AN INVESTIGATION INTO THE INFLUENCE OF AN INSET PROGRAMME ON TEACHER COGNITIONS

by

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ABSTRACT

This study was based upon a concern about the quality of education in South Africa and a concern about the quality of NGO and other INSET interventions. Many organisations purport to address the issues of education, most of them doing so from the very comfortable position of the *moral high ground* (the position adopted where the political correctness of the intervention outweighs the quality and impact) rather than from the position of having *the capacity to deliver a quality service* (a position from which they can effect genuine educational transformation toward quality education for all).

With the rapid social, political and educational changes taking place at present, it is necessary for most organisations to assess their positions in respect of their ability to effect quality changes within the broad educational terrain.

This study is an attempt to investigate the influence of one particular programme, that of the Centre for Cognitive Development, as it effects changes in **teacher cognitions.** It is argued that teachers are the *catalysts for* and *agents of* educational and social change and that these changes require the thinking and beliefs of individual teachers which inform their practices and behaviours, both personally and as professionals, to be addressed. These beliefs need to be critically reflected upon by the teachers themselves and through this process of reflection, teachers need to be empowered to take responsibility for the quality of teaching and learning.

This concern was addressed by selecting a sample of teachers from within one such INSET intervention and through the use of a questionnaire, investigating whether

teachers cognitions had changed, as a result of the INSET programme.

It was hypothesised that changes in teacher cognitions would occur as a result of the INSET programme and that these *cognitive or gestalt shifts* could be categorised as *Attributional shifts, Efficacy shifts, shifts in teachers perceived Locus of Control (Control Beliefs) and changes in general Pedagogic Beliefs.*

The statistical analysis of the data indicated varying degrees and trends of significant change. However, the complexity of the social context of teaching and the impact of this on teacher beliefs and cognitions, especially those of teachers who have been most affected (disempowered) by social and personal oppression, cannot be under-estimated and even minor shifts reflected in this investigation should be seen as positive changes none-the-less.

DEFINITION OF TERMS AND ACRONYMS USED IN THIS THESIS

CCD - Centre for Cognitive Development
DEC - Department of Education and Culture
DET - Department of Education and Training
IDT - Independent Development Trust
INSET - In Service Education and Training
NGEO - Non-Government Education Organisation
NGO - Non-Government Organisation
PRESET - Pre-Service Education and Training

Black - The generic term "Black" refers to any person of colour which the doctrine of apartheid discriminated against most profoundly, or any person who is not "white"

black - Any person classified as "black" under the apartheid Population Registration Act imposed upon South Africans.

coloured - Any person classified as "coloured" under the apartheid Population Registration Act imposed upon South Africans.

indian - Any person classified as "indian" or "asiatic" under the apartheid Population Registration Act imposed upon South Africans.

white - Any person classified as "white" under the apartheid Population Registration Act imposed upon South Africans.

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CHAPTER 1 : CONTEXT OF THE INVESTIGATION

1.1 TEACHERS AS CHANGE AGENTS IN THE SOUTH AFRICAN CONTEXT

> Teacher education programs must help teaching candidates to link the moral purpose that influences them, with the tools that will prepare them to engage in productive change.
>
> (Fullan, 1993, p.118)

In an article entitled Why teachers must become change agents, Fullan (1993), quoting Farber (1991) in a study of teacher burnout, suggests that teachers have a growing sense of inconsequentiality which accompanies their teaching careers. Teachers begin their careers with a sense that their work is socially meaningful and that it will yield great personal satisfaction. However the inevitable difficulties of teaching interact with personal issues and vulnerabilities as well as social pressures and values and these engender a sense of frustration and force a reassessment of the possibilities of the job and the investment one wants to make in it (Farber, 1991).

Teacher burnout and the growing sense of frustration arising from the contextual, social and political issues surrounding education in this country appear to be some of the determinants of the quality of teaching and learning. Both socio-educational contextual pressures and generally inadequate educational support systems are likely to have a significant effect on the quality of teaching and learning. If this is the case in South Africa, then Pre-Service Education and Training (PRESET) and more importantly In-Service Education and Training (INSET), have a responsibility to respond to this dilemma in a meaningful way.

The basic premise of this investigation is that teaching practice in South Africa desperately needs to be improved. In order for this to happen, teachers need to be empowered to believe in themselves and in their capacity to effect change and improvement. Only once these cognitive changes have taken place can one hope for changes to take place in their teaching practice.

Despite the fact that conventional wisdom and research data have pointed to teachers and teacher training as key ingredients of school improvement and educational change (Hartshorne, 1987), data on teacher characteristics associated with success in implementing innovative programmes is sparse. Particularly lacking is information on the motivational factors undergirding change efforts, including how and why some innovative programmes are adopted and maintained by teachers, and why others are not (Stein and Wang, 1988). Although there has been a surge internationally in the past three decades in research based upon *what constitutes effective teaching* (Brophy, and Good, 1986); *what factors promote successful student learning* (Bickel, 1983; Edmonds, 1979); and *why school change efforts fail or succeed* (Berman and McLaughlin, 1978; Crandal and Loucks, 1983), the focus of research on *teacher change as a consequence of teacher education programmes* is particularly lacking in this country and internationally.

Universities, Teacher Training Colleges, Education Departments and Non-Government Organisations, many of whom are involved in INSET, have little to show for their efforts or for the vast amounts of money invested in this field, specifically if one focuses on Black teachers who make up 85% of the teaching population of this country. If teachers are to be the catalysts of educational and social change as suggested by Fullan (Fullan, 1993) and if money is to be provided for INSET in any large quantity in

the future then all involved in INSET need to re-focus their efforts on establishing the impact and outcomes of their individual programmes.

This needs to be done through focusing on the different spheres of impact of INSET which include teachers, pupils, schools, communities, education systems and society as a whole. The focus of this investigation is on the teacher, but more specifically on the thinking (cognition) of teachers.

1.2 SOCIO-POLITICAL CONTEXT OF INVESTIGATION

The social engineering of the apartheid political system over a period of more than 40 years has, through its conscious and deliberate strategies, affected all South Africans on a personal, social and political level, with Black South Africans bearing the brunt of this disempowering process (Wouters, Moonsammy and Pule, 1992). The impact of disempowerment can most clearly be seen in the education systems of the various departments within South Africa and the so called homelands, approximately 18 departments in total, all of which were instrumental in perpetuating and reinforcing the cultures and values of a political ideology of separateness and inequality (Hartshorne, 1987). This social phenomenon most severely affected the system of Black education and to a greater or lesser extent, White education. For the purposes of this investigation, the generic term Black refers to the previously (up to 27 April 1994) disenfranchised majority of South African who were not classified White and subsumes so-called Coloured and Indian peoples.

From a closer perspective, this racially separatist ideology was further entrenched through the authoritarian processes which occurred within the various education

systems resulting in a perpetuating cycle of domination which took place as a result of disempowering teacher-pupil and teaching-learning paradigms and has led to the demise of effective teaching and learning (van der Westhuizen and Naude, 1992; Soudien, 1991). The ongoing educational crisis and more specifically the catalytic educational and social uprising in Sharpeville in 1976 were the consequential outworking of this process of disempowering education on groups of oppressed individuals.

Black education was therefore also a passive extension of state domination (Soudien, 1991). The policies of apartheid affected all sectors and levels of society, keeping people apart and preserving inequalities. Morrow (1986) contextualises the effects of the school system describing it as an historical effort at systematic domination.

Thembela suggests of Black education that all instructions came from above. The resultant stultifying atmosphere reinforced the traditional norm of obedience without question (Thembela, 1985, p.76). Black teachers (and white) who have lived, trained and taught within this social environment, eventually act as instruments of perpetuation rather than agents of change (Thembela, 1985).

> It is known that every Black teacher daily subverts the system, consciously or subconsciously in a thousand different ways, but on balance and at the end of the day, most Black teachers are willing tools of social reproduction.
>
> (Mncwabe, 1985, p.116)

Thembela concludes that the conditions which exist make it

difficult to attain the effective transmission of knowledge as well as the proper development of skills and effective understanding and insight by pupils (Thembela, 1985, p.79-80).

Some issues which further complicate the present education crisis are large class size resulting in teacher-pupil ratios in excess of 60 pupils per teacher. The high teacher-pupil ratio is compounded further when one considers that shortages of classrooms results in a pupil-classroom ratio which far exceeds the teacher-pupil ratio resulting in teachers sitting idle while their colleagues teach unacceptably large classes, due to the physical lack of classrooms to teach in. These factors have resulted in a series of time consuming boycotts by both teachers and pupils which ultimately encouraged the need for rote learning at the expense of insight and understanding.

This phenomenon of boycotts is usually the consequence of socially disrupted education system where pupils have missed so much teaching time that they have no choice but to resort to memorising the facts for the examinations. Compounded by the reality that the majority of Black teachers have little more than the bare minimum qualification and training to teach, the impact of the problem on teaching and learning becomes exponential and a downward spiral of the quality of teaching and learning results. Many teachers are also either unqualified or have qualifications which are inappropriate or not sufficient for the level or content which they teach. Black teachers are not only conscious of the implications of inadequate teacher qualifications and training on their own professional teaching careers but they are also critically aware of the implications of this for the pupils which they teach.

Findings of research undertaken through semi-structured

dialogue interviews with Black teachers indicate that teachers make strong links between the education system of apartheid and white superiority and the disempowering effects of this on teachers and pupils (Wouters *et al*, 1992). Other findings of this research are that the existing system of education makes Blacks feel inferior and that it trains Blacks for obedience and subservience.

Apart from the unequal and inferior provision of education for the majority of South Africans, Bantu Education aimed to be *practical* while that of whites was considered *academic* (Ashley, 1990; Moulder, 1989) and this has given rise to debilitating perceptions and beliefs in Black teachers about Black education in general.

1.3 IN-SERVICE EDUCATION AND TRAINING (INSET)

If this scenario is applicable to all education in South Africa (and it is assumed for the purposes of this investigation that this is so), then van der Westhuizen and Naude are correct in their claim that the role of the teacher within the education system has not received enough attention and that "the legacy of apartheid and inequality has left deep attitudinal and cognitive scars" (van der Westhuizen and Naude, 1991, p. 4). Blacks have always been critically aware that the function of segregated education systems is the maintenance of white privilege (Hartshorne, 1989) and it is therefore crucial that the perceptions of Black teachers, as regards their roles in education, are taken into consideration especially in the context of In-Service Teacher Education (INSET) (Fullan, 1991).

If social change is to be effected through education (Fullan, 1993) in a country where disempowerment and authoritarianism were and still are intrinsic components

of the educational and social cycle of teaching and learning (Soudien, 1990), then these very same teachers who suffered the effects of the system need to be empowered (Wouters *et al*, 1992). Empowerment implies enabling teachers to bring about changes in the ways in which they fulfil their professional duties and in particular the manner in which they teach and relate to pupils (Fullan, 1991). Sarason (1993) speaks of the psychology of the individual when referring to teachers, as being one of the complexities missing in the process of teacher learning and INSET. Wouters *et al* (1992) and Sarason (1993) appear to use different terms for a similar process which combines teachers as learners and the process of empowerment. Whether one assumes the term as suggested by Sarason (1993) or that of Wouters *et al* (1992), the underlying principle of enabling teachers to make changes to their own teaching practices through reflection on their own beliefs and perceptions remains the same.

If the number of INSET programmes in this country (approximately 2500 in total) are an indication of the need to address this issue of disempowerment, then the need is certainly being addressed in no small measure by both Non-Government and Government sectors and this includes the INSET programme of the NGO upon which this investigation is focused.

Davidoff and Robinson (1992) argue that part of what motivates the interest in INSET is the realisation that most teachers who have been trained under an apartheid system are not teaching in a way that prepares students to meet the demands of a society in transition. The result is that education perpetuates the history of domination and oppression rather than transforms it.

The Inset Policy Initiative (IPI) mission statement of

1992 argues for particular attention to be given to INSET as a strategy in the current historical context in which education finds itself:

> INSET will be essential if we are to improve the quality of educational provision in South Africa, redress historical inequalities and prepare all teachers to participate in the transformation of education and society.
>
> (Draft mission statement, IPI, No.2, 1992)

Naude and Van der Westhuizen (1991) suggest that a specific form of cognitive education is necessary in South Africa to empower teachers to become pupil-centred teachers, effective decision makers and problem solvers and critical thinking professionals.

The focus of this investigation is therefore on INSET and the effects thereof on *teacher cognitions*. Teacher Cognitions are broadly defined as the thinking, planning and decision making of teachers (Clark and Petersen, 1986). Clark and Petersen (1986) argue that teacher behaviour is substantially influenced and even determined by teachers' thought processes and beliefs (cognitions). This position assumes that INSET is based upon and must work within the context of what the teachers already know including what they as professionals believe they need to know and, what the institutions undertaking INSET perceive the need to be. Richardson, Anders, Tidwell and Lloyd (1991) found that teacher beliefs and cognitions correlated positively with teaching practices, prior to further training and INSET. However, they also found that changes in teacher beliefs and cognitions (as a result of teacher development programmes) did not correlate with authentic changes in classroom practices. This implies a tenuous link between changes in teacher cognitions and changes in the actual behaviours or teaching practices of

teachers. It must therefore be acknowledged that belief changes brought about through INSET do not necessarily result in behavioural changes of teachers in the classroom but that such belief changes are essential starting points from which teachers are empowered to bring about changes to their own teaching practices. It is also necessary to acknowledge that teacher change and INSET programmes do not all focus on the same aspects of teaching and that this will necessarily result in differing outcomes of the various INSET initiatives. Some programmes concentrate on methodology while others attempt to improve subject content competence and teacher qualifications. (The CCD INSET programme focuses primarily on methodology and to a lesser extent on content.)

This investigation assumes the positions *that teachers are learners with prior knowledge and experience and that teacher learning is central to national developments educationally, socially and politically* (Kennedy, 1991, p.6). The INSET programme under investigation claims to bring about changes in teacher thinking and through this, changes in teacher practices and behaviours. However, teaching practices can only be assessed through the actual observation of teachers in the classroom and this aspect of the teacher change process does not fall within the parameters of the present investigation. The investigation therefore focuses only on changes in teacher cognitions and not the practices but it does assume that the one precedes the other although it acknowledges that changes in cognitions do not necessarily result in changes in actual teaching practice.

INSET is more and more perceived as the weapon to combat societal problems as well as the challenges presented by education and many commentators still regard the ultimate objective of INSET to be the improvement of the quality of teaching (Sparks, 1983, p.279) implying improved teacher

practices and ultimately improved pupil results.

INSET is also a strategy which can and must bring about social change through education. This is clear from the suggestion by Davidoff and Robinson that;

> Without the active engagement of the teachers in the classroom, it is possible that the real challenges of building a non-racial, democratic and equitable education system in South Africa could remain at the level of rhetoric and intention.
>
> (Davidoff and Robinson, 1992, p.2)

This investigation is therefore an attempt to address this issue of restructuring education through teacher education programmes, by investigating the influence of one such INSET programme, that of the Centre for Cognitive Development (CCD) on teacher cognitions.

1.4 THE CENTRE FOR COGNITIVE DEVELOPMENT

The Centre For Cognitive Development (CCD) is a private-sector-funded, non-profit, non-government education organisation (NGEO) which functions under the administrative auspices of Vista University. Informed by its own mission statement separate from that of Vista, it facilitates In-Service courses for teachers on a regional and national basis. These courses accommodate approximately 5000 teachers per annum. The CCD has its head office in Pretoria and has sub-centres in Umlazi (Durban) and Athlone (Cape Town). The courses are run predominantly for those teachers who have been most disempowered by the social system, namely Black, Coloured and Indian teachers and serves to empower teachers as agents of educational and social change. The mission statement of the CCD indicates that its main objective is

the transformation of the existing educational system(s) from one which predominantly advocates autocratic practices and styles toward a unified democratic system thereby bringing about consequent changes in teaching and learning as well (Mission Statement: CCD Publication, 1992). The INSET courses are undertaken in areas and within communities which are largely dictated by the sponsors of the various programmes. At present, there are 20 projects throughout South Africa, each project following the same CCD INSET model and methodology but differing in size and location. The CCD undertakes INSET in both rural and urban communities which is a requirement of its major core funder, the Independent Development Trust and the focus of this investigation was one such rural project in the Grabouw region of the Western Cape.

1.4.1 The CCD model

The CCD INSET model is an unsystematic and eclectic assimilation of both educational and psychological theories which include the following. Feuerstein's *Mediated Learning Experience* (MLE), taken from the methodology of the Instrumental Enrichment programme (Feuerstein, Rand, Hoffman and Miller, 1980) which is used as the core of the CCD teacher methodology and focuses on Mediation as an effective, empowering and interactive teaching style. Along with this methodology, the development of *Cognitive Skills* theory (Perkins, 1986; Feuerstein *et al*, 1980; Nickerson, Perkins and Smith, 1985) is advocated as a necessary additional outcome for teachers to achieve, in addition to subject content teaching.

Cognitive skills development therefore form part of the CCD teacher development model and this is done both subject content related as well as un-contextualised through the teaching and development of cognition through

mediums other than through school subjects. Cognitive skills are further contextualised in their educational and social context through the inclusion of *Social Cognition and Discovery Learning* theory (Bruner, 1975). *Cooperative Learning theory* (Bennett and Dunne, 1991 and Smyth, 1991) is included in the CCD INSET model as a teacher strategy which develops both thinking, and cognitive development. Cooperative learning is also assumed to be the basis for the development of learner independence as well as being an effective process to develop cognition through group interaction which subsumes theories which focus on the role of *Language in Learning and the construction of knowledge* (Vygotsky, 1978). *Knowledge as design* theory (Perkins, 1986) and *Metacognition* theory (Flavell, 1979) feature strongly in the model as elements of learning which link with reflection, empowerment and independent thinking.

Lastly, *Empowerment theory* (Wouters *et al*, 1992) comprises that component of the model which attempts to assimilate the various theories and innovative teacher methodologies into a meaningful teacher development process. This is done by highlighting the power relations which exist within the teaching process through a programme which aims at developing teachers as reflective professionals who are both aware of the disempowering role of authoritarian styles of teaching as well as able to transform it. Theories which influence this component of the programme include the *Transactional Analysis* work of Eric Berne (1972).

The CCD INSET model does not prescribe teacher change according to predetermined theories but rather draws on them as alternatives available to teachers. It relies heavily on the assumption that teachers have beliefs and perceptions about teaching and learning which directly impact upon what they do in their classrooms and

especially on how they interact with pupils. It also assumes that if these beliefs and perceptions can be changed then changes will take place in the teaching styles and methodologies of teachers.

Although the model has a strong theoretical base, it is not content or theory driven. Rather, it is informed by the theories but is process driven implying that teachers are taken through a teacher development process of reflecting on existing teaching practices and beliefs thereby empowering teachers to explore and develop strategies which would improve their own teaching and learning. It also does not aim to equip teachers with new strategies and beliefs but rather to expose them to alternatives and through this process, empower teachers to take responsibility for their own development and consequently bring about changes in their own perceptions and beliefs about teaching and learning.

It is within the parameters of this broad INSET model that the investigation attempts to identify changes in teacher cognitions. No specific behavioural outcomes of the model can be assumed or stated as the model is empowerment based. What can be assumed is that changes in teacher thinking will take place and that these may bring about changes in teaching practices.

1.4.2 The CCD INSET programme

The CCD programme is a 13 day participatory training workshop spanning a time frame of 15 months. The training days are grouped into two and three day course based clusters which are interspersed by periods of approximately one month where teachers return to their classes and continue to teach, reflecting on the programme and testing its application in the actual teaching situation.

The programme has three main components, *Teacher Empowerment* and *Personal Empowerment* and *Cognitive Empowerment*. The term Empowerment acts as the overarching description of the CCD intervention into teacher education. Empowerment is therefore the reflective process which includes the cognitive, personal and professional teaching practice aspects of teaching (CCD publication, 1992).

Teacher Empowerment (TE) aims to produce confident, critical thinking learners, the term learners including both teachers and pupils. It does this by investigating alternative teaching and learning practices and it encourages a mediative teaching style which includes cooperative learning (CCD publication, 1992).

Personal Empowerment (PE) focuses on the teacher as both individual and professional. It encourages teachers to reflect upon their own perceptions of empowerment and disempowerment as well as on their own teaching practices and the ways which these may perpetuate the cycle of disempowerment and contribute to maintaining their own powerlessness as well as the powerlessness of those they teach. It also attempts to empower teachers to resist the cycle of domination present in authoritarian teaching systems and to work toward the reconstruction and transformation of society through education (CCD Publication, 1992). Teachers' beliefs and perceptions of their roles as social change agents are focused upon along with broader empowerment issues affecting teaching. The PE component serves as a means of linking education with the broader social and political issues by contextualising education and teaching within this transformation and empowerment paradigm (CCD publication, 1992).

Cognitive Empowerment (CE) is the component of the programme where the thinking of teachers and learners are

developed with the aim of empowering individuals to become independent critical thinkers. Cognition refers to how a person interacts with their environment as well as their awareness of their own thinking (metacognition), their beliefs and attitudes and the role of the above factors in determining ones own actions (CCD publication, 1992). It focuses on the development of *cognition* (including metacognition and social cognition) and *cognitive skills* (skills, strategies and processes) as the means of achieving this.

More simply put, the programme consists of a teacher methodology component called Teacher Empowerment, a content or curriculum innovation component called Cognitive Empowerment and a personal and professional development component called Personal Empowerment.

1.4.3 Assumptions of the CCD model

The CCD INSET model is based upon the following assumptions about teaching and INSET:

- A philosophy and practice of empowerment through personal and professional reflection is necessary for effective INSET
- Empowerment of individuals enables teachers to be better mediators and this empowers both teachers and learners
- Empowerment through INSET results in:
  - i. a greater sense of *self-efficacy* of teachers where teachers have a deeper understanding of the causal-effect relationship of their own teaching
  - ii. a shift from external to internal *locus of control* or (control beliefs) where teachers greater sense of control over their own choice of teaching practice
  - iii. an awareness and understanding of *teaching attributions*, where teachers begin to attribute their successes and failures to own their actions rather than seeking reasons beyond their control

iv. an awareness of personal and professional *pedagogical beliefs*, especially as they relate to a deeper understanding of their own teaching and professional practices.

(CCD publication, 1992)

Empowerment through INSET therefore assumes that the above assumptions form a central component of the CCD INSET programme and that changes in teachers' thinking or cognition at the end of the programme can be attributed to the impact of the programme or certain aspects of it. These assumptions therefore form the focus of the investigation and informed the construction of the questionnaire which was used to assess teacher cognitions.

1.5 CONTEXT OF THE PROBLEM

Teachers develop strong conceptions of the practice of teaching while they are still pupils and students (Lortie, 1975). They spend over 3000 days (or 18000 hours) as children and as young adults in classrooms, observing their teachers teaching. Their experiences are tantamount to an apprenticeship of observation and it is one which is invested with emotion, given the students dependence on the teacher (Kennedy, 1991). As a result, those who become teachers tend to carry with them into the classroom, the very same experiences and beliefs about teaching and learning which they experienced as learners. Teacher Colleges and Universities generally do little to enable students to unlearn unproductive beliefs and practices and some tend only to teach new methodologies leaving the student teacher in a state of cognitive dissonance about the value of existing beliefs and practices as opposed to newly acquired ones.

Holt-Reynolds (1992), in a study of personal history-based

beliefs on teacher learning and thinking highlights the notion of schemata development (Anderson, 1977; Rumelhart, 1988). This development of conceptions of what teaching and learning is, needs to be *worked with* through INSET and in some cases *worked against*, in order that teachers reflect upon their pre-conceived theories of learning and teaching in order that they may be open to innovations and developments presented through In-Service teacher education programmes.

Kennedy (1991) found that teachers' backgrounds are often also limited with respect to experiences concluding that most Black teachers come from homogenous, lower middle-class communities, attending college in nearby communities and returning to their homes or neighbouring towns to teach.

The above research findings and assumptions are specifically applicable to the American context but may be equally appropriate to the South African context. Unfortunately there is no research to substantiate or refute these findings locally but it is probable that the American situation is true of the South African context, especially as regards teachers within the Black communities. Due to the restrictive effects of apartheid on the career choices of most Black South Africans, two dominant professional career paths were available namely nursing and teaching.

The major factor contributing to this phenomena was the system of state and provincial bursaries and subsidies available to those wishing to and selected to enter these professions. This factor was further reinforced by the homeland and self-governance system which grouped people of similar ethnic and language origins into geographical and political regions. The result was that many Black teachers, having received their schooling and teacher

training at schools and colleges within homelands and self-governing territories (due to local government and provincial teacher bursaries), returned to teach in the same geographical areas and communities from which they came in order to fulfil their financial commitments.

This phenomenon may also be true for the teaching population (including White teachers) in South Africa in general, but to a lesser extent due to the mobility that economic empowerment afforded them as Whites.

If this position is accepted then some general findings of the National Centre for Research on Teacher Learning (NCRTE in the USA) are applicable to the process informing teacher learning (INSET) in South Africa.

Floden (1993) has found that the apprenticeships of observation yield in teachers a deeply entrenched and tacit set of beliefs about what can and should happen in schools, about the teacher's role in facilitating learning and about the pedagogical implications of student diversity.

The NCRTE also found that despite the diversity of teacher learning programmes, many programmes were unable to alter substantially the ideas which teachers had when they arrived. They also found that:

- teachers simply cannot envision alternative teaching strategies other than the ones they had been *apprenticeshipped* into (McDiarmid, 1993b)
- prior beliefs are important as teaching practices are substantially influenced by what teachers think and believe (Trumball, 1987)
- these beliefs influence not only teacher practices but also what teachers learned (Petersen, Fennema, Carpenter and Loef, 1989)
- teachers' assumptions about the pedagogical

implications of student diversity often yield counter productive instructional strategies (Good, 1987).

The implications of these findings for the South African context and INSET programmes in particular are that teachers have acquired their teaching practices and beliefs about teaching within a very specific social context which, due to a separatist and culturally exclusive educational policies, are usually politically tainted. This has had a significantly adverse effect on teachers, both on their perceptions and beliefs about teaching and education as well as on their teaching practices.

From the above it is clear that INSET should also focus on the teacher as learner with prior knowledge. McDiarmid, reporting the findings of the Teacher Education and Learning to Teach (TELT) study, states that teachers' views about teaching rarely change as a result of participation in teacher development programmes and most continue to believe that teaching entails little more than telling pupils what they need to know and measuring their ability to recite it back (McDiarmid, 1993a).

Kennedy (1991) suggests two reasons for this lack of change. The first is that the prolonged period of participant observation which each would-be-teacher endures before beginning their formal training or teaching, develops a strongly entrenched belief that they already know what teaching is about and that they have little to learn.

The second is that when faced with conflicting information, teachers are more likely to distort or ignore the conflicting information than to question their own initial beliefs. The resiliency of initial beliefs is

well documented in psychological literature on the subject (Roth and Anderson, 1988 and Pintrich, 1990).

The CCD INSET model acknowledges the above findings and specifically targets these problem areas of programme impact through the Personal Empowerment component of the programme. Here, the implications for the South African context are clear. Teachers, and particularly Black teachers, have had very effective, but often bad role models in their own teachers and college lecturers, perpetuated by an educational culture of non-questioning, disempowerment and rote learning. Teachers in this country therefore have socially tainted prior knowledge and it is suggested that INSET should address this if it is to have any real impact upon improving the quality of teaching and learning. These factors play themselves out in the form of *teacher attributions* (Weiner, 1977) and *teacher efficacy* (Bandura and Schunk, 1981).

Skinner and Chapmann (1987) propose that *control related beliefs*, relating to locus of control theorists like Rotter (1966) and Lefcourt (1976), have direct links with the theories and research which focus on teacher beliefs of attributions and efficacy.

Control beliefs, broadly defined as the extent to which the "self" can produce desired outcomes (Skinner and Chapmann, 1987), therefore also have bearing upon teachers in as far as they perceive or believe their actions to affect learners. Control beliefs further impact upon the efforts and outcomes of teacher actions (their personal teaching styles) as well as their expectations of pupils. Control beliefs, as they impact on teacher efficacy and attributions in a society which has perpetuated oppression and disempowerment, are therefore a necessary component of any investigation of teachers and INSET initiatives.

Efficacy theorists such as Bandura and Schunk (1981) make strong links between *self-efficacy and self-motivation* and they suggest that these aspects of cognitive change bring about changes in behaviour. The links between *efficacy of teachers* and *teaching practice* is drawn upon by Gibson and Dembo (1984) in work relating to teacher-efficacy and the effectiveness of teachers in the classroom. (Certain aspects of items used in the research questionnaire of the above research have been included in the research questionnaire of this research.)

Attributional theorists such as Weiner (1977), suggest links between the efficacy theories and the locus of control theories in the outworking of attributions. Attributions are the causal perceptions of individuals such as luck and effort which impact upon or are influenced by efficacy and locus of control.

It is argued therefore that *attributions, efficacy and locus of control or control beliefs* of teachers all impact upon the *cognitions* (thinking and beliefs) of teachers relating to teaching and learning and ultimately inform the actions and practices of teachers in the classroom. The work of Zimmerman, Bandura and Martinez-Ponz (1992) as well as the work of Borowski, Carr and Rellinger (1987) all link the attribution, efficacy and control belief theories to cognition and metacognition as does the CCD model under investigation.

1.6 THE PROBLEM

> The CCD model addresses the problem of decades of disempowering social, educational and interpersonal environments that continue to restrict the development of human potential and cognitive abilities.
>
> (CCD publication, 1992)

The CCD publication further states that;

> Since the model makes the assumption that the socio-political and educational environment was and still is characterised by *disempowerment*, the notion of *empowerment* is central to the CCD initiative.
>
> (CCD publication, 1992)

The CCD INSET model under investigation is realised through an In-Service teacher programme which deals with the process of the empowerment of teachers and which attempts to bring about an understanding of their own teaching practices and interpersonal behaviours through workshops based upon reflective practices.

Through its INSET programme the CCD attempts to bring about positive, affirming changes in teachers both on an individual level and as professionals. These changes are anticipated both in the teachers' beliefs (about themselves and others) and in their behaviours and actions (their teaching methodology and practices).

The CCD model of INSET therefore attempts to bring about changes in teacher cognitions on a personal and professional level through the Personal Empowerment programme, and on a methodological level through the Teacher Empowerment programme. Both are seen as intrinsically necessary for change as well as being necessary components of any INSET or teacher development programme if quality educational change and transformation is to take place (CCD Publication, 1992).

The problem lies in the question of *whether* and *to what degree*, the CCD INSET programme effects *shifts in teacher cognitions*, such cognitions defined as *Control Beliefs, Pedagogic Beliefs, Attributions and Efficacy.*

1.7 RESEARCH HYPOTHESES

The general research hypothesis is based on the research assumption that:

THE CCD INSET PROGRAMME EFFECTS CHANGES IN TEACHER COGNITIONS

The general research hypothesis is:

THERE WILL BE A SIGNIFICANT DIFFERENCE IN THE PRE-TEST AND POST-TEST SAMPLE MEANS

Associated research hypotheses are:

THERE WILL BE SIGNIFICANT DIFFERENCES IN THE PRE-TEST AND POST-TEST SCORES OF THE SAMPLE GROUPS AS REGARDS:

i. **GENDER** (male vs female)
ii. **AGE** (age groupings of teachers)
iii. **SUBJECTS and LEVELS** taught (sample groupings of teachers)

These hypotheses are based on the assumption that *teacher cognitions* are central to teacher learning and development. Further assumptions are that changes in teacher cognitions can be brought about through INSET and this may result in changes in teacher performance and behaviour. Also, cognitive changes are likely to occur differently between differing age groupings of teachers where age is an indication of the number of years taught and where teachers with differing years of experience are likely to derive differing benefit from INSET. Lastly, gender groupings as well as subject or level (standard) groupings are likely to show different cognitive shifts.

1.8 OBJECTIVES OF THE STUDY

The objectives of the study are to investigate teacher cognitions prior to the CCD INSET programme and at the end of the programme, in respect of changes which may occur in:

i) Teachers' *general pedagogic beliefs and perceptions about teaching, learning and the context of education*
ii) *Attributions* of teachers
iii) *Teacher Efficacy* and,
iv) *Control Beliefs* affecting teachers,*both internal and external*, as a result of the INSET course intervention.

1.9 SUMMARY:

This chapter serves to contextualise the investigation within its social, educational and academic setting. It also serves to present the rationale for the investigation as a backdrop for the survey of literature as well as for the selection of the methodology of the investigation and the selection and grouping of the sample.

CHAPTER 2 : REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

The objective of this chapter is to explore the available literature pertaining to the field of investigation in order to gain an informed understanding of the extent and context of work previously and presently being done in this field. It also attempts to examine and define the various theoretical bases from which the assumptions informing the investigation were made.

2.2 EVALUATION OF EDUCATIONAL PROGRAMMES AND INSET

Although this is an investigation into one specific model of INSET, it is necessary to place the investigation into its context within the field of education. Most evaluation of education until as late as the mid 1960's was focused on the evaluation of students, teachers and the outcomes of learning (Nevo, 1983). Whereas most educational evaluation attempts to gather empirical data for decision making and for the justification of decision-making policies (Cronbach, 1963), this investigation forms part of an overall evaluation of the impact of the CCD and its programme, both as a research function as well as a development function.

Scriven (1980) and Lewy (1985) refer to Summative and Formative evaluation as being the two options for evaluation of educational programmes. Formative evaluation refers to the assessment of the components of a programme at various points throughout the lifespan of the programme as a form of research and development function. Summative evaluation refers to the evaluation at the end of a programme in order to assess whether the objectives

of the programme were reached. This investigation is both formative and summative. It is formative in the sense that it forms part of a research and development function investigating one component of the entire CCD INSET strategy, namely teacher cognitions. It is summative in the sense that it investigates the outcomes of one complete course comprising all components of the CCD model within a representative sample of the CCD's national strategy of intervention into education. It thereby attempts to provide a summative assessment of the teacher cognitions component of the programme.

The major writers on the subject of INSET, namely Bolam (1982), Ruddock (1981), Morant (1981) and Keast (1984), all agree that research into INSET forms part of the strategy itself and that the findings are imperative to the development of INSET itself.

Although the focus of the investigation is on the influence of INSET on teacher cognitions, these are considered to inform and impact upon teacher behaviours and practices. It is the aim and the claim of the INSET model under investigation that it effects changes in teacher cognitions and through them it effects changes in teacher practices. Teaching practice and teacher behaviours do not form part of this investigation. However, both teacher cognitions and teacher practices are thought to be influenced through INSET interventions and for the purposes of this investigation could be seen as mutually dependent upon each other.

2.3 TEACHER COGNITIONS

Teacher cognitions are broadly defined as the thinking, planning and decision making of teachers (Clark and Petersen, 1986). For the purpose of this investigation,

Teacher Cognitions are defined in terms of the internal reasoning processes posited in the theories of Albert Bandura (1977) and Bandura and Schunk (1981). These theories attempt to bring together research on motivation and learning and research on *cognition and instruction*. In terms of Bandura and Schunk (1981) and Weiner (1979), teacher learning and change is based upon performance attributions, self efficacy and perceptions of control, as well as other cognitive appraisals of the teaching task. The investigation suggests that *teacher beliefs or pedagogic beliefs* are also integral components of *teacher cognitions*.

2.4 TEACHER COGNITIONS AND INSET

Although the findings of Corno and Rohrkemper (1985) pertain to student learning, they are also applicable in the context of teacher learning and INSET. Their findings, focusing on self regulated learning, parallel the theories of Weiner (1979) and Bandura and Schunk (1981) and echo the attribution, efficacy and control belief position that these are the most important factors affecting teacher cognitions and teacher learning. Teacher perceptions and beliefs about learners and learning also play a significant role in teacher learning (McDiarmid, 1993b; Ball, 1988; O'Laughlin and Campbell, 1988; Hoge and Coladarci, 1989). The implications for INSET are that if cognitive changes are desired and it is argued that they are, then changes need to occur in teachers' beliefs and perceptions about teacher learning which may ultimately affect teacher practice or methodology.

Toward achieving this Borowski, Carr and Rellinger (1987) suggest that the interface of motivation, attitudes and cognition is advanced through metacognitive theory. They

further argue that strategy-based actions directly influence self-concept, attitudes about learning, and attributional beliefs about personal control. In turn these personal-motivational states determine the course of new strategy acquisition and more importantly, the likelihood of strategy transfer and the quality of self-understanding about the nature and function of mental processes (Borowski, Carr and Rellinger (1987); Paris and Oka, 1986). Simply put, these researchers attempt to link theories of motivation with theories of attributions, efficacy and locus of control or control beliefs. If INSET can be defined as a strategy-based action and if it can positively impact upon any or all of these mental processes or teacher cognitions, then it is proposed that it can impact positively on teacher behaviours as well.

This investigation advocates that INSET is a form of strategy-based training. Teacher actions and planning (Yinger, 1979; Yinger and Clark, 1983), as regards their teaching practice, can be defined as strategy and the INSET model under investigation focuses specifically on changing and improving teacher strategy or methodology. Metacognitive theory suggested by Borowski, Carr and Rellinger (1987) as a means of advancing attitudinal change in teachers, is also an integral part of the INSET programme being investigated and is operationalised in the INSET model in the form of teachers reflecting upon their own teaching practice.

Clark and Petersen (1986) suggest that the thinking, planning and decision making of teachers constitute a large part of the psychological context of teaching. They also suggest that it is within this context that curriculum is interpreted and acted upon and teacher behaviour is substantially influenced, even determined, by teachers' thought processes. It is clear therefore that one goal of research on teacher learning should be

research into the effects of INSET as it impacts upon teacher cognitions. Another important and complementary goal of such research would be to establish the effects of these cognitive changes on teachers' actual practices.

Pajares (1992) points out that research into teacher thinking or cognitions (Clark and Petersen, 1986; Housner and Griffey, 1985) is not sufficient to inform teacher education. He suggests that focusing on the things and ways that teachers believe is a perspective which cannot be excluded from research into teacher learning either (Pintrich, 1990). Pajares suggests that research should not only focus on *what* teachers think but also on *how* they think. The CCD INSET programme claims to address both the *what* and the *how* of teaching. The *what* of teacher thinking is addressed throughout the Personal Empowerment component and the *how or methodology* of teacher thinking and practice is addressed through the Teacher Empowerment component. The *what* of teacher thinking includes the tacit set of beliefs and perceptions which teachers develop and learn and which inform them and help them conceptualize teaching and learning. The *how* of teacher thinking includes the thoughts about their own behaviours and practices (metacognition).

2.5 INSET

For the purposes of this study, the acronym INSET refers to the widely accepted usage of **In-Service-Education-and-Training**. Terms such as Recurrent Education (Cropley and Dave, 1978, p.41), Continuing Education (Harris 1980, p.23) and Staff development (Wideen, 1987, p.2), are subsumed under the acronym INSET.

It is necessary to point out that the words education and training not only have educational implications and

connotations but they also have political connotations within the present South African educational context. The similarity between the acronym INSET and the Department of Education and Training, (the existing national education body controlling black education) is somewhat disturbing to many South Africans. INSET is therefore often viewed as an extension of state domination through official In-Service teacher training programmes. The word Training, as it is used in certain contexts, also has the connotation of equipping people with functional skills rather than a deeper understanding of the content of a course, therefore retarding personal and professional development through being prescriptive. In political terms it smacks of oppression and the doctrines of apartheid education which has had as its aim the subservience of Blacks through the training and educating of black people as skilled workers rather than thinking professionals. It is therefore understandable that the word training is used circumspectly and within a specific definition of INSET.

Defining INSET is therefore a difficult task because there are as many similarities and differences between the various definitions as there are education systems (Murphy, 1985, p.6).

The very diverse use of the acronym INSET which covers a wide range of initiatives and courses, is often confusing. This section offers some widely accepted definitions in order to point out some similarities and differences, and finally to define INSET as it is used by the CCD and as it is used in the context of this investigation.

Bolam and Porter (1976) suggest that no agreed definition exists. Morant (1981, p.1) suggests that it is probably easier to say when in-service education should occur than to give an immediate definition.

However, a commonly accepted definition of INSET is that "it embraces all those experiences that a teacher may undergo for the purposes of expanding his professional and personal education" (Murphy, 1985, p.6). This is confusingly broad and vague and it assumes that the INSET covers all learning experiences relating to the teaching profession, direct or indirect, which teachers encounter from the day that they take up their first teaching positions.

Dunkley suggests the more focused definition:

> All those planned activities teachers undertake to improve their instructional effectiveness, personal and professional knowledge and skills to equip them for new or changed roles.
>
> (Dunkley, 1984, p.2)

Van den Berg proposes in his definition that INSET is aimed at outcomes, namely the improved quality of learning, when he suggests that the fundamental rationale for INSET is not related to teacher quality *per se* but to its role as a major strategy in attempts to maintain and improve the quality of schooling (Van den Berg, 1983, p.2). This definition is closer to the definition assumed by the CCD in that it also refers to the teacher as a change agent and to transformation as a teaching objective rather than to teaching as merely a technical function of knowledge transfer.

Bolam suggests a broader role of INSET and proposes that all concerned with teaching, including principals, should be involved in INSET. He specifies that the ultimate purpose should be to improve the quality and learning of pupils through the increased knowledge and improved professional skills and attitudes of teachers (Bolam, 1982, p.6).

In the South African context Hartshorne (1985) suggests the working definition that INSET is:

> The whole range of activities by which serving teachers and other categories of educationalists (within formal school systems) may extend and develop their personal education, professional competence and general understanding of the role which they and the schools are expected to play in their changing societies. INSET further includes the means whereby a teacher's personal needs and aspirations may be met as well as those of the system in which he or she serves.
>
> (Hartshorne, 1985, p.9)

This definition echoes the CCD INSET strategy more clearly than do the other definitions.

Based on a survey of 500 teachers in England, Keast (1984) suggests four separate categories or definitions of INSET. In doing this, Keast acknowledges the need for teacher autonomy in articulating their professional needs. Keast suggests the following four categories and associated definitions:

a) School-based in-service: to help teachers to improve the quality of education in their school.
b) Job-related in-service: to help teachers to be more effective in their own post; and ... to derive job satisfaction.
c) Career-oriented in-service: to prepare teachers for promotion.
d) Qualification-oriented in-service: to provide teachers with further qualifications.

(Keast, 1984, p.4)

The CCD INSET strategy is best represented by Keast's first category although the programme is not school based but rather school focused. The difference is semantic,

however. The CCD has a course based and school focused programme with one component of the programme taking place in the school (school focused) and the rest of the course taking place at centralised training venues (course based) which are often the actual schools where the teachers teach.

Although there are different categories of INSET, it is important to clarify the purposes, especially in a South African context. Hofmeyer (1991, p.379) suggests five purposes:

- Equalisation - through upgrading academic and professional qualifications.
- Efficiency - through management training.
- Classroom competence - through input on subject knowledge and methodology.
- Change - through curriculum development, social awareness programmes and INSET for new roles.
- Empowerment - through action research and teacher-led initiatives.

2.6 COURSE BASED AND SCHOOL FOCUSED INSET

The CCD focus of INSET is both course based and school focused. Course based refers to the content of the INSET programme which is based upon pre-determined sequences of processes, each of which has clear parameters of intended content informed by specific theories and intended outcomes. Unlike other course based programmes, this particular INSET programme is not certificated and therefore there is no examination of content.

School focused refers to the strategies employed by trainers and teachers in partnership, directing training programmes in such a way as to meet the identified needs of the school (Bolam, 1982, p.134). The CCD programme

uses class based training as well as school based workshops as components of the programme where teachers actually teach their pupils or role play teaching scenarios and the learning experience and training takes place around this. In this way, the actual classroom, pupils and school issues are dealt with.

David (1982) commenting on INSET states that proponents of school based strategies believe that any planning effort that encourages self-awareness and reflection on the part of school staff will greatly increase the chances that behaviours will change.

Current work on educational change and school improvement (Fullan, 1982; Hopkins and Wideen, 1984) agree about the need for educational change efforts (INSET) to focus on both system and personal levels and involve both task and process elements.

This is a claim made by the CCD INSET model where the programme is based on developing reflective practices where the interaction with teachers is both at a personal level and at a system level (through the Personal Empowerment component) and it involves changes in both the task and process actions of teachers (through the Teacher Empowerment component) (CCD Publication, 1992).

2.7 TEACHER BELIEFS

Rokeach (1968) argues that all beliefs have a cognitive component representing knowledge, an affective component capable of arousing emotion and a behavioral component activated when action is required. It is interesting that Rokeach subsumes that knowledge is a component of belief and not the more obvious converse that belief is a component of knowledge. He suggests through this that

belief systems form the basis of knowledge and that knowledge is not the informing agent of an individual's beliefs. Therefore, if one's beliefs can be changed, then the way that teachers act upon what they consider knowledge, can also be changed. It is far more difficult for an INSET programme to impact upon one's knowledge about learning in order to change one's beliefs and ultimately, teaching behaviours. It is far easier to get teachers to reflect upon their personal beliefs in order that these may change and in return change teachers' knowledge.

Goodman (1988) suggests the term "teacher perspectives" rather than "teacher beliefs". These perspectives or beliefs pertaining to education may be similar, however the teachers' expression of beliefs through their choice of actions bad teaching practices whereby they carry out and act upon their beliefs, may differ significantly from teacher to teacher. In other words, two teachers may share a common belief about an issue but their individual choice of actions in respect of their individual beliefs may differ vastly.

Pajares (1992) provides a synopsis of research into teacher beliefs and suggests that difficulties in studying teacher beliefs and their effects on teaching is compounded by definitional problems of individual researchers as well as differing understandings of teacher beliefs and belief structures. He suggests that beliefs strongly affect behaviour and that investigation of teacher beliefs will provide valuable *insights* into the relationship between teacher beliefs and practises.

Finally, Pajares (1992) suggests that although teacher beliefs are difficult to change and that this is more so in the case of older adults than younger adults, changes in beliefs can take place and he suggests that these

belief-changes or gestalt-shifts, as coined by Nespor (1987), are possible and even necessary if educational practices are to change and be improved. These suggestions were made specifically in the context of teacher education and therefore have direct bearing upon the present INSET investigation.

2.8 TEACHER ATTRIBUTIONS

Weiner's (1977) motivational and attribution theory relates to the motivational aspects of teacher beliefs. He postulates that teacher practices are influenced by the process whereby teachers attribute success or failure to their efforts. Brophy and Rohrkemper (1983) report that teachers' attributions affected the types of goals which they set for individual students; that teachers' attributions affected the way which teachers controlled and managed student behaviour, and that teachers' attributions also affected the choice of educational practices or methodologies used with students.

Teacher behaviour and achievement are therefore clearly influenced by attributions of success or failure and therefore have an influence also on the motivation of the teacher. Locus of control factors relating to attribution (whether internal or external) therefore also play a role in the teachers' motivation and ultimately their teaching practices.

2.9 TEACHER EFFICACY

Drawing on the work and self-efficacy theories of Bandura and Schunk (1981), and Schunk (1984), Gibson and Dembo (1984) it is suggested that teacher efficacy is multidimensional and consists of at least two factors,

namely teacher efficacy and teaching efficacy. Teacher efficacy (personal teacher efficacy) refers to teachers' beliefs that they have skills and abilities to bring about effective student learning. Teaching efficacy reflects the general relationship between the teachers' beliefs about their ability to bring about changes and the teachers' beliefs about the conditions and environment in which children find themselves and which significantly limit or enhance the effects and impact of the teacher.

For the purposes of the investigation, both are seen to impact upon teacher behaviours in the classroom and therefore efficacy or teacher efficacy, as used in the investigation, incorporates both teaching and teacher efficacy as defined above. Also, the links between efficacy theory and Rotters' control beliefs (internal and external) are clearly present in the constructs of efficacy theory.

Drawing on Rotters' (1966) locus of control theory as well as Weiner's model of achievement motivation, Weiner (1977 and 1979) and Schunk (1984) make the links between causal attributions and efficacy as they are influenced by individuals' perceptions and beliefs. Bandura (1977) further suggests a link between self efficacy on the one hand and how the individual cognitively appraises the context within which individual efficacy judgements take place, on the other. The context referred to above of self efficacy and efficacy judgements, is specifically related to teaching and professional practices.

2.10 TEACHER CONTROL BELIEFS

Drawing on Rotters' (1966) theory of locus of control and Phares, Ritchie and Davies (1968) work relating to attributions and social pressure, Kremer and Lifmann

(1982) found that teacher attributions correlated with their locus of control (internal and external), specifically as regards the age of the teachers. Younger teachers tended to have a stronger external locus of control and they generally attributed their successes or failures to environmental factors. Middle-aged and older teachers generally had a more internal locus of control which was characterised by creativity and motivation.

The definition of teacher cognitions is therefore extended, for the purpose of this investigation, to include teacher beliefs about their perceptions of locus of control, both internal and external. Locus of control theory draws upon attribution and efficacy theory and *vice versa*, and together these form a platform upon which teacher cognitions can be investigated. Teacher cognitions are therefore the outworking of these beliefs, through teacher attributions and perceptions of efficacy as well as their generalised beliefs about education or general pedagogic beliefs about their individual practices or behaviours.

The CCD INSET programme attempts to develop teachers' reflective practices as a means of bringing about qualitative changes in the teaching and learning of teachers. Empowering teachers to evaluate and assess their actions in respect of their beliefs about teaching and learning, through the process of reflection, is the ultimate aim of the CCD INSET programme and strategy. The consequent changes in teachers' practices which may result arise from empowered insights into own practices rather than changes which may take place as a result of the imposition of a prescribed course on teacher methodology.

2.11 SUMMARY

In this chapter the fundamental criteria and implications for the investigation were established. The investigation is supported by the theoretical assumptions revealed in the review of the literature.

It is assumed that teachers lack an awareness of their own thinking (cognitions) in respect of their beliefs and perceptions and how these cognitions affect their understanding of teaching and learning. Changes in cognition are coined *gestalt shifts*, by Nespor (1987) and the term *shifts*, taken from Nespor's concept, is used for the remainder of this investigation, to imply *cognitive changes*.

The mass of the literature focused on this aspect of teachers as being the most crucial with which to work, if quality changes are to occur in teacher further training and learning.

It was also necessary to review the available literature relating to INSET and other teacher programmes in order to focus this investigation on those areas where little or no research has been done, in order to avoid overlap with work which has already been done, and also to contribute to the already existing body of knowledge in the field of INSET.

CHAPTER 3 : RESEARCH METHODOLOGY

3.1 METHODOLOGY AND PROCEDURES

The research methodology is two fold. It firstly makes use of a survey of related literature to focus the investigation and define the specific areas of the investigation for the compilation of the instrument and the collection of data. Secondly, the methodology follows an empirical investigation of the defined field and a statistical analysis of the data.

The empirical investigation is designed around a quasi-experimental research methodology. Such a methodology attempts to approximate the true experiment in a setting which does not allow for the control or the manipulation of all relevant variables (Isaac and Michael, 1972). The decision to use a quasi-experimental methodology as opposed to an ex-post-facto methodology was that although most of the independent variables could not be controlled for, a pre-test and post-test assessment of teacher cognitions was possible and the dependent variables such as the age, sex and sample groups as well as the 13 day INSET course, could be controlled or manipulated. In this case the control of the variable INSET was in the form of a structured course presented by a consistent group of trained facilitators and presented at the same venue for all groups with the same core of materials. The time period for the completion of training of each group was staggered over an eight month period.

For the above reasons, as well as the nature of the investigation and the fact that no research into the effects of INSET on teacher cognitions has been undertaken in this country, the methodology is also considered exploratory. Katz (in Kerlinger, 1973) refers to two

broad types of studies; *exploratory* and *hypothesis* testing. Exploratory seeks *what is*, rather than predicts *the relations to be found.*

Exploratory research has three purposes:
- discovering significant variables,
- discovering relations among the variables and
- laying the ground work for more rigorous testing of hypotheses.

Because no research could be found dealing specifically with teacher cognitions in relation to INSET, no prior model or findings were available upon which to make assumptions or against which the data could be evaluated. For this reason the research methodology attempts to bring together true experimental research methodology and exploratory research methodology and does this in the form of quasi-experimental methodology.

This investigation is also not merely an attempt to test an hypothesis. It attempts to investigate the relationships of the findings as well as significant shifts in the responses of the sample and attempts to understand and explain variations between the findings and the hypothesis.

This was done by:
a) Making a representative analysis of the beliefs and perceptions of In-Service teachers regarding the teaching/learning process and environment.
b) Assessing trends among teachers as regards their autobiographic groupings (their position as teachers ie. junior primary or senior primary), their age and sex and their teaching experience.
c) Assessing changes or shifts in beliefs and perceptions at the conclusion of the INSET programme.

The specific focus of the study namely the influence of an INSET model, necessitated that the investigation attempt to approximate the conditions of a true experiment in a setting which did not fully allow for the control or manipulation of all relevant variables (Isaac and Michael, 1972). The reason for the lack of control of all possible independent variables was the applied and contextual setting of the investigation and this can be attributed to two factors. Firstly, the nature of the project namely that of a rural In-service course as opposed to a controlled experimental setting in a College or University provided a context which was not always consistent. Secondly, the extended duration of the *treatment* (the INSET programme) intermittently over a period of 8 months between pre-test and post-tests provided a time frame within which many extraneous influences could have had a bearing. These two main factors as well as the compounding problem of controlling all the independent variables which relate to or arise from them, were the primary concerns of the researcher.

Intervening variables such as biological changes and development of the sample, maturation, the residual effects of the testing or measurement in a pre-post application of the same questionnaire as well as the effects of contextualised social impact or history, could not be controlled.

A quasi-experimental design therefore appeared to be a stronger option than the ex-post-facto methodology where control of the dependent variable would also not be possible and in ex-post-facto research purely causal comparative analyses would have to be made. Inherent weaknesses of such analyses is that no single variable or condition can be attributed to changes in the dependent variable and that for the purposes of this investigation the findings would be too broad and possibly vague to have

any external validity.

The additional focus of the study as exploratory allowed for the investigation of possible relationships between the variables rather than a simple causal comparative analysis.

Although a true experimental research design was not possible due to the above mentioned constraints of the nature of the INSET project, an action research methodology was also considered but it was decided that although this form of participatory research was more appropriate to investigating the effects of INSET as well as the fact that such research was more empowering of individuals within the research framework than other forms, it was considered too time consuming and too limiting of the necessarily broad application of the findings to other CCD programmes. The need to assess the effects of the INSET programme across a variety of primary school teachers in order to generalise the findings through the investigation's external validity, were the driving forces in the decision to adopt the quasi-experimental methodology.

3.2 RESEARCH DESIGN

The research design which was used was an adaptation of the One-Group Pre-test-post-test design, originally taken from Campbell and Stanley (1963). The design is an adaptation taken from Isaac and Michael (1972). The original design was enhanced through the use of four pre-test and post-test groups, all of which experienced the treatment namely the INSET course. This design is graphically represented in Table 1 overleaf.

Table 1: Multiple group Pre-test Post-test Design

Group	Multiple Group Pre-test-post-test Design		
	Pre-test	Treatment	Post-test
Group 1	T.i	X	T.ii
Group 2	T.i	X	T.ii
Group 3	T.i	X	T.ii
Group 4	T.i	X	T.ii

T represents the testing instrument namely the Questionnaire,
T.i being the initial administration or pre-test,
T.ii representing the post-test administration of the same questionnaire administered in the pretest application, and
X representing the *treatment* namely the INSET programme and the dependent variable.

Group 1 to 4 therefore experienced the same pre-test measure (the questionnaire), the same INSET programme (the 13 day CCD INSET programme) and the same post-test (the same questionnaire used in the pre-test application). The essential differences between the groups was the time delay in the exposure to the treatment, the INSET programme. Each group began and ended within an 8 month period but each group was treated independently of the others.

The rationale for the choice of this design was that it enabled, through the application of t-tests, the empirical investigation of *cognitive shifts*, between groups and isolating variables across groups.

The advantages of this design is that the pre-test provides a comparison between the performances by the same group of subjects, before (T.i) and after (T.ii) exposure to the experimental treatment (X). It also provides for the control of the selection and mortality variables, as the same subjects formed the pre-test and post-test samples of the four groups. The use of four groups (stratified random sampling) also allowed for inter-group comparison and correlation of the performances of the groups on pre-test and post-test measures as well as provided a larger total sample for the analysis of the findings and exploration of the relationships between the variables in general. This also has positive implications for the external validity of the findings as the stratified random sample mirrored the actual ratios (i.r.o. subjects, gender and level of schooling ie. Junior Primary, Senior primary etc.) of the larger INSET programme of the CCD. These statistics are presented under the sample description.

The disadvantages of this design are that there is no assurance that shifts can be exclusively attributable to the INSET programme due to lack of control of independent and intervening variables, and that the treatment X (the INSET programme) is the only or major factor in a T.i - T.ii difference. This aspect was addressed in the choice of the exploratory bias of the investigation, which was built into the study although it does not satisfactorily accommodate it.

The eight month period of treatment (the dependent variable, INSET) between pre-test and post-test assessments is compounded by the effects of independent variables such as *history* (changes in the physical setting and social context of the sample groups eg. political changes, moves within schools etc.); *maturation* (physical changes in the sample groups as a result of time); *testing*

effects (changes brought about in the sample groups as a result of exposure to the instrument as well as familiarity of the sample groups with the instrument itself) and *statistical regression* (the inevitable effect when the pre-test scores are considered the norm for comparison with the post-test scores, especially when the samples are not wholly random, as is the case in this investigation when considering the entire CCD population).

In spite of these disadvantages, the choice of a dual faceted approach to the investigation methodology (quasi-experimental and exploratory) as well as the stratified-random sampling of the population were the researcher's attempt to replicate experimental features of research in a setting which was not wholly conducive to experimental research.

3.3 DESCRIPTION OF THE POPULATION

The population from which the sample was drawn was selected from one project within the scope of the CCD INSET program. The total CCD programme covers 20 projects nationally, each project training approximately 250 teachers annually, in total some 5000 teachers. The reason for the selection of this particular project for investigation and not a more representative sample which could have been drawn from the entire CCD population was that it was the only project which started and ended within the time frame of one calendar year. The significance of this selection is that in all the other CCD projects, all of which span a period of between 15 and 18 months, the attrition rate of participants as a result of year end transfers and general movement of teachers to other schools and areas as well as resignations and retirements, is reasonably high. An average of 18% of each CCD course group of teachers is lost due to attrition.

This phenomena has the consequence of limiting and distorting the initial samples. Changes in sample size are caused by, among others, the Departmental reduction and retrenchment of teachers, as well as teachers which are initially part of one sample being transferred to another school within the same project area and therefore becoming part of another group. Teachers also are compelled to change subjects as well as standards taught, (usually at the instruction of the school principal) within the INSET training period and this also results in attrition of original sample sizes. This is the result of the total sample being sub-divided into groups according to the subjects which they teach and changes in the teaching subject results in changes in the sample group.

All the factors mentioned above relating to effects on the sample and size of the sample, relate to the other areas and projects within which the CCD works and are generally a consequence of the arbitrary processes which teachers endure as a consequence of their being employed within black education in general.

Also, the other 19 CCD projects have course participants beginning and ending the course over a 15 to 18 month period which means that the collection of pre-test and post-test data would span a longer time period than the 8 months of the sample group. The variables of History and Maturation (Isaac and Michael, 1972) which could affect the sample, were far greater in the other projects than in the sample. This was yet another problem in maintaining the consistency of the sample which the researcher had to contend with and upon which to base decisions.

3.4 THE SAMPLE

Approximately half of the CCD INSET projects are based in

rural areas and half in urban areas. The project from which the sample was taken is considered a rural project. Approximately 60% of the teachers (and schools) within the CCD intervention are junior primary, 35% are senior primary and 5% are high school. The selection of this particular CCD project as representative of the CCD intervention was that it dealt with teachers representing 95% of the CCD intervention, namely primary school (junior and senior primary teachers, as well as it dealt with a sufficient number of teachers from junior and senior primary. The project was also representative of the normal distribution of males and females, and subject groupings. The overall CCD statistic for male and female course participants is 43% and 57% respectively which compares favourably with the sample statistics of 49% and 51% male and female respectively. Due to the nature of the overall population of the CCD teachers being predominantly primary school, teachers generally teach all subjects or are qualified to teach all subjects.

The project area from which the sample was drawn covered 245 primary school teachers in the Grabouw demographic area of the Western Cape and included 14 primary schools. The schools in this particular project area fall under the DEC. They are predominantly Coloured schools and the teachers are predominantly Coloured.

All groups were trained through the same process and content of the CCD programme, spanning 13 days per group and a period of 8 months in total. The training began with the first groups in February 1993 and all groups had completed the 13 days within 8 months, by the middle of September 1993.

The sampling technique used was a stratified-random sample. This is one of the probability samples where the population is divided into strata (Kerlinger, 1973). From

these strata the random sampling was done in order to achieve randomness as well as representation across the range of the entire project population.

The Grabouw project was divided into nine course groups by the CCD, groups A to I, and ranging in size from 20 to 33 teachers per group. This grouping of teachers into homogeneous groups was done according to the standards as well as subjects taught by the teachers attending the INSET to facilitate the subject specific nature of the course at times in the 13 day course.

The population from which the sample was drawn consisted of 128 Junior Primary teachers (Sub A to Standard 1) and 117 Senior Primary teachers. The junior primary teachers were not subject grouped as they tend to teach all subjects at this level. The senior primary teachers have more subject specific qualifications but these do not correlate with the actual subjects taught. This phenomenon is evident in the 42 Maths and Science teachers, 52 Language teachers and 23 History and Geography teachers in the sample groups.

The autobiographical information obtained from the questionnaires revealed that there are more teachers within the total project population teaching Maths and Science than are qualified to in terms of their formal qualifications. For this reason, it was decided to use only part of the 245 teachers in the project and focus on alternate groups (stratified groups), groups C, E, G and I, for the pre-test and post-test sample. This decision was largely a consequence of obtaining a representative sample from across the project in respect of specific subjects taught as well as being representative of Junior Primary teachers (group C) and senior primary teachers and their respective subject groupings (E, G and I, and representative of Maths\Science, Language and

History\Geography, respectively).

Also, only a random sample of 15 course participants from each of the four course groups was taken to form the total sample of 60. This represents about 40% of the entire course of 245 teachers and approximately 1.2% of the total CCD population of 5000 teachers. The original sampling included 20 participants from each group but problems with the administration of the questionnaires as well as teacher-union related chalk-downs during the period of data collection resulted in the limiting of the size of the original samples from 20 per group to 15.
The final pre-test and post-test sample is presented in Table 2 below.

Table 2: Sample

GROUP	C (JP)	E (SP)	G (SP)	I (SP)
Males N=29	0	11	7	11
Females N=31	15	4	8	4
Subjects	All Subj.	Math\Sci	Language	Hist\Geog
Age				
0 - 25	2	0	1	0
26 - 35	8	4	8	6
36- older	5	11	6	9
Total N=60	15	15	15	15

The gender ratio of the final random sample for analysis is N=60, 29 Males and 31 females, all of which completed

all 13 days and components of the course, in their correct sequence.

3.4.1 Comparative statistics of the CCD Population, Project and Sample

The total CCD population statistics comparing the distribution of male and female, subjects taught, levels taught and age is necessary to establish the representativeness of the research sample. This is presented below in percentages for ease of comparison.

Table 3: Comparative statistics of CCD, Project and Sample

	CCD	PROJECT	SAMPLE
SEX Male Female	 43 % 57 %	 45 % 55 %	 48 % 52 %
SUBJECTS Language Math\Sci Hist\Geog and general	 27 % 26 % 47 %	 34 % 21 % 45 %	 25 % 25 % 50 %
LEVELS TAUGHT High School Jun. Primary Sen. Primary	 5 % 60 % 35 %	 - 53 % 47 %	 - 15 % 75 %
AGE 0-25 26-35 36 - older	 12 % 41 % 47 %	 8 % 37 % 55 %	 5 % 43 % 52 %
N % of CCD work	5000 100 %	245 5 %	60 1.2 %

From the previous table of percentages, it is clear that the research sample compares favourably with the overall CCD population in almost all categories with the exception of high school teachers and to a lesser degree the junior primary and senior primary teachers. This is due to the specific project not including high school teachers. The discrepancy of a 15% to 75% distribution between the junior primary and senior primary teachers respectively which is converse to the overall CCD trend of 60% to 30% for junior primary and senior primary respectively results from the focus of the particular project funder being on primary schools only. The reality is however that 95% of the CCD programme is carried out in primary schools which includes both junior and senior primary and the CCD course is the same for both groups. High school courses are generally separate courses which are specifically funded and these only constitute a small percentage (5 %) of the total CCD work in INSET.

3.5 CONSTRUCTION OF THE QUESTIONNAIRE

The decision to develop a questionnaire as the instrument with which to investigate influences of INSET on teacher cognitions, was based on the fact that the investigation formed part of an existing research strategy within the INSET organisation (CCD) and the findings of this study formed part of a research matrix which is used to assess impact as well as outcomes of the CCD INSET programme. This study forms part of the outcome and impact evaluation and these are distinguished by the time period associated with each. Impact refers to those effects upon teachers which are measurable over a longer period of time after the actual intervention, and outcomes are the effects which are more immediate and measurable immediately after the intervention.

The other components of the CCD research matrix include a time series study, action research and collaborative teacher researcher projects, interviews, qualitative research of various kinds including research based on anecdotal information all of which contribute toward the larger research strategy. This questionnaire thus forms part of the data of the overall matrix.

The questionnaire was initially compiled from readings around teacher beliefs, teacher attributions, teacher efficacy and locus of control or control beliefs, all of which are mentioned and justified in previous chapters. These theoretical constructs are argued to be some of the aspects which comprise teacher cognitions. More specifically, the work of Zimmerman *et al* (1992) on self regulated learning and motivation; Bandura and Schunk (1981) and Gibson and Dembo (1984) on teacher efficacy and motivation; Weiner (1979), Borowski Carr and Rellinger (1987) on attributional theory; Pajares (1992) on control beliefs and Holts-Reynolds (1992) on pedagogic beliefs, was used to focus the investigation and provide parameters with which to define the constructs of the sub-scales.

It was decided that these components of teacher cognitions should form sub-scales of the instrument and that control related beliefs and pedagogic beliefs should form the greater part of the instrument. Attributions and efficacy would only comprise one third of the items of the instrument as these were seen to be underlying and contributory factors of the two main sub-scales, control beliefs and pedagogic beliefs.

The instrument was therefore designed and constructed as follows (See Appendix A):

A questionnaire of 24 questions with sub-scales;
   Attributions (4 items)

Control Beliefs:

a) external (4 items)

b) internal (4 items)

Efficacy (4 items)

Pedagogic Beliefs (8 items)

The questionnaire in its final form was called the Teacher Questionnaire and will be referred to as that.

3.5.1 Attributional sub-scale

For the purposes of this questionnaire Attributions are defined as motivational aspects of teachers' perceptions of their own performance relating to how teachers attribute success and/or failure to their performance and motivation.

The attributes which were selected for inclusion as items were effort, ability, skill as opposed to luck and motivation. Teacher attributions and reflective feedback thereof by individuals, are seen as linking with and very important to teachers' levels of self-efficacy.

3.5.2 Control beliefs sub-scale

Control beliefs were differentiated into internal and external and were defined as teacher beliefs and personal perceptions about contingencies refer to their teaching actions and outcomes as these relate to self perpetuated (internal) or externally perpetuated (external) beliefs and perceptions about their choice of behaviours.

Internal control belief items included in the instrument were constructed around the individual teachers' perceptions of their personal beliefs and choices relating to teaching and their freedom to choose effective teaching methodologies and strategies.

External control beliefs included items relating to school principals, high teacher-pupil ratios, lengthy syllabuses and lack of facilities as being the contributory factors affecting beliefs about their locus of control or their perceived lack of control over their role as teachers.

3.5.3 Efficacy sub-scale

Teacher efficacy was defined as attitudinal and judgemental perceptions of teachers about themselves, relating to the causal relationships between teaching (methods and practices), teachers or self (personal ability) and the effects of the teacher and teaching on learners (successes or outcomes in children). The efficacy items related to teachers' perceived significant impact on children, children's attitudes, slow learners and the teachers choice of methods to meet the needs of differences between children in the same class.

3.5.4 Pedagogic beliefs sub-scale

Pedagogic beliefs were defined as all beliefs which teachers have relating to teaching, to learners and to the socio-political context of education which impacts upon the way that teachers perceive teaching and learning and which ultimately impacts upon teachers' behaviour and teaching practices in general. The definition of pedagogic beliefs therefore incorporates aspects of locus of control, attributions and efficacy as well as beliefs about the broader context and impact of education. This sub-scale is not in reality a sub-scale as it does not focus on one particular aspect of beliefs. For instance beliefs about the relationship between politics and education is not specifically addressed but rather the focus is on broad areas of pedagogic beliefs. The items were grouped into a sub-scale for convenience in the analysis of data. Also, the specific beliefs which are

highlighted through this sub-scale do not attempt to cover all facets of teacher beliefs but rather a piecemeal selection of some areas of belief which were considered important to assess in relation to the overall CCD research matrix.

3.6 DEVELOPMENT OF THE QUESTIONS

An eclectic approach was adopted in the creation and selection of items for the instrument. The essence of questions from established instruments assessing efficacy (Gibson's Teacher Efficacy Scale: Gibson and Dembo, 1984), attribution (elements of the attribution theory such as luck, effort etc. were used as items) and locus of control (Rotters' Internal External Locus of Control Scale, 1966) were used. The pedagogic beliefs questions were compiled in conjunction with a panel of colleagues. The questions taken from various sources as items for the teacher questionnaire were re-written maintaining the essence of the original questions (where applicable) but refined for the specific context of the application and the parameters of the investigation ie. that of the South African context and that of the effects of teaching and INSET. A draft of the teacher questionnaire consisting of 30 items was pre-tested on a sample of 60 teachers from one of the CCD projects and was found to be too long and the wording and vocabulary of certain questions was confusing for teachers. The results of the trial run were considered in the final compilation of the items for the Teacher Questionnaire.

3.6.1 Positive and negative rating of questions

Once the essence and specific wording of all questions was finalised, each item assigned either a positive or negative value using a randomised process and thereafter

they were re-worded to give either a positive or a negative response. This was done to avoid having an instrument which had either a positive or a negative response trend. If the majority of questions suggested a positive response trend, it may have been interpreted as such by respondents and could have resulted in a skewed impact on the responses.

The positive and negative items are:
Positive items : 1,2,3,10,11,12,13,15,16,17,20,21 and 24.
Negative items : 4,5,6,7,8,9,14,18,19,22 and 23.

For the statistical analysis of the data, these items were all re-coded as positive. This means that all the negative items were re-coded where a 9 (strongly agree) became a 1 (strongly disagree) and vice versa. This was done using the SAS statistical package.

3.6.2 The rating scale

For each item, a Lickert-type or Summated Rating scale was used. This was done because the 24 items of the Teacher Questionnaire were considered approximately equal in attitude or value loading (Isaac and Michael, 1972, p. 100). In this type of scale, subjects respond to the questionnaire items with varying degrees of intensity, on a scale of strongly agree to strongly disagree. The Thurstone-type or Equal-appearing Interval scale as well as the Guttman-type or Cumulative scale were considered but were rejected as the items of the questionnaire were considered too divergent to be comparatively scaled in respect of their value or to be considered homogenous groupings, as these criteria pertain to the above two scales respectively (Isaac and Michael, 1972, p. 100).

The decision to use a nine point rating scale per item was based on the principle that a choice of nine options

ranging from 1 or strongly agree to 9 or strongly disagree, gave the respondents a particularly wide range of choices with the option of a neutral or mid point option, 5, which offered a non-committal or neutral point.

3.7 PROCEDURE FOR ADMINISTRATION

The pre-test questionnaire was administered to all participants of the Grabouw project. It was administered at the beginning of the first day of the course and the autobiographic questionnaire served as the registration form for the CCD as well as the autobiographic data base by which the questionnaire data was analyzed and the independent variables defined for the purposes of analysis and interpretation. Each course participant was issued with a registration number which was assigned arbitrarily to the teachers by the coordinator of the specific project, prior to the course. This number then became the source of identification for all CCD work as well as the means of reference of the investigation sample, without the individuals in the sample having to write their names on the questionnaire each time, both pre-test and post-test. It also allowed for an element of perceived anonymity as the teachers expressed the feeling that a number was less personal than writing ones name on the questionnaire.

The participants were assured that the questionnaire was confidential and that no names of individuals would be identified, either in the processing or discussion of the findings. They were also told that they would only be identifiable by number for the purposes of data analysis. The function of the questionnaire was also explained as being part of the CCD's research function and that the information would be used for the purposes of informing the CCD's process of further developing the course as well

as providing the data for a dissertation.

Participants were not informed initially of the post-test application of the questionnaire to the randomly selected sample at the end of the course. This was done to avoid participants responding to items in a manner which would project them in a positive light and make pre-test and post-test comparisons less distinctive and more difficult to define pre-test and post-test shifts.

It was explained to participants that all questions of the questionnaire should be completed. The procedure for answering the questionnaire as well as the scale (from strongly agree to strongly disagree) was also explained in detail. It was also explained that the questionnaire would take approximately 20 minutes and that they should answer the questionnaire confidentially and honestly. The questionnaire was administered by the course coordinator of the project and therefore the pre-test and post-test application procedure was consistent between all groups.

The post-test application of the questionnaire took place at the beginning of the last day of the course, day 13 (approximately 8 months after the pre-test application). It was administered to all participants of groups C, E, G and I and it was again explained that the questionnaire being administered was a research and development questionnaire and that the data would be confidential and that no individual would be identified. In this application of the questionnaire, the autobiographic component of the questionnaire was not completed by participants and therefore no names were filled onto the questionnaire. The participants were however given their registration number to fill in on the post-test questionnaire and once again the procedure for completion of the questionnaire was explained.

This application was also done by the course coordinator across all four groups, maintaining uniformity of the application procedure and conditions. It was not explained to participants that only a random sample of the questionnaires would be used for data analysis as this could have led to individuals not responding to the questionnaire seriously and honestly.

At no time during the application of either the pre-test or post-test questionnaire were there objections or queries voiced by any of the participants. Questions of clarification regarding the meaning of some of the words in the questionnaire as well as questions relating to the procedure for answering did occur and these were dealt with by the course coordinator administering the instrument.

3.8 PROCEDURE FOR DRAWING THE SAMPLE

Once all the pre-test questionnaires were completed, the sample was drawn. Of the total population of pre-tests and post-tests, approximately 107 in total, all participants who had missed components of the CCD course or those who had swopped groups as well as those who had not completed the course in its correct sequence of modules were excluded from the population from which the sample would be drawn.

Secondly, all questionnaires which were not completed or not completed correctly were excluded from the sampling. Each course group (C, E, G and I) was then divided into male and female (with the exception of group C which was only female) and thereafter the sample of 15 from each group was drawn randomly following a simple random sampling procedure (Kerlinger, 1973). These four groups of 15 then formed the stratified random sample (N=60) for

investigation and analysis.

3.9 EMPIRICAL PROCEDURES FOR ANALYSING AND INTERPRETING THE DATA

The data obtained from the questionnaires was captured and processed on a micro computer using the SAS statistical software analysis programme.

3.9.1 Statistical description of the sample

The sample was described in broad statistical detail based on the descriptive statistics obtained from the pre-test application of the questionnaire. This was done in order to describe the general population parameters. Due to the randomness of the sample, these general statistical trends or *shifts* and descriptions of the population could then be generalised to all participants within the larger population from which the sampling was done, namely the entire Grabouw project and to a lesser extent, the entire CCD INSET intervention. It was also done in order to describe and understand the general statistical parameters of the group in order to make decisions relating to the further analysis of the data and the specific choice of statistical techniques to do this, which suited the patterns of the data obtained. This also provided a base line from which analyses of differences of means could be made. The results are presented in Tables 2 and 3.

3.9.2 Statistical techniques used in the analysis of data

Due to the pre-test post-test nature of the research design, the t-test for two sets of related data was used. The two sets of data were obtained from the pre-test and post-test applications of the questionnaire and the relatedness of the data was assumed through the random

sampling within each group. With this statistical technique the means of the two sets of data are compared in order to determine whether they differ significantly or not. This analysis of means is also termed paired sample analysis where each individual's pre-test data is paired with their post-test data for comparison.

The choice of a t-test for analysis was based on the assumption that the sample statistics were parametric (as a result of a stringent random sampling method) and the sample size varying from N=15 in the case of individual groups to N=60 in the total sample was suited to t-tests. The parametric assumption of the data was based on a descriptive statistical analysis of the data which revealed that the sampling distribution of participants in the study complied with a normal population distribution and that the findings referred to under section 3.9.2 supported this. The grouping of the samples for deeper analysis was however problematic as the age groupings resulted in an N=3 for the age group 0-25. The decision to proceed with data analysis in spite of having an N for a t-test which was too small, was based on the assumption that this particular analysis of sample was not as significant as the t-test significance of the age groups 26 to 35 and 36 and older.

The results of these groupings were considered more important for the purposes of the CCD overall research as the vast majority (88%) of the teachers trained by the CCD are older than 25 years and therefore trends within the research group could be compared to the majority of teachers trained by the CCD. It was however necessary to split the younger grouping from the middle (26 to 35) age group as this group represents 41% of the total CCD population whereas the group 0 to 25 represents only 12%.

A study conducted by Kremer and Lifmann (1988) further indicated that younger teachers (less than 5 years teaching

experience) had not had sufficient time to formulate clear beliefs and theories around teaching and therefore cognitive shifts in this grouping of teachers would not be as significant as cognitive shifts of teachers who had already formulated their own sets of beliefs (the group 26 to 35). This study also suggested that older teachers (35 and older) were generally more accepting of the *status quo* and that their beliefs were influenced by the system and more resilient to changes which may be anticipated through teacher development programmes. These findings therefore provided further support for the grouping of the sample into 3 age groups with the expectation that the grouping 26 to 35 years would reveal the most significant as well as the largest number of cognitive shifts.

CHAPTER 4 : EMPIRICAL ANALYSIS OF THE DATA

4.1 GENERAL ANALYSIS OF PRE-TEST AND POST-TEST SCORES

4.1.1 Sample means

Both the pre-test and post-test means are positively skewed. The pre-test means range from a low of 4.65 to a high of 8.28 and these exist on a continuum from 1 (strongly agree) to 9 (strongly disagree). The range for the 24 items varies between 4 and 8, on both pre-test and post-tests indicating a positive trend or *shift* of the means.

4.1.2 Standard deviation

The standard deviations on the pre-test range from 2.950 to 1.427 and from 2.720 to 0.982 on the post-test application. This indicates that the marginally smaller standard deviation range of the post-test application of the instrument shows a tighter distribution around the mean and this indicates a more significant grouping or consensus as regards the trends within and between the variables. The significance of this is that in the pre-test application of the questionnaire, teachers responded from a wide range of perspectives to each item. In the post-test application, teachers responses were closer to each other indicating a shift toward agreement or a closer level of consensus on the issues raised by the questionnaire.

4.1.3 Skewness

The skewness values range from -3.124 to 0.628 on the pre-tests and from -3.756 to 0.322 on the post-test. The implications of these values are significant if N=60

(Snedecor and Cochran, 1976). The implication at the 5% level of significance is that if the value is greater than 0.492 (Snedecor and Cochran, 1976) then only 5% of the total sample falls outside this general statistic for the entire sample making the skewness therefore applicable to 95% of the sample. The implications of this skewed distribution on the pre-test application of the instrument is two-fold. Firstly, the potential for change or of a positive significant shift, is limited due to the high degree of consensus with the statements at the pre-test phase of the investigation.

Secondly, the skewed distributions implies that the instrument items were not critically diverse enough to elicit a normal distribution of responses to the item or the rating scale provided too wide a range of options as well as a mid point option which allowed respondents to favour a mid point option and a slightly more positive tendency.

The implication of the skewness on the post-test application is that the shifts in the means for both pre-test and post-test applications followed a very similar pattern of positive skewness and that this is indicative of weakness in the instrument rather than trends or anomalies in the sample. The distributions for both pre and post-test stayed roughly the same.

4.1.4 Kurtosis

The Kurtosis values range from -1.469 to 7.621 in the pre-test and from -1.275 to 7.399 in the post-test indicating a large variance of the distribution of scores or responses. The implications of these values, if N=60, at the 5% level where the kurtosis ranges between an upper value of 3.99 and a lower value of 1.95. is that more than 5% of the total

sample falls outside this general statistic for the entire sample making the kurtosis significance applicable to less than 95% of the sample. This implies that the data, although parametric, has a wider spread than that of the normal, expected distribution and that the intensity or extremes of choices were not significantly diverse to allow for distributions which conform to the normal distribution curve. This is again indicative of weaknesses in the instrument rather than trends within the sample.

The results of the above descriptive statistics relating to the pre-test application of the instrument indicate that although weaknesses and shortcomings within the instrument are evident, the results still conform to the basic requirements for the analysis of the data through the use of t-tests, namely that it is still parametric data (although skewed) and that the sampling methodology conformed to parameters of a normally distributed sample of the population. The requirements of t-tests for sample size allow for this method of analysis of data.

4.2 RESULTS OF THE t-TESTS : Evaluating the Null Hypothesis

t-Tests for two sets of related data were done in order to investigate whether the shifts in the pre-test and post-test means were significant. Also, this significance could then be interpreted with reference to the sub-scales, as a means of investigating significant trends or cognitive shifts across sample means. t-Tests were also done isolating the variables of sex, age and group, as a means of analysis and comparison. The results of the t-tests are presented overleaf in Table 4. Significant indicators of the t-scores are highlighted and indicated by an * alongside the t-score.

4.2.1 Analysis of the whole sample

Null hypothesis 1: There will be no significant difference in the means of the pre-test and post-test scores.

In Table 4 below are the results of the t-test for the whole sample where (N=60).

Table 4: t-TEST ON PRE-TEST VERSUS POST-TEST ITEMS WHOLE SAMPLE

Variable	Item	t value	PR > [t]
Attributions	1	-0.74	0.4599
	2	0.56	0.5774
	3	2.32	**0.0236***
	4	-0.77	0.4438
Control beliefs (External)	5	-1.15	0.2539
	6	2.11	**0.0390***
	7	1.80	0.0766
	8	1.45	0.1518
Control beliefs (Internal)	9	2.13	**0.0369***
	10	-0.25	0.8008
	11	0.05	0.9600
	12	1.37	0.1761
Efficacy	13	0.17	0.8649
	14	3.43	**0.0011***
	15	0.60	0.5512
	16	0.72	0.4739
Pedagogic beliefs	17	0.28	0.7800
	18	1.41	0.1643
	19	4.26	**0.0001***
	20	-1.62	0.1098
	21	1.58	0.1194
	22	1.20	0.2368
	23	0.64	0.5259
	24	1.28	0.2041

(N=60; $t < 0.05$)

CONCLUSION:

Only 5 items of the questionnaire, (one from each of the four sub-scales) revealed a significant shift in the mean.

Those items are:

item 3 (Attribution) Teachers teach well because of skill and not luck.

item 6 (Cont. Belief, Ext.) High teacher pupil ratios do not make effective teaching impossible.

item 9 (Cont. Belief, Int.) Teachers do not find it difficult to change and improve teaching styles.

item 14 (Efficacy) Teachers think there is much they can do to improve children's attitude toward school work.

item 19 (Ped. Belief) Teachers believe that authority and obedience are not the most important qualities a child should learn.

Although the indications that shifts in these five areas are significant, and encouraging, this only constitutes 20% of the items in the instrument. Because the significance level of 0.05 has been used to assess the significance of the t-test and because the 24 items in the instrument do not cover all aspects of teacher cognitions, the significance of a positive shift in only 20% of teacher cognitions measured does not validate accepting the research hypothesis. For this to happen, it would be expected that significant shifts would have had to occur in 22 items (ie. 95% of cases), if the same level of significance was to apply.

The Null Hypothesis therefore cannot be rejected.

4.2.2 Analysis of the sample by gender

Null hypothesis i: There will be no significant difference in the means of the pre-test and post-test scores of the male and female groups.

In Table 5 below are the results of the t-test, comparing the sample by gender.

Table 5: t-TEST ON PRE-TEST VERSUS POST-TEST ITEMS BY GENDER

Variable	Item	t values		PR > [t]	
		Male	**Female**	**Male**	**Female**
	1	-0.09	-1.07	0.9317	0.2938
Attributions	2	0.13	0.72	0.8973	0.4759
	3	0.91	2.53	0.3722	**0.0170***
	4	-0.16	-0.88	0.8704	0.3862
Control	5	0.32	-1.76	0.7516	0.0893
beliefs	6	2.30	0.79	**0.0292***	0.4362
(External)	7	2.48	0.24	**0.0175***	**0.0889***
	8	2.48	-0.09	**0.0196***	**0.0397***
Control	9	1.87	1.23	0.0722	0.2300
beliefs	10	1.14	-1.03	0.2641	0.3095
(Internal)	11	-0.09	0.12	0.9300	0.9044
	12	1.39	0.76	0.1770	0.4527
	13	0.49	-0.24	0.6279	0.8152
Efficacy	14	3.55	1.67	**0.0014***	0.1053
	15	2.09	-1.00	**0.0456***	0.3253
	16	1.81	-0.41	0.0805	0.6870
	17	1.11	-0.69	0.2765	0.4951
	18	1.92	0.38	0.0652	0.7039
Pedagogic	19	2.71	3.26	**0.0114***	**0.0028***
beliefs	20	-0.43	-1.75	0.6677	0.0901
	21	1.26	1.02	0.2171	0.3170
	22	2.66	-0.83	**0.0129***	0.4146
	23	0.22	0.64	0.8281	0.5255
	24	0.80	1.01	0.4332	0.3201

(Male N=29; t < 0.05)
(Female N=31; t < 0.05)

CONCLUSION:

A significant shift in the mean took place in seven items in the case of the male group and in four items in the case of the female group. The items are:

Male group;

item 6 (Cont. Belief, Ext) High teacher-pupil ratios do not make effective teaching impossible.
item 7 (Cont. Belief, Ext) The length of the syllabus or curriculum does not render teachers ineffective.
item 8 (Cont. Belief, Ext) Lack of facilities in a school do not prevent teachers from teaching well.
item 14 (Efficacy) Teachers think there is much they can do to improve children's attitude toward school work.
item 15 (Efficacy) Teachers believe they can achieve much, even with slow learners.
item 19 (Ped. Belief) Teachers believe that authority and obedience are not the most important qualities a child should learn.
item 22 (Ped. Belief) Children should not accept that the teacher always knows best.

Female group;

item 3 (Attribution) Teachers teach well because of skill and not luck.
item 7 (Cont. Belief, Ext) The length of the syllabus or curriculum does not render teachers ineffective.
item 8 (Cont. Belief, Ext) Lack of facilities in a school do not prevent teachers from teaching well.
item 19 (Ped. Belief) Teachers believe that authority and obedience are not the most important qualities a

child should learn.

From this it is clear that shifts in the means of the male group took place to a greater extent than those of the female group. In the case of three of the items, this shift was consistent for both the male and female groups.

Once again and as in the case of the whole group analysis, the overall shift is not significant enough across all the items to be able to validate accepting the research hypothesis.

The Null hypothesis therefore cannot be rejected.

4.2.3 Analysis of the sample by age group

Null hypothesis ii: There will be no significant difference in the means of the pre-test and post -test scores of the groups according to age.

Overleaf in Table 6 are the results of the t-test comparing the sample by age grouping.

Table 6: t-TEST ON PRE-TEST VERSUS POST-TEST ITEMS BY AGE GROUP

Variable	Item	PR > [t] 0-25	26-35	36-Older
	1	0.7418	0.0603	0.7144
Attributions	2	**0.0351***	0.8473	0.6595
	3	0.1917	**0.0138***	0.8010
	4	0.2999	0.7802	0.3115
Control	5	0.2943	0.7216	0.1607
beliefs	6	1.0000	**0.0214***	0.3788
(External)	7	0.8809	**0.0004***	0.7136
	8	0.2863	**0.0094***	0.8574
Control	9	0.0927	**0.0028***	0.4627
beliefs	10	0.4226	0.5517	0.4919
(Internal)	11	0.4226	0.8339	0.7196
	12	0.8845	0.1940	0.6049
	13	0.0742	0.4278	1.0000
Efficacy	14	0.9261	**0.0020***	0.0787
	15	0.1836	0.5209	0.4132
	16	0.2254	0.2299	1.0000
	17	0.7418	1.0000	0.5773
	18	0.5394	0.2445	0.6287
Pedagogic	19	0.4226	**0.0528***	**0.0005***
beliefs	20	0.1201	0.5978	0.2854
	21	0.4226	**0.0543***	0.9137
	22	0.8740	0.1218	1.0000
	23	0.6349	0.1186	0.4994
	24	0.2668	**0.0489***	0.7027

(0-25 N=3; t < 0.05)
(26-35 N=26; t < 0.05)
(36-older N=31; t < 0.05)

CONCLUSION:

From the above it is clear that the group age 26 to 35 years revealed more significant shifts in the means (9) than the other two age groups (1 each).

The items are:

26 to 35 years:

item 3 (Attribution) Teachers teach well because of skill and not luck.

item 6 (Cont. Belief, Ext) High teacher-pupil ratios do not make effective teaching impossible.

item 7 (Cont. Belief, Ext) The length of the syllabus or curriculum does not render teachers ineffective.

item 8 (Cont. Belief, Ext) Lack of facilities in a school do not prevent teachers from teaching well.

item 9 (Cont. Belief, Int.) Teacher do not find it difficult to change and improve teaching styles.

item 14 (Efficacy) Teachers think there is much they can do to improve children's attitude toward school work.

item 18 (Ped. Belief) Teachers believe that there is much they can do to change a child's intelligence.

item 21 (Ped. Belief) Teachers see it as important to have an open and positive relationship with pupils.

item 24 (Ped. Belief) Teachers believe that what they do in the classroom is political and that it has an effect on the broader society.

0 to 25 years:

item 2 (Attribution) When a teacher presents a successful lesson, it is because they have the ability to teach well.

36 years and older:

item 18 (Ped. Belief) Teachers believe that there is much they can do to change a child's intelligence.

Although the group 26 to 35 years indicated the most significant number of shifts in items, this number does not even exceed half the number of items in the instrument and therefore is not significant enough to validate the acceptance of the research hypothesis.

The Null Hypothesis therefore cannot be rejected.

4.2.4 Analysis of the sample by group

Null hypothesis iii: There will no significant difference in the means of the pre-test and post-test scores of the different teaching\subject groups.

In Table 7 overleaf are the results of the t-test comparing the sample by the groups according to which they attended the course. The groups are; Group C, Junior Primary teachers; Group E, Senior Primary Maths and Science teachers; Group G, Senior Primary Language teachers; and Group I, Senior Primary History and Geography teachers.

Table 7: t-TEST ON PRE-TEST VERSUS POST-TEST ITEMS BY GROUP

Variable	Item	PR > [t] Grp C	Grp E	Grp G	Grp I
	1	0.2462	0.8447	0.2499	**0.0028***
Attributions	2	**0.0035***	0.8062	0.1706	0.9276
	3	0.9066	0.8377	0.0891	0.3948
	4	0.2269	0.5290	**0.0252***	0.5979
Control	5	0.2418	0.2201	0.8899	1.0000
beliefs	6	0.4215	0.7192	0.0824	0.2797
(External)	7	0.6788	0.2723	**0.0391***	**0.0035***
	8	0.3016	0.2463	0.8375	**0.0013***
Control	9	**0.0323***	0.7137	0.8576	**0.0071***
beliefs	10	0.8463	0.1034	0.1510	0.4039
(Internal)	11	0.9547	1.0000	0.3630	0.1868
	12	0.7555	0.0856	0.7451	0.6289
	13	0.8413	0.8093	0.6770	0.5774
Efficacy	14	0.1643	1.0000	**0.0153***	**0.0037***
	15	0.7995	0.8178	0.7513	0.1736
	16	0.8275	0.6074	0.6631	0.3343
	17	0.7637	0.3803	0.8550	0.2587
	18	0.5251	0.8612	0.9455	**0.0158***
Pedagogic	19	**0.0041***	0.4999	0.1201	**0.0118***
beliefs	20	0.1962	0.7769	0.6612	0,2379
	21	0.1597	1.0000	0.3535	**0.0581***
	22	0.6264	0.7722	0.1189	0.1142
	23	0.5851	0.8657	0.4682	0.7932
	24	0.9033	0.8899	0.0697	0.6570

(Grp C N=15; t < 0.05)
(Grp E N=15; t < 0.05)
(Grp G N=15; t < 0.05)
(Grp I N=15; t < 0.05)

CONCLUSION:

A significant shift in the mean took place in eight items in the case of group I, three items in the case of group C, two

items in the case of group G and none in the case of group E. The items are:

Group I

item 1 (Attribution) Positive results which teachers get from children are the product of their (teachers') hard work.

item 7 (Cont. Belief, Ext.) The length of the syllabus or curriculum does not render teachers ineffective.

item 8 (Cont. Belief, Ext.) Lack of facilities in a school does not prevent teachers from teaching well.

item 9 (Cont. Belief, Int.) Teachers do not find it difficult to change and improve teaching styles.

item 14 (Efficacy) Teachers think there is much they can do to improve children's attitude toward school work.

item 18 (Ped. Belief) Teachers believe that there is much they can do to change a child's intelligence.

item 19 (Ped. Belief) Teachers believe that authority and obedience are not the most important qualities a child should learn.

item 21 (Ped. Belief) Teachers see it as important to have an open and positive relationship with pupils.

Group C:

item 2 (Attribution) When teachers present a successful lesson, it is because they have the ability to teach well.

item 9 (Cont. Belief, Int.) Teachers do not find it difficult to change and improve teaching styles.

item 19 (Ped. Belief) Teachers believe that authority and obedience are not the most important qualities a child should learn.

Group G:

item 4 (Attribution) When teachers teach well it is because they are motivated.
item 7 (Cont. Belief, Ext.) The length of the syllabus or curriculum does not render teachers ineffective.
item 14 (Efficacy) Teachers think there is much they can do to improve children's attitude toward school work.

Group E:
No significant shift on any item.

It is evident that group I presented the most significant number of shifts, however, once again, these are not sufficient to validate the acceptance of the research hypothesis.

The Null Hypothesis therefore cannot be rejected.

CHAPTER 5 : FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND IMPLICATIONS

5.1 LITERATURE REVIEW AND FINDINGS OF THE INVESTIGATION

The review of related literature formed part of the methodology of this study. It attempted to capture the essence of findings from the various facets of education which were covered in the investigation as well as explore the definitions and findings of the various relevant spheres of work which had been done in the field of cognition and more specifically, teacher cognitions.

One of the difficulties of this chapter was trying to find relevant research conducted in South Africa which had specific relevance to and which focused on, the specific field of the investigation.

The most significant contribution of the literature review to the investigation was the theoretical delineation of cognitions, beliefs, attribution, efficacy and locus of control theory as a basis for the investigation. The most challenging task was to bring together the various applications of the various theoretical constructs which formed components of the concept "cognition", especially as they applied to psychological and educational paradigms. Much of the pioneering work in the field of cognition has taken place within the psychological context and this body of knowledge has been assumed as a frame of theoretical reference and used for further application and research in the educational context. This investigation has drawn primarily on the findings and developments of *cognition* in the present educational context but has drawn on psychological definitions and applications as a basis for

conceptualising the constructs such as attributions and efficacy.

5.1.1 Attributions

Teacher attributions are the causal explanations given for achievement or failure, assessed in terms of ability, effort, luck and the difficulty of the task which teachers have based on their awareness thereof and their beliefs and perceptions relating to their successes or failures. Reflections of these attributions are very important to teachers' levels of self-efficacy.

Teachers do not often ascribe success to ability because it is seen as internal, which suggests that it is stable and static and therefore changes in this dimension of teacher cognitions are not common. Instead effort, which is more prone to change, is usually cited in teacher's attributions because it is under one's conscious control and therefore it can be changed (Schunk, 1982). The findings of the investigation do not support this position in that significant shifts occurred on all four attributional items but most significantly they occurred on items 2 and 3, relating to attributions of ability and skill and not luck. The investigation also found attributional shifts in respect of effort and motivation.

5.1.2 Efficacy

Efficacy, being the judgemental process whereby teachers cognitively assess their abilities to perform their task of teaching successfully (Bandura and Schunk, 1981), implies that this aspect of teacher cognitions, compounded by each individual's ability to understand and assess their realities differently, is the most crucial aspect of self regulated

learning in teachers (Pintrich and De Groot, 1990). Efficacy beliefs about teachers' ability to perform (teaching) tasks effectively and the relevance and worth of the tasks, are central to and necessary components of teacher learning and change. The findings of this investigation reveal that the Efficacy sub-scale items showed the least overall shift of all the sub-scales. Two of the items of the sub scale however indicate, by far the most significant shift of any two items in the questionnaire. The two items relating to teachers' abilities to improve pupils' attitudes toward school work, and teachers' ability to achieve much even with slow learners, items 14 and 15 respectively, showed the most significant shifts. The most significant overall shift of all the items of this sub-scale occurred on item 14.

5.1.3 Control Beliefs

The work of Kremer and Lifmann (1982), drawing on Rotter's (1966) theory of locus of control, found that teacher attributions correlated with their locus of control and that the age of teachers was a particular factor in their study. Their findings were that younger teachers (within their first five years of teaching) have a stronger external locus of control, generally attributing success and failure to "environmental" factors. Middle aged teachers generally had a stronger internal locus of control which was characterised by creativity and motivation. Older teachers once again reverted to an external locus of control, but to a lesser degree. The most significant correlation between the literature review and the investigation occurred in the Control beliefs sub-scale (locus of control). The data indicates that the age group 26 to 35, (middle age), exhibited the most significant shifts of any of the groups or variable groupings. Furthermore, the most significant positive shifts occurred in respect of their move from an

external to an internal locus of control. Those items which revealed the shift most significantly were items 6,7,8 (internal) and 9 (external). The items respectively relate to high teacher-pupil ratios not adversely affecting their teaching, lengthy syllabus and curriculum constraints not adversely affecting their teaching and lack of facilities in schools not adversely affecting their ability to teach well. The positive shift toward teachers in this age group not finding it difficult to continuously adapt, change and improve their teaching style, is further evidence of the shift toward a strong internal locus of control, supporting strongly the findings of Kremer and Lifmann (1982).

5.1.4 Pedagogic Beliefs

Lastly, Goodman (1988) and Pajares (1992) suggest that teacher beliefs (or perspectives, in the case of Goodman), significantly affect the actions of teachers. Pajares suggests that although these are very necessary to change, especially in adulthood, they can and do take place in ways suggested by Nespor (1987). He suggests that subtle *gestalt shifts* occur and are necessary if teachers' educational practices are to be improved or changed.

The findings of this investigation indicate that fewer than expected shifts on items occurred in the Pedagogic beliefs sub-scale but the significant shifts which did occur related to a shift away from authority and obedience being the most important qualities a child should learn (item 19) and a significant positive shift toward the importance of an open and positive relationship between teacher and pupil (item 21). Other less significant shifts in this sub-scale include teachers' belief that they can do much to improve a child's intelligence (item 18) and that pupils should not accept that the teacher always knows best (item 22).

5.2 FINDINGS AND CONCLUSIONS BASED ON THE EMPIRICAL ANALYSIS OF THE DATA

5.2.1 A collective Item - Variable matrix of significant t-test scores

Table 8 below is a matrix of those items which indicated significant t-values (Y-axis) and the variables of age, sex and group (X-Axis). This matrix indicates the trends of significant shifts in the means of the variables as well as indicates trends within the items of the instrument.

Table 8: MATRIX OF SIGNIFICANT ITEMS AND VARIABLES

	SAMPLE	SEX	AGE	GROUP
	Whole Gp	Male:Female	0-25:26-35:36+	GpC:GpE:GpG:GpI
Item				
1				*
2			*	*		
3	*	*	*			
4					*	
6	*	*	*			
7		*	*	*	*	*
8		*	*	*		*
9	*		*	*		*
14	*	*	*		*	*
15		*				
18			*	*		*
19	*	*	*	*		*
21			*			*
22		*				
24			*			
Tot	5	7 : 4	1 : 9 : 1	3 : 0 : 3 : 8

* represents t-values which are significant (t < 0.05)

CONCLUSION:

It is clear that the most significant number of shifts within

any particular item took place on items 7, 14 and 19, each indicating significant shifts in the means in the cases of 5 variables. It is not possible however to place too much significance on these trends in the frequencies as it is possible that one item could have been recorded as significant under the variable sex *male* as well as *group I* and therefore could be recorded as significant, twice for the same sub-sample, (ie. individuals responding as the group *male* could be the same as those in *group I*).

The matrix does however indicate certain trends, both in the items and in the variables. From these trends the following conclusions can be drawn.

5.2.1.1 Trends within the whole sample group

The sample as a whole only indicated five significant shifts. These were spread over all the sub-scales, however two items were extremely significant, namely items 14 and 19 both at the ($t < 0,001$) level. These indicate very significant shifts in the items pertaining to:

- there is much a teacher can do to improve a child's attitude toward school work and
- authority and obedience are not the most important qualities a child should learn.

The implication of the positive shift on the first item is that the vast majority of teachers experienced a greater sense of efficacy as regards their ability to improve the attitude of pupils as a result of the CCD INSET programme. The implication of the second item is that changes occurred in the beliefs of the majority of teachers where authority and obedience were no longer considered the most important qualities which a child should learn. It also implies a general trend away from beliefs about authoritarian teaching and unquestioning obedience of as a result of the CCD INSET

programme.

The information above suggests that significant shifts did not occur as expected across all items and sub-scales and across all variable groupings within the sample, but specific shifts did occur across different variable groups and these are presented below.

5.2.1.2 Trends within the groupings according to gender

The most significant shift (7 items) in cognitions took place in the male group which comprised almost half of the sample. These shifts tended to be in the Control beliefs (Internal) sub-scale indicating a move from an external to an internal locus of control. The shift also occurred in the items of both Efficacy and Pedagogic beliefs which related to male teachers' perceived ability to bring about positive changes in both the attitude and intelligence of pupils. Lastly, cognitive shifts took place in respect of the awareness of the effects of apartheid on their teaching. This did not occur in any of the other variable groupings. In some instances, this item even indicated a negative shift.

A far less significant shift took place in the variable grouping, female (4 items). These items were spread over the sub scales but two of the shifts related to Control beliefs (Internal) also, as in the case of the male group, indicating a shift from an external to a more internal locus of control.

There were a few minor negative shifts in items indicated by the minus sign (-) alongside the t-values in the table of t-scores for male and female. These were not large enough shifts in the means to place any significance upon them. They do however indicate that negative shifts did occur.

5.2.1.3 Trends within the groupings according to age

The sample was divided into three age groupings in order to investigate whether any one group indicated more cognitive shifts than any other. From the matrix, it is clear that the age grouping 26 to 35 years revealed the most shifts (9 items) while the group 36 and older (1 item) and the group 25 and younger (1 item) showed the least shifts. This is attributed to the rationale given under point 5.1.3 in the Kremer and Lifmann (1988) study, as well as to the assumption that the younger teachers have not had sufficient time within the profession to formulate their own clear beliefs and theories around teaching and learning and the older group tend to be more accepting of the system and the status quo in general. The middle group tend toward the age group which is willing to reflect and change their beliefs and this group generally still believe that they can influence the status quo in education. Historically, this middle age group were the participants of the 1976 black education crisis and they, more than the others, would be prone or willing to change.

5.2.1.4 Trends within the groupings according to subjects

The sample was grouped, through the process of a stratified random sampling into groups according to the levels taught namely, junior primary (Group C, all subjects) and senior primary, and the subjects taught namely Languages (Group G), Maths and Science (Group E) and History and Geography Group I).

Of the four groups, one (Group E) did not indicate any significant shifts. Groups C and G indicated shifts on three different items each and Group I revealed eight significant shifts across all four sub scales. It is extremely difficult to explain these differences but various factors include

tendencies of men to choose to teach certain subjects and not others, eg. Geography as opposed to languages. This, linked with the greater significant male shift compared to female as described above, could be a factor which explains these trends.

The influence of different presenters for specific components of the course as a result of their particular fields of expertise, may have resulted in group biases which could be linked to specific course presenters. Due to the subject specific nature of the course, certain groups were facilitated by subject specific presenters, and therefore spent more time and had more impact upon certain groups. These were variables which could not be controlled for but which may have had a significant impact upon the findings.

5.3 FINDINGS AND CONCLUSIONS OF THE EMPIRICAL INVESTIGATION

The implications of the findings of the investigation are significant in that they impact directly upon the CCD course planning and development, the groupings of teachers with which the CCD runs its programme and the actual content of the programme. The following is an analysis of the trends of the items which indicated significant shifts on the t-test. It is interesting that one item per sub-scale showed a significant positive shift.

5.3.1 Positive shifts

The most significant positive shift of the questionnaire occurred on item 19 of the pedagogic belief sub-scale where every member of the sample indicated a significant cognitive shift on this item ($t < 0,0001$). The implication of this is that, as a result of the INSET programme, all teachers tended

to shift significantly from the pre-test to post-test, toward the notion that authority and obedience are not the most important qualities a child should learn.

The next most significant positive shift occurred on item 14 of the efficacy sub-scale where statistically, 99 teachers out of a possible sample of 100, indicated a significant cognitive shift ($t < 0,001$). The implication of this is that the overwhelming majority of teachers tended to shift toward the notion that there is much they can do to change children's attitudes toward school work.

Significant positive shifts also occurred on items 3, 6 and 9, where ($t < 0,236$), ($t < 0,0390$) and ($t < 0,0369$) respectively implying 24, 39 and 36 percent of the sample indicating significant shifts. This indicates that teachers believe they teach well because they have skills and not due to a lucky good lesson; that high teacher-pupil ratios do not make effective teaching impossible; and that teachers do not find it difficult to change and improve their teaching styles.

The implications of these shifts all indicate that teachers tended to shift cognitively on items or in areas which had to do with their belief systems about teacher-child relationships and about their ability to teach well and impact positively within the teaching relationship. The lack of significant positive shifts on other items indicates that teachers change their beliefs about educational factors external to them more frequently than they change beliefs about themselves and their relationships with others.

5.3.2 Negative shifts

Although there were negative shifts on individual items, none

of these were significant. Negative shifts occurred on items 1, 4, 5, 10 and 20. These items relate to teachers' beliefs about the relationship between positive results of children and the hard work of teachers (item 1); teaching badly and lack of motivation (item 4); positive performance being a result of motivation from the principal (item 5); responsibility for the way they teach, whether good or bad (item 10); and the effects of apartheid not having had a big influence on the way they teach (item 20). There is no clear explanation for these negative shifts. The only implication is that the further development of the INSET programme should bear cognisance of these and work with them specifically if it is the goal of the programme to influence changes in these areas positively.

5.4 LIMITATIONS OF THE INVESTIGATION

5.4.1 Research design and methodology

The most obvious limitation of the investigation is the research design. Although the study was an exploratory one into the field of teacher cognitions, it attempted to assume an experimental methodology and design into a paradigm with which it was not suited. Few of the variables upon which certain of the research assumptions were based and few of the variables which could help to analyze and explain the findings, could be and were controlled for. This is a basic assumption of the quasi-experimental design which was adopted and which left the researcher unable to do any deep level empirical analysis of the data.

The lack of any control groups also made the analysis of the data and the interpretation of the significance of the cognitive shifts difficult. A better design which

incorporated a stratified random control group would have been more suited to this investigation.

The specificity of the particular population and sample selection from across the entire intervention of the CCD INSET programme was also problematic. This investigation could have had greater application and validity had the samples been drawn from across the various projects of the CCD.

The differential impact of various presenters of the same programme to different groups was a major weakness and limitation in the design of the investigation and could account for the nature of the findings more so than any other variable affecting the study. Control for and of this variable would have made for a greater reliability of the findings but although this was the major negative factor affecting the study, it was also the most difficult to control and to account for. The extent of the administration of the actual programme was not under the control of the researcher and accounted for a major weakness in the investigation.

The specific choice of a quantitative methodology in a field of study which preferably lent itself to a qualitative methodology, could also be seen as a weakness. A participatory or collaborative study would possibly have been more suited to assessing or investigating teacher cognitions. The decision not to adopt such an approach was based on the context of the investigation within the organisation under investigation. Firstly, other methodologies were being used by the CCD to compile a data matrix of which this investigation was a part. The different formats of research were then used in conjunction with each other to assess the impact of the INSET programme globally. This resulted in

only one choice of methodology for the investigation.

Secondly, the choice of instrument or technique for the data collection was also determined by the context of the investigation in the broader organisational research strategy. Interviews and observations were considered but these again would have been a replication of strategies being applied elsewhere in the overall research strategy as well as the fact that a quantifiable questionnaire was most suited to a quantitative investigation.

The use of an already standardised instrument which assesses cognitions would have been a great help in the validity and reliability of the findings of the investigation. However, although certain instruments were available such as the Rotter IE scale for locus of control and the Sherri Gibson Teacher Efficacy Scale (1983), the choice to use a self-designed and compiled, non-standardised instrument is justified by the need for a short, simple and locally contextualised instrument which captured the complete spectrum of facets of what the CCD considered teacher cognitions rather than one very specific aspect of it.

5.5 IMPLICATIONS

The implications of the findings of the investigation for the CCD are varied. Firstly, the results should impact upon the process of selection of teachers for the programme. The significance of the findings in respect of sex, age and subjects should be a determinant influencing the decisions to invest in the training of certain teachers at the expense of others.

The findings, along with the need for further investigation

into the impact of specific presenters as compared to others, should also have an impact upon decisions in respect of the selection for specific courses and the intended outcomes of the programme.

The implications of the findings for INSET in general are that closer attention should be given to the affective and attributional aspects and teacher cognitions in the development and presentation of INSET programmes. Courses and programmes should be specifically designed to develop critical and reflective practices in teachers, sometimes at the expense of the more general pragmatic approach to teacher education which often focuses on the training of new teaching skills and methodologies rather than teacher beliefs and perceptions of teaching and education.

5.6 RECOMMENDATIONS FOR FURTHER RESEARCH

Further exploration is necessary in both the field of general teacher cognitions as well as in the area of the impact of changes in cognitions as compared with actual changes in teacher behaviours and practices. The sample which was selected for investigation should be further investigated through the use of structured interviews, observations of teaching practices and possibly open ended questionnaires. These findings could be used in a matrix to assess whether reported shifts in cognitions have an outworking on the behaviours and practices of teachers.

Specific exploration and research of the individual sub-scales of this investigation should be undertaken with larger samples of South African teachers especially in the spheres of teacher attributions, efficacy and locus of control. This should also focus on more representative samples of teachers

and possibly isolate new teachers or teachers in training as a means of collecting data of a specifically South African nature which could inform the process of teacher training at a PRESET level. Perhaps, if we knew more about teacher cognition during the initial training phase of pre-service teacher training where young teachers-to-be conceptualize the essence of teaching and learning, we could do more to address the barriers to effective teaching which pre-service teachers may have. These cognitive patterns or "barriers" which usually result from modelling both the methodologies and beliefs of their own teachers could then be dealt with and worked against as a means of improving the quality of teaching and learning.

Moving beyond the confines of teacher education and formal education, programmes which are used in industry and non-formal education for the training of teachers or trainers, should take cognisance of the field of knowledge which is developing around the cognitions of trainers or teachers.

If effective teaching, training and learning is to be the catalyst for economic, educational and social transformation in this country, then the cognitive development of teachers and trainers (functions which all of us at times fulfil), needs to become a focus of the energies of all those concerned.

5.7 CLOSING REMARKS

Although the field of the investigation and the theoretical focus does not dominate the *political high ground*, it is the researcher's hope that this investigation will contribute to the field of teacher learning and to the transformation of education in this country, for the future benefit of all.

It is suggested that Attributions, Efficacy, Control beliefs and General Pedagogic beliefs all form part of the broader concept of empowerment. It is also suggested that in the process of *training* teachers through INSET programmes, the focus of such programmes will move from mere methodologically informed content and certificate based courses toward processes which encourage the thinking and decision making and empowerment of teachers as individuals and as professionals. If this is not done, the cycle of domination which has been perpetuated through the education system thus far will not be broken and as a consequence, political change, no matter how great, will have no effect upon the system of education through which all children will proceed in future.

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APPENDIX A: Teacher Questionnaire

CENTRE FOR COGNITIVE DEVELOPMENT
TEACHER QUESTIONNAIRE

	For office use only
Please fill in your course registration number +-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+	+------+ ¦1 ¦ +------+

PLEASE COMPLETE ALL 24 QUESTIONS WHICH FOLLOW BY READING THE QUESTION AND THEN CIRCLING YOUR CHOICE ON THE 9 POINT SCALE, RANGING FROM **STRONGLY DISAGREE WITH THE STATEMENT = 1, TO STRONGLY AGREE WITH IT = 9** DO NOT SPEND TIME PONDERING BUT RATHER GIVE YOUR FIRST, BEST RESPONSE. PLEASE ANSWER **ALL THE QUESTIONS** AS HONESTLY AS POSSIBLE.

		For office use only
1	The positive results I get from children, is a product of my hard work as a teacher. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	2
2	When I present a successful lesson, it is because I have the ability to teach well. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	3
3	When I teach well, it is because of my skills and not because of a lucky good lesson. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	4
4	When I teach badly, it is because I am not motivated. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	5
5	My positive performance as a teacher is a result motivation from my principal. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	6
6	No matter what I do, high teacher-pupil ratios makes effective teaching impossible. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	7
7	When I am not effective as a teacher, it is because of the lengthy syllabus/curriculum I have to complete. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	8
8	Lack of facilities in my school prevents me from teaching well. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	9
9	I find it difficult to continuously change and improve my teaching style. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	10
10	I am responsible for the way that I teach, whether it is good or bad. STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE	11

11 I feel I am free to use any teaching strategy which I may find effective.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 12

12 Its up to me to make a difference in the education of our children.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 13

13 My teaching has a significant effect on the education of our children.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 14

14 I don't think there is much I can do to improve children's attitudes, if they do not enjoy schoolwork.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 15

15 I believe that I can achieve much, even with slow learners.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 16

16 I am good at making changes to my teaching methods to meet the needs of the children in my class.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 17

17 Children should be encouraged to think about, question and challeng the content of lessons.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 18

18 There is not much I can do to change a child's intelligence.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 19

19 Authority and obedience are the most important qualities a child should learn.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 20

20 The effects of "apartheid" has not had a big influence on the way I teach.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 21

21 It is important for teachers to have an open and positive relationship with pupils.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 22

22 A child should accept that it is always the teacher who knows best.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 23

23 It is more important for children to learn the facts than to try to understand all the detail of a lesson.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 24

24 What teachers do in a classroom is political because it has an effect on the broader society.
STRONGLY DISAGREE 1 2 3 4 5 6 7 8 9 STRONGLY AGREE | 25

THANK YOU