompany them. In this study the researcher will be engaged in ongoing interaction with the participants throughout the year. Following the principles of cognitive apprenticeship as outlined by Collins et al. (1989) the role of the instructor in the cognitive apprenticeship model is one of 'facilitator and guide' who provides ever decreasing support rather than taking the role of 'assessor or evaluator'. It is suggested that the participation in cognitive apprenticeship sessions will develop a collaborative rapport between the participants and the researcher enabling participants to feel comfortable articulating their interactive thoughts. In addition the participants will have participated in sessions where the cognitive and metacognitive processes of expert practitioners are modelled, reflected upon and subject to ongoing dialogue between the novice and the expert.

2.4   Data Analysis

Repertory Grids will be initially subject to content analysis to determine the types of constructs the participants use to identify and describe effective teachers and teaching. Constructs used by participants are examined sorted into categories which emerge from the analysis. Of interest in this study is the constructs which the participants ordinarily use in interpreting and predicting their own and colleagues behaviour and further, if such constructs reveal changes after participation in the cognitive apprenticeship sessions.

Individual repertory grids are subject to two way hierarchical cluster analysis using Shaw's (1984) Planet program which serves to sort the constructs into a focused grid such that there is least possible variation between adjacent constructs and adjacent elements. The program does this on the basis of the numerical ratings assigned to the elements for each construct by the participant, not the written labels given to each construct. The focus-ed grid is printed with an 'element tree' and a 'construct tree' which graphically depict the relationship and percentage match of adjacent elements and constructs.

The element and construct trees of each repertory grid are examined to identify patterns which will serve to elucidate how the participants construe effective teachers and teaching. Consideration of successive element trees of each participant enables the researcher to trace how each participant positions themselves in relation to their 'good', 'bad' and 'ideal' colleagues through the course of the year.

Personal Journals and Stimulated Recall Transcripts will be subject to analysis which involves the coding of statements or 'significant units of thought' following the convention of Marland (1984) into categories empirically derived from the data. Acknowledging concerns raised by Keith (1988) the categories are not pre-determined but are generated from the data as transcribed and further, categories are subsequently presented to the participants for comment and verification. Categorised data will be organised and subject to numerical manipulations (code frequency counts, word occurrence frequency, code matrix) utilising Textbase Alpha qualitative data analysis program (Tesch, 1989).

In an effort to make explicit the analytical approaches adopted and so ensure accountability for decisions made in relation to category development in this study the researcher is informed by Constas (1992). Mindful of the concerns expressed by Constas (1992) this study will adopt his framework of category development and verification to enhance the integrity and validity of the study through opening the processes to public inspection and criticism.

3.0   Proposed Timeline

	1994		1995		1996	
	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2
PROCEDURES:						
Research Design	X					
Review of the Literature	X	X	X	X		
Theoretical Framework	X	X				
Design of Cognitive Apprenticeship Sessions		X				
Trialing of Cognitive Apprenticeship Sessions		X				
Selection of Participants		X				
Data Gathering						
Cognitive Apprenticeship Intervention Sessions			X	X		
Repertory Grid Interviews			X	X		
Observation of Participants Practice			X	X		
Stimulated Recall Interviews			X	X		
Personal Journals			X	X		
Analysis of Data						
Categorisation of transcript data				X	X	
Re-present categorisation of data to participants				X	X	
Analysis of transcript data				X	X	
Analysis of Repertory Grid Data			X	X	X	
Writing of Report					X	X
Submission						X

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