FOSTERING CRITICAL THINKING THROUGH INTERVENTION IN TEACHING AND LEARNING IN THE CLASSROOM.

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Statement:
It is hereby stated that the contents of the thesis represents the student's own work and the opinion contained herein is her own work and not necessarily that of the Peninsula Technikon.

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Excerpts from poem:

TIME[1]

by Clark & David Soames.
{Performed by Sir Laurence Olivier}

It can be a blessing or a curse-
It's entirely up to you.
For the quality of your life is brought about
by the quality of your **thinking**-
think about that.

Thoughts produce actions-
Look at what you are **thinking**.

If your **thinking** is in order,
Your words will flow directly from the heart
Creating ripples of love

[1] http://www.cube.co.za/~tiaan/music_time.html

TABLE OF CONTENTS

	Page
Title page	1
Statement & acknowledgment	2
Poem "Time"	3
Table of contents	4
Abstract	7
Definition of Terms	8
Chapter 1: Chronicles on Thinking: Research to investigate critical thinking practices.	10
Chapter 2: Literature review: Reading about thinking. An investigation of critical thinking practices.	22
Chapter 3: Planning for Thinking: A research methodology to investigate critical thinking practices.	76
Chapter 4: The thinking practices of parents, teachers and learners: a presentation of the research findings.	99
Chapter 5: The thinking practices of parents, teachers and learners: an analysis of the research findings.	143
Chapter 6: The state of critical thinking in our Schools. Conclusions and recommendations.	107
Bibliography	222
Appendix A: Parents' Questionnaire	235
Appendix B: Letter to parents for permission	243
Appendix C: Learners' Questionnaire #1	242

Appendix D: Learners' Questionnaire # 2 246

Appendix E: Teacher's Interview Schedule 248

Appendix F: Bloom's Taxonomy 249

Appendix G: A Better Way to Live 252

Appendix H: Self-Talk 254

Appendix I: Poster: Education 256

Appendix J: The Education Process 257

Appendix K: Poster of the Education Process 258

Appendix L: The Story of Jeans 259

Appendix M: Newton's Cradle 261

Appendix N: Critical Thinking 262

Appendix O: Thinking Tools 264

Appendix P: Application to EMS 267

Appendix Q: Letter to Educators 269

Appendix R: Critical Thinking Syntax 270

Appendix S: Descriptive Statistics 275

Appendix T: ANOVA Table for Parents & Schools 276

Appendix U: ANOVA Table before Intervention 277

Appendix V: ANOVA Table for After Intervention 278

Appendix W: Paired T-Tests Parents & Learners 279

Appendix X: Paired T-Tests Before and After 280

Appendix Y: Permission from WCED 281

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The purpose of this research was to investigate the practices, understanding and application of critical thinking in the lives of learners, educators and parents. The research was conducted in the grade seven classes of three schools in the Western Cape. These schools are representative of the demography of the Western Cape.

Initial questionnaires were sent to parents of the grade seven learners in this study to determine whether the home environment encourages critical thinking and whether or not the parents practice critical thinking in their home and personal lives. An interview was conducted with the

teachers of each grade seven class at the three schools, to determine their understanding of critical thinking, whether they use critical thinking in their personal capacity, and whether they nurture and teach critical thinking.

Each learner completed a questionnaire to determine his or her knowledge and understanding of critical thinking, prior to teaching and learning interventions. The interventions occurred through a series of teaching/learning activities, and participative action research to facilitate the learning, understanding and application of critical thinking. Data was obtained from observation throughout intervention as well as from a final questionnaire at the end of the teaching/ learning activities.

The data collected was analysed and the results and recommendations form part of this thesis. The results clearly indicated that it is possible to foster critical thinking through teaching and learning interventions. It also became evident that the influence of learners' home life plays a major role in children's thinking practices. It is

hoped that teachers' awareness of the need to teach and foster critical thinking in the classroom was aroused by this intervention.

Definitions of terms:

Community based school: A public school based in the community.

Critical Cross Field Outcomes: (Critical Outcomes (CO's): The generic outcomes that are useful for, and result from, all teaching and learning. They are contained in the regulations governing the NQF (RSA 1998a) and are derived from the constitution (RSA 1996b) and the transformational vision of the NQF. These are the outcomes stipulated in the 1997 and 2002 national curriculums.

Critical thinking: Disciplined, self-directed thinking for a specific purpose using specific intellectual skills and abilities to master the art of thinking about thinking.

Curriculum 2005: The new curriculum implemented in South Africa, based on outcomes, not content.

D.E.C. The Department of Education and Culture, an education department during the former apartheid era in South Africa, specifically for coloured education.

D.E.T: The Department of Education and Training, an education department during the former apartheid era in South Africa, specifically for black education.

Empowerment: to give legal or moral power or authority

Instructional Intervention: Specific, purposeful intervention by the educator.

Model C schools: Public schools in white neighbourhoods, in South Africa, particularly under the Education Department prior to 1994, given greater autonomy by appointing a Governing Body.

NQF: National Qualifications Framework for the registration of national standards and qualifications in education and training.

O.B.E.: Outcomes Based Education

Outcomes: The result of (learning) pertaining to understanding, skills attitudes, values and disposition. An outcome is high quality, culminating performance of something that really matters in the long run.

SAQA; South African Qualifications Authority sets the standards of Educational outcomes in South Africa, and oversees the NQF (National Qualifications Framework.)

Township: A settlement of houses in a specific area not large enough to be classified as a town. During the Apartheid era in South Africa, people of colour other than white lived in the townships.

CHAPTER 1: CHRONICLES ON THINKING: RESEARCH TO INVESTIGATE CRITICAL THINKING PRACTICES.

1.1 Introduction.

Education in South Africa has a complex history. Education departments were segregated according to race – and there was a deliberate attempt on the part of the government to delimit and restrict the thinking abilities of black South Africans (Kallaway, 1990). The legacy of apartheid Education has been well documented. During apartheid, black people, classified as African, Indian and Coloured did not get the same education and training as white people and did mainly low-skill and low- paid jobs. *"Most workers were expected to obey orders, and to do the same repetitive tasks each day. They were not expected to think and not given opportunities to develop their skills. "Unskilled" workers were treated as if they had no knowledge or skills at all, even if they had worked for many years. They were treated like this simply because they did not have formal education and training.*[1]" Traditionally Education and Training operated in isolation from each other. Training

[1] Department of Labour **An introduction to the Skills Development Strategy. P. 9**

took place through the department of labour, in the workplace through training boards. The education departments, through primary, secondary and tertiary education institutions, governed education. The inequalities in society were perpetuated by the division between education, training and development, and there is a need to overcome the structural rigidities and inequalities inherited from the apartheid era and to meet the dual challenges of social development and the requirement to compete in the global economy.

The South African Qualifications Authority (SAQA) sets the standard of educational outcomes in South Africa and has been enacted to integrate our education and training systems, as stated in the Act of 1995.
However, even 'advantaged' schools were not without problems, in particular, the imposition of a strong, authoritarian educational culture, which did not promote critical questioning (Kraak &Young, 2001). We therefore have a legacy in South Africa of the under-development of

the critical thinking skills of our young people (Mboya, 1993).

Educational change was clearly imperative for post-apartheid South Africa. The new outcomes based curriculum is aimed at providing equal and adequate educational opportunities to all South Africans, and in the process also developing thinking, problem-solving citizens – and many theorists have argued for both the improvement of the overall standard of education, through Outcomes Based Education (OBE) – and for the inclusion of critical thinking in the curriculum – both to avoid a narrow focus on 'competency' or 'vocationalism' and to foster the skills for responsible citizenship (Mncwabe, 1993). Educational change, then, should ensure equity in terms of educational provision, and promote a more balanced view, by developing learners' critical thinking powers and their problem-solving abilities that would ensure that citizens are empowered to participate in the development of the country in an active and productive way. (Van Der Horst & McDonald, 1997).

The National Qualifications Authority (NQF) aims to reconstruct the current education and training system into a system, which reflects an integrated approach, which addresses learners' needs effectively. The NQF has identified the life skills and the critical thinking skills that are essential for learners in all walks of life, and are aimed at redressing the inequalities of the past. These skills are called "critical cross field outcomes" (CCFO's) and include problem solving, interpersonal and information management skills. The critical cross-field outcomes or essential outcomes are generic to all the learning areas and fields of study. Critical means "essential " but also " independent, well thought out and logical."

1.1.1 Defining Critical Thinking

Individuals who think critically can think for themselves: they can identify problems, gather relevant information, analyse information in a systematic way and come to reliable conclusions independently (Freire, 1994). Critical

thinking is thus a vital component of education. The purpose of specifically teaching critical thinking is to improve the thinking skills of learners and thus better prepare them to succeed in the world (Schafersman, 1991). We should be teaching students how to think, instead of teaching them what to think (Clement & Lochhead, 1980). Critical thinking is not only an academic skill, but also a life skill. Gough (1991) views thinking skills as crucial for educated persons to cope with a rapidly changing world. Critical thinking involves activities requiring examining, questioning and challenging taken-for-granted assumptions (Freire, 1974).

Critical thinking is the ability to think for one's self, also called *thinking independently*. The other aspect of critical thinking is *analytic thinking*, when a person reliably and responsibly makes those decisions that affect one's life. Critical thinking is also critical inquiry, so such critical thinkers investigate problems, ask questions, pose new answers that challenge the status quo, discover new information that can be used for good or ill, question

authorities and traditional beliefs, challenge received dogmas and doctrines. Ennis (1987) suggests that critical thinking is reasonable, reflective thinking that is focused on deciding what to believe or do.

Critical thinking is the practice of processing information in the most skilful, accurate and rigorous manner possible, in such a way that it leads to the most reliable, logical and trustworthy conclusions, upon which one can make responsible decisions about one's life, behaviour and actions with full knowledge of assumptions and consequences of decisions. Schafersman (1991) states that critical thinking can be described as the scientific method applied by ordinary people to the ordinary world.

Gough (1991) points out that in today's information age, thinking skills are viewed as crucial for educated persons to cope with a rapidly changing world. She further states that many educators believe that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and make sense of new information. Cotton

(2002) believes that students must be equipped with lifelong learning- and thinking skills necessary to acquire and process information in an ever-changing world if students are to function successfully in a technical society.

1.1.2 Socialisation and critical thinking

The importance of critical thinking cannot be underestimated. In many cultures children are socialised into following authority figures and not questioning their pronouncements. Parents and teachers through positive and negative reinforcement do such socialisation. Most individuals reach adulthood in this socialised form. The results of such socialisaton are the antithesis of critical thinking. In fact Freire calls the first step in critical thinking 'desocialisation' (Freire, 1974).

Learners who are socialised into the acceptance of authority lack both the curiosity and the skills to perform independent inquiry to discover reliable knowledge (Christie, 1991). Schafersman (1991) states that most

learners are followers of authority; they do not ask questions, are not curious, and do not challenge authority figures that claim special knowledge or insight. Most learners do not think for themselves but rely on others to think for them; they indulge in wishful, hopeful and emotional thinking, believing that what they believe is true because they wish it, hope it, or feel it to be true. Most people, therefore, do not think critically.

1.1.3 The Teaching of Critical Thinking Skills

Educators must be able to define and understand critical thinking before they would be able to facilitate the learning of critical thinking (Davis, 2001). The fostering of critical thinking in the classroom is often not evident in learners. Paul (1994) is of the opinion that many educators have not learnt that art of disciplined reasoning and do not understand the relationship between thinking, knowing and learning. This lack of critical thinking about education is a grave concern (Schrag, 1988). If educators are unaware of the relationship between thinking, knowing and learning,

then there is a strong possibility that learners will not be aware of the importance of acquiring these skills. The role of the educator in this process is of extreme importance. According to Linskie (1977) the teacher plays a vital role and is the key to helping the learner to master effective thinking and learning.

Critical thinking is an active process, while for most students, listening to lectures is a passive activity. Davis (2001) is of the opinion that thinking skills in children should be a vital concern among educators and that the key to thinking lies in how the teaching process is conducted. According to him children are unlikely to develop thinking abilities if a high percentage of their learning activities is simply geared to completing pencil-and-paper activities, especially if these activities are fill-in-the-blank workbook pages.

The need to teach higher order thinking skills is not a recent one. Carr (1988) quotes Raths et al (1967) as decrying the lack of emphasis on thinking in the schools.

They note that memorization, drill, homework, 'the three R's' and the quiet classroom were rewarded, while inquiry, reflection and the consideration of alternatives were frowned upon.

Robinson (1987) states the if learners are to function in a highly technical society, then they must be equipped with life-long thinking- and learning skills necessary to acquire and process information in an ever-changing world.

Blackaby & Blackaby (2001) state that the ability to think will hold leaders in good stead regardless of what new or unforeseen challenges they may face. They continue by saying that thinkers lead with their mind, because they challenge the status quo and traditional ways of thinking to solve new problems, envisioning new paradigms and offering fresh insights. They state that thinkers have exerted the longest lasting influence on world history. They conclude by saying that significant leadership does not emanate primarily from action but from thinking. They state

that "society-shaking, world-changing, history-making though is not produced by lackadaisical, lazy minds."

Wallace & Adams (1993) indicate that many learners have a sense of learned helplessness, in which they see themselves as 'incapable'. They perceive themselves as powerless victims in a world where others are more powerful, and they do not even attempt to solve problems. The educator plays an important role to build self-esteem and confidence in the learner, together with critical thinking skills.

1.2 Critical Thinking and the South African Context

In South Africa we have come out of an apartheid education era and we need to develop learners who are able to deal with all the social, economic and intellectual demands of a modern country. Teaching children to become effective thinkers is increasingly recognised as an immediate goal of education.

Masoga (2003) states that since the elections of 1994 the South African Government has embarked on an urgent program of restructuring its education system to redress the inequalities of the past, including reforms and reorientation to outcomes-based education through Curriculum 2005. One area that has been identified to be restructured is the development of 'critical cross field outcomes' (CCFO's), which are conducive to critical discourse and creative thinking.

Lipman (1980) suggests that the educational process must be one that cultivates reasoning, judgment and good thinking. This seems to be the goal of the Department of Education also, judging from a letter, written by Mrs. S. Hendricks, Head of Secretariat, accompanying the Revised National Curriculum Statement Gr.R – 9 (schools) Policy for English Home Language, which has recently been released by the Department of Education. The letter states that the kind of learner that is envisaged must be a confident and independent, literate, numerate, multi-skilled, compassionate learner, with a respect for the environment

and the ability to participate in society as a *critical* and active citizen. This implies that the learner should be educated to master critical thinking skills. The role of the educator in this process is of extreme importance. According to Linskie (1977) the teacher plays a vital role and is the key to helping the learner to master effective thinking and learning.

The Overview to the draft revised National Curriculum of the Department of Education (30 July 2001:17) states that the outcomes are intended to enable school-goers to:

- Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made.
- Work effectively with others as members of a team, group, organisation, and community.
- Organise and manage oneself and one's activities responsibly and effectively.
- Collect, analyse, organise and critically evaluate information.

- Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation.
- Use science and technology effectively and critically, showing responsibility towards the environment and health of others.
- Demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

In analysing each one of these outcomes, it is clear that skills of critical thinking are prerequisites to performing optimally in the outcomes; yet, it is unclear how these skills would be acquired along the way, as there is no indication in the curriculum of when and how it is required of educators to intentionally teach critical thinking. Orlich, Harper, Callahan, and Gibson (2001) state that while few people would argue that educating students to become good learners and responsible citizens means that they must also be good thinkers, the road toward that goal is not automatic.

1.3 Rationale for this Research

The inclusion of critical thinking skills in the CCFOs in the Department of Education and SAQA documentation attests to its importance and relevance. The research might be helpful to educators who are required to include critical thinking skills across all subjects. The research could also prove to be beneficial to learners who need to develop critical thinking skills both as a life skill and for academic success.

The findings of the research suggest that critical thinking is not an automatic process; it can and should therefore be taught just like every other skill. Van Der Horst & Mc Donald (1997) state that every effort should be made to help learners by teaching them thinking skills and then to help them transfer the skills and strategies to new contexts.

By engaging with learners in a formal contact and teaching critical thinking skills, I endeavoured to make a contribution to this end.

1.4 Awareness of the Problem.

As many educators and learners are not familiar with critical thinking tools and skills, Van Der Horst & Mc Donald (1977) illustrate how educators can adapt the different thinking tools for personal use and use in the classroom. Evans & Wallace (1998) state that thinking skills are vital to OBE in South Africa, which aims to develop independent, critical thought in all learning areas. Both authors have worked extensively in the classroom and felt the need to develop a programme for the teaching of thinking skills, because they observed learners did not generally implement critical thinking skills in the classroom.

This could be the result of the previous South African school curriculum, which was content based, where rote

learning and regurgitation, brought about the desired results of "correct answers" in tests and exams. According to Evans & Wallace (1998) thinking skills that were generally not emphasized in the past, have become essential in the new South Africa and an important part of the OBE System. They state that in the past, syllabi have been overcrowded with content information that children have to learn; while in OBE, educators need to concentrate on teaching learners to improve their thinking skills.

The education system of the previous dispensation required pupils to do much rote learning, and as the curriculum was content based little critical thinking was required. There is a real danger of educators continuing along the same lines in the future, thus not embracing the change needed to bring about the teaching and learning of critical thinking skills.

There is thus a need to raise awareness among educators, learners and parents of the value of acquiring these skills. Mc Peck (1981) points out that many educators are not even sure what critical thinking means, and many are not in

favour of it being taught. The possibility therefore exists that some educators and learners would not attach value to the skills of critical thinking.

Learners are not motivated to use critical thinking skills and are often not able to apply critical thinking to other situations, outside of school. Wallace & Adams (1993) suggest that *all* learners require the development of a range of comprehensive tools of thinking that can be applied everywhere, which the learner can use in any context, whether within a formal academic context or informal social & cultural context.

Godsell (2000) states that the schools of the 21st Century must embrace change, and prepare learners for the Information Age of the 21st Century. He mentions that thinking skills must be taught to prepare our learners well, as these skills have evidently not been taught in schools in the past, and learners cannot apply what they have not learnt. He furthermore, is of the opinion that a person with well-developed thinking skills will be able to improve

action and enhance choice in the quagmire of information accessible on the Internet, and therefore be more in demand in the world of work in the future.

1.5 Research Questions.

In the light of the above discussion, the following research questions were identified which then guided my research activities.

1. What are the learners' practices with regard to critical thinking?
2. What are learners' parents and their families' critical thinking practices?
3. What are educators' critical thinking practices?
4. How effective is classroom-based facilitation of critical thinking?

1. 6 Research Objectives.

The overall objective of this research is:

- To develop a framework for effective classroom-based critical thinking intervention.

1.7 Research Hypothesis.

It is possible to foster critical thinking in learners through classroom based teaching and learning interventions.

1.8 Conclusion.

The new National Curriculum Statement requires educators and learners to be skilled in critical thinking. The developments evident in our Technology- and Information-based economy demand that citizens develop critical thinking skills and practices. The impact of globalisation compels everyone to acquire entrepreneurial skills, which include critical thinking.

As educators are entrusted with the responsibility to prepare the next generation for the demands of the 21st Century, it has become a matter of urgency to determine whether instructional intervention can develop learners' critical thinking skills, so that they can be well prepared for the challenges of the future.

1.9 The Structure of the Study.

The overall aim of the research is to highlight the importance and possibility of teaching critical thinking in the classroom and to develop a framework for effective classroom-based critical thinking intervention. At first the understanding and application of critical thinking in the lives of grade seven learners, educators and parents in three school in the Western Cape were investigated. The learners and their parents completed questionnaires and the three grade seven class teachers at the three schools were interviewed to determine the thinking practices both in their

personal lives, as well as in the classroom. The research findings indicated that the learner's home life plays an important role in his/her thinking practices but that it is possible to foster critical thinking in the classroom, through teaching and learning interventions.

The report investigates the possibility of fostering critical thinking in the classroom through teaching and learning activities. In order to address the research questions, the report is structured in the following way.

Chapter 2 gives an overview of the literature used in the investigation of critical thinking practices.

Chapter 3 describes the research methodology and design to investigate critical thinking practices.

In Chapter 4 research on the thinking practices of parents, teachers and learners are presented.

An analysis of the research findings of the thinking practices of parents, teachers and learners are given in chapter 5.

In addressing the research questions, a conclusion to the state of critical thinking in our schools is reached and recommendations are made in Chapter 6.

Chapter 2: READING ABOUT THINKING: AN INVESTIGATION OF CRITICAL THINKING PRACTICES

The Literature review

An overview of the literature review examines the need for and the importance of critical thinking and the role that educators could play in fostering critical thinking in the teaching and learning process, by examining critical thinking in the classroom at present; whether there is a need for critical thinking; what the relationship is between critical thinking skills and academic success; what the role of the educator is in fostering critical thinking; the role of history, milieu and social development in learners; teaching and learning practices in critical thinking; the relationship between cognitive processes, thinking and learning and petitioning for the inclusion of critical thinking in the curriculum.

2.1 The importance of critical thinking in education today.

The movement to the information age has focused attention on critical thinking as an important element of life success (Huitt, 1993; Thomas & Smoot, 1994). These changing outcomes require new interventions, such as critical thinking to be included as a focus of schooling. Old standards of simply being able to score well on a standardized test of basic skills, though still appropriate, cannot be the sole means by which we judge the academic success or failure of our students.

2.2 Critical thinking in the classroom today.

A physical and intellectual environment that encourages a spirit of discovery facilitates critical thinking in the classroom. Potts (1994) suggests two aspects that must be addressed. Firstly, if the seating is arranged so that students share the "stage' with the teacher and all can see and interact with each other, it will help to minimize the

passive, receptive mode many students adopt when all are facing the teacher. Secondly, visual aids in the classroom can encourage ongoing attention to critical thought processes, e.g. posting signs that say: "Why do I think that?" "Is it fact or opinion?" Keefe and Walberg (1992) suggest that suggestions below each question can remind students how they should go about answering them. Showing that many of the same thinking strategies and skills apply to different topics and problems emphasize the idea of transfer.

Defining and understanding the concept of critical thinking does not explain whether it should or should not be taught at school. Mc Peck (1981) believes, however, that institutions can greatly benefit from including teaching thinking.

He believes that many of the common problems that people are faced with daily are not so common, and where common sense can solve problems, there is no call for critical thinking. Where thinking skills are needed, it is argued,

these are subject specific and should be dealt with in the context of the subject. Mc Peck has found that specific subject courses commonly permit information and authority to dominate, and leave very little room for reasoning and critical thinking development.

The decline of thinking about education is a grave concern of Schrag (1988). He asks the question whether the school can be expected to nurture more effective thinkers. Langford (1989) believes that this is possible. He suggests that teachers should study cognitive development in order for them to understand learning in children so that they can set up their classrooms in such a way that learning can take place optimally.

He gives an overview of the work of the four classic authors on cognitive learning: Piaget, Bruner, Gagné and Ausubel.

He then continues to reconsider the classics in the light of research and comes to the conclusion that critical thinking should be taught in schools as every other subject.

Bonnett (1994) states that learners can develop thinking and understanding when they are actively involved in the classroom and are learning to apply knowledge in other situations.

Langford (1989) examines the areas of reading and writing by asking questions such as: "How do fluent readers read?" "How do fluent writers write?" "How should we teach reading?" "How should we teach writing?" In the light of recent findings he reconsiders teaching methods. He believes that discovery learning in a subject such as Mathematics should be developed through the Science Curriculum. In conclusion, he supports the idea of a "back to the basics" approach, coupled with room for creativity.

Van Der Horst & Mc Donald (1997) state that Higher thinking skills & problem-solving skills must be included in

teaching to allow learners to use the full power of their minds.

Farnham-Diggory (1992) supports the idea that the learning environment should be changed to suit the changing practices while Bonnet (1994) addresses what he sees as the problem in primary schools and why thinking and understanding have little place in the school curriculum. He feels that the curriculum is too structured and rigid and that the learning should be structured in such a way that there is room for learning and thinking in an active way. Children should not receive information passively from the teachers.

He explains the rationalist way of thinking and how that influences the individual. He also addresses the issue of liberal education, as well as an existentialist perspective, and the existentialist background to thinking and understanding. He believes that thinking and learning involve teachers leaving room for self-expression, which will lead to authentic rational thinking.

2.3 The Need for Critical Thinking.

Mr. Thabo Mbeki, President of South Africa, in his opening speech at the 1st African Union Summit in Durban on July 9th, 2002, stated the following: "It is time to end the marginalisation in Africa." This destiny for Africa can be fulfilled when every citizen is able to deliberate critically and creatively so as to participate in the creation of free and just societies.

Paul (1994) maintains that critical thinking is fundamental to education for a free society. He believes that children should be encouraged from an early age to think for themselves through instruction in certain strategies. Swartz (1995) states that there are three distinct factors that play a role in learning: intelligence, knowledge and thinking.

Paul (1994) believes that critical thinking is a tool necessary for survival. He is of the opinion that our educational institutions are totally unprepared for change.

Godsell (2000) states that educators have not learned the art of disciplined reasoning and do not understand the relationship between thinking, knowing and learning. Godsell (2000) CEO of Anglogold states that never before have thinking skills been more paramount than today. He is adamant that no learner will survive in the 21st Century without the knowledge and skills of critical thinking. It is the duty of educators to ensure that learners are equipped. He states that the tools and machines which students use at school WILL NOT BE the tools, machines, techniques and programs they encounter in adult life.

Because the world, as Godsell states it, *is now forever reinventing itself,* learners must be equipped to take charge of their own lives. He further intimates that the school can no longer continue as an assembly line for the cast previously required in the industrial society stage. He says that the school can no longer stream and prepare individuals for a limited and relatively unchanged range of roles, jobs or professions. He feels that tomorrow's workers will be called upon to do jobs that are not yet created, and can

therefore not yet be taught, but that schools can prepare learners to accept the challenge as they arise, by teaching thinking skills.

Smith (1992) states that learning to think is a matter of experience and opportunity. He maintains that schools should encourage learners to think by creating interest and respect. He believes that a productive partnership can be created when educators and learners think together about educational issues. He states that the key to successful thinking is empowerment of educators and learners to succeed in the workplace, and the 21st Century.

2.4 The relationship between critical thinking skills and academic success.

Lipman (1980) discusses the traditional aim of education, and how a person became knowledgeable through the process of learning, but since knowing that any given bit of knowledge soon becomes obsolete when something new is discovered, Lipman suggests that the educational process

must be one that cultivates reasoning and judgment. He advocates that inquiry should be encouraged, but that inquiry should not just be scientific inquiry. He strongly feels that philosophy is very important to stimulate the mind and help learners to reason and cultivate good thinking.

He believes that philosophy is *par excellence* the discipline that raises the generic questions that can introduce it to other disciplines and prepare us to think in those other disciplines.

He maintains that society must be free and just, and that these free and just societies are made up of individual citizens who deliberate critically and creatively.

Lipman further suggests that philosophy for children must follow the "whole language" educational approach, and should emphasize the basic skills of reading, writing, speaking and listening. He defines critical thinking as

thinking that is self-corrective, sensitive to content and relies upon criteria for the formation of judgments.

Belmont (1989) argues that the root word in the Russian language for learning and teaching is the same, with no distinction between the two, and that the word therefore embodies an ancient understanding that human learning is a social enterprise. Whatever the socio-political climate during its intervention, the concept of zone itself, realizes the understanding of learning and teaching as one, on behalf of all students and teachers, regardless of what is being taught. Vygotsky's concept of the zone of proximal development is central to the research effort that Belmont describes in this article. He discusses the zone theory in the context of traditional cognitive strategies research and in terms of its practical applications. Belmont believes that the notion that development is a social construction has never fully been taken seriously.

Belmont agrees with Vygotsky's (1962) idea that thinking is at root an activity rather than a skill, and that it is

intimately related to and depends upon both internal and overt speech and that it develops and is maintained through interpersonal experience. He also believes that children's cognitive development can be understood by observing their responses to instruction. Vygotsky included both toddler learning and teenage reading, in his experimental design using a remedial reading approach.

Grigorenko & Sternberg (1997) researched the relationship between styles of thinking, abilities and academic success. The participants of the study to investigate the role of thinking styles, in academic performance, were 199 students enrolled in the Yale Summer School Program. The Sternberg Triarchic Abilities Test evaluated the abilities of the students. Independent evaluators judged their academic performance, and their thinking styles were measured by two converging self-report questionnaires. The question of whether thinking styles add anything to the explanatory power of ability measures for predicting academic performance was explored. The result indicated that students' performance was associated not only with their

levels and patterns of abilities, but also with their thinking styles. The authors concluded that there were no distinct patterns of particular thinking styles among the students by abilities, gender or grade.

The results showed that styles of thinking significantly contribute to academic performance, and that able thinkers of different styles tend to do better in different assessment settings.

2.5 The role of the Educator in the fostering of critical thinking.

Linskie (1977) addresses the physical, emotional and social needs of the students first, and then she discusses case stories to illustrate how the needs can influence student's learning. She then moves on to discuss the self-concept of the child and how that would be reflected in his personality. Furthermore that would influence the child's self-directedness, -discipline and-control.

Linskie (1977) believes that the teacher plays a vital role in assisting the learning of the child and should be a role model of enthusiasm and motivation for the child.
The teacher must support and counsel the child who needs help, instead of labeling him, so as to prevent the child from becoming a self-fulfilled prophecy of failure. In such cases the teacher is the key to learning as well as to encouraging the child to think in a mature way.

Physical as well as mental health for teacher and student are important issues, and Linskie cites various examples of case studies to support her view. She discusses what she sees as the ideal teacher, and gives guidelines how to become the ideal teacher.

In part three of her book Linskie discusses the process of learning and whether the child can still be seen as a clean slate to be written on; the so-called *"Tabular Rasa"*
She explains how concepts develop and uses various case studies to explain.

Linskie (1977) further discusses the issue of integrated learning, as well as learning, thinking and problem solving, and she gives a model outline for developing and integrate units of study. She defines the concept of 'open school' and discusses the philosophy behind the idea.

The operating principles of the open classroom and the roles of the administrator and teacher are addressed. She also deliberates on what the community expects of its school system and illustrates these ideas with case studies.

The issue of evaluation and who really knows what the teacher has taught, as well as the issue of accountability are developed as well. Different samples of rating scales are given, as well as more case studies.

The final section of this book discusses the ideas of re-tooling and re-education, and answers the question what our educational system has done to prepare us for a lifetime of learning and helps the reader to understand the processes of

learning, the role of the teacher and various influences on the learning process.

Bonnet (1994) believes that the teacher plays a significant role in the developing of children's thinking, and that there is a place to develop children's thinking by deliberately structuring certain elements of teaching.

2.6 The role of the history, milieu and social development of learners.

Greeno (1989) suggests that the study of cognitive structures and procedures has made rapid process. The research on general thinking abilities has progressed slowly. In his opinion, thinking abilities include productive, higher order, critical and creative thinking. He proposes three assumptions for the study of thinking: situated cognition, personal and social epistemologies and conceptual competence. He proceeds to outline evidence consistent with the assumptions. He discusses topics in the psychology of thinking related to the assumptions.

Greeno (1989) states that the psychological study of thinking has two parts. One part is concerned with performance on specific tasks and the other part is concerned with broader capabilities of productive thinking, higher order thinking skills, critical thinking and creativity.

An alternative set of framing assumptions may be needed if significant headway toward an adequate understanding of thinking and creativity is to be made. Greeno (1989) believes that by using the three assumptions to study thinking, different questions will be asked and different phenomena will be searched for. He suggests that a theory of thinking in these terms, would view it as activity in physical and social contexts and would consider the individual's intuitive conceptual understanding and beliefs about knowledge, learning and intelligence as important background factors for thinking activity. It may at first seem as though the endeavour to understand thinking along these lines may be more complex, and since no rapid progress in the study of higher order thinking has been

made, the phenomena may seem simpler when one takes their contextual factors into account.

Boucher (1998) believes that children are naturally intrigued with the world around them, and that they use everyday materials to think of new questions and to make meaning of the world around them.

One should use the inquisitive nature of children to stimulate critical thinking through estimation. The questions asked are whether there is a difference between guessing and estimation, and whether guessing is what children do.

Nuts and bolts, trundle wheels, scales, timers, candy and various counting toys were used in the experiment. The children had to estimate how many sweets in a bag. They used other familiar objects to help them to estimate.
A commercial product called "Slime" was bought and then the children were asked to estimate the volume of the slime. The reasoning and critical thinking abilities of the children

were evident as they used prior knowledge of spatial relationships to suggest a method of testing a hypothesis.

The children had to estimate the number of stamps in a jar. The children were asked to discuss the problem in small groups, and they came up with answers such as: "Weigh one stamp and then weigh all the stamps." Others thought to stretch the stamps in a long line so that they can see all the stamps.

Boucher (1998) found that the excitement about estimating activities grew, and parents began to comment on the children's eagerness to estimate numbers at home. He found that the project proved to be a worthwhile endeavour and that the opportunities for meaningful discussion and critical thinking were given to children.

Through various practices the children realised that there was a significant difference between guessing and estimation. Estimation they understood was a method that

they can use to think about a problem and possible solutions.

Lagatutta & Wellman (2001) discuss the emotional side of people, as well as the fact that humans are social creatures and that they spend the majority of their time talking, interacting and thinking about other people. It therefore makes sense that people's interpretation of the present is influenced by their past.

The question is then how past events, thoughts and emotions are connected. Recent research by the authors showed that pre-school children already start to link past experiences with current emotion and thinking.

The authors' first study focused on understanding the connections between past events, thoughts and current emotions. The study also examined whether children will explain people's current emotions as being controlled by thinking. This was undertaken to determine whether emotional situations in general promote children's early

understanding of thinking. The methods and results are explained in detail. The second study was a control study to the first. Children were asked to predict how another person who knew nothing about past events would react to a certain scene.

The data collected suggests that preschoolers' explanation for negative emotions, particularly those that mismatch, or are discordant with current situations, provide the ideal situation for understanding how people's experiences and thinking influence present behaviour.

2.7 Teaching and Learning in Critical Thinking.

Fisher (1990) maintains that a child will not make the effort of directing attention to a stimulus that carries no significance. He believes that parents and teachers are the makers of meaning for the child. The beauty of sunset for example must be pointed out to a child otherwise the experience will lack vitality and relevance.

He believes that a damaging change takes place in the child's learning process around the age of three or four, and can last a lifetime if left unchecked. The child stops guessing and inventing answers if he is rejected or ridiculed. He does not guess what a new thing is, he just asks an adult what it is. He has learnt that the adult knows everything, and he knows nothing. He then relies on answers from adults rather than to increase his own knowledge by retrieving, connecting, comparing and transforming information. He becomes a passive receiver of information. The same attitude is often reinforced in the classroom and the child no longer desires to use his own ability to think, but simply waits for the answer or for an explanation from someone who knows.

Fisher (1990) deals with some misconceptions about creative thinking, and summarises some actions that can encourage or inhibit the climate for creative thinking and speculation. He also gives some examples of exercises that can be used to stimulate thinking. He uses Bloom's (1956) taxonomy of cognitive skills to indicate that critical

thinking can be equated with the highest of the levels, viz. evaluation. He believes that a student can be taught to think by asking the right questions, an invitation to reason, apply experience to another field, classification, problem solving, planning and language, and that in teaching for thinking a student can become an active participant and not just a passive observer in school. The school can become a more interesting and challenging place for a child, and he/she can experience the adventure of play as well as the adventure of ideas. Fisher supports the idea of the school using co-operative learning as a means of stimulating lateral, critical and creative thinking.

By thinking, a child can avert a dangerous situation or develop a novel way of preservation of scarce physical resources. Fisher believes that we should aim high by teaching children to think, for their own sakes and ours.

The aim of an experiment by Riesenmy, Mitchell & Hudgins, (1991) was to determine whether self-directed critical thinking skills were better retained by a group of

thirty-eight children selected from 10 classes who were trained in four "thinking roles" through small-group discussions. The roles given to the groups were called task definer, strategist, monitor and challenger. A control group of twenty- eight children were given no practice in small-group discussions or thinking roles.

The authors have determined through study of earlier works in critical thinking that even though educators regard critical thinking as an important objective of schooling, that there are different opinions about its definition and generality. The authors define critical thinking as a matter of the thinker's assessing a problem, with which he or she is confronted to determine its demand, and organising and evaluating the evidence to determine its acceptability.

In the experiment volunteer teachers were requested from a suburban St. Louis public school district. Ten fourth- and fifth grade teachers were selected, and given in-service training. The sessions were used to inform the teachers about the research program and what their role would be in

it. The teachers were then placed in two small groups each with one or two of the research members and given an opportunity to solve a problem similar to those that the children would be working on. Later on each teacher was given a manual with 12 of the lessons they were to undertake. A test of critical thinking was administered to all the pupils. A comparison of means and variances from experimental and control groups yielded no significant differences between the groups.

The results proved that the use of self-directed critical thinking skills of the experimental children were superior to those of the control group. The experimental children had better quality answers than the control children.

The outcomes of the experiment were that the children, who were tutored in the roles of self-directed critical thinking, applied the thinking roles effectively up to eight weeks after the end of their training. Trained children also applied those thinking roles to problems that placed different demands on them other than what was used in the

experiments. The authors do not believe that thinking could be learned through a computer. They believe that without the dynamics of the interaction of small group discussions, learning thinking skills is not possible, as learning to think, is an intellectually active pursuit on the part of the learner.

Smith (1992) believes that thinking cannot be taught, as people are thinking all the time. He calls this type of thinking "commonplace thinking." He believes strongly that what is needed is more experience in thinking. In his opinion, what others have classified as "higher order thinking" is no different from what everyone else does every day, and that it is a discriminatory term.

He argues that if we think impulsively or compulsively, it is for personality or experiential reasons not because we have faulty thinking. He gives the example that someone who knows nothing about nuclear physics cannot ask intelligent questions about the subject, not because she lacks essential questioning skills but because of ignorance of nuclear physics. The statement is made that no one needs

to learn how to think about the consequences of their thought, although we all have different propensities to become analytical (and self-critical) in particular circumstances.

Smith (1992) states that, we cannot observe our own thought processes. We are not aware of them, and they cannot be inspected in oneself or in anyone else. They are obscured in a world of neurological and chemical flux that no one can read or translate.

According to Smith, what we are aware of, when we listen to the inner voice of introspection that we cannot ignore, is a product of our own thought. He states that the problem is not that we cannot think, but that we have nothing solid to think about.

In the latter half of his book, Smith devotes a whole chapter to critical thinking and another whole chapter to creative thinking, contradicting himself as he initially argues that there is no such thing as critical or creative thinking,

and those who profess to be experts in critical and creative thinking are discriminating against those who do not profess to be critical or creative thinkers.

Smith (1992) maintains that thinking cannot be taught through systematic instruction, but that what he has written in his book should support his opinion that students can be trusted to learn, and to think when they are immersed in an environment that promotes and encourages thought. He believes that facilitating thinking is more a matter of attitude than of lesson plans. He encourages teachers to have classrooms that are interesting so that students' imagination can run free. He believes that the imagination is a magnificent function of the brain that enforces thinking, if allowed to have the freedom to do so.

A high premium is placed on respect, and Smith believes that teachers who respect the opinions and feelings of their students can partner together freely to enhance thinking. He feels strongly about the fact that teachers should not interfere in thinking. Writing and reading, according to

Smith are activities that promote thought, provided that the literature is worth thinking about and that writing is used to extend the imagination of the writer. In my opinion, "beauty is in the eye of the beholder, and therefore what one person describes as "worthwhile" literature or good imaginative thought cannot be measured.

De Bono (1994) believes that critical thinking is important but that it is inadequate on its own. Even judgment thinking has a place, but what is lacking is the generative, productive, creative and design aspects of thinking. The mistake that is made in education is that everyone concentrates on analysis, judgment and argument, and that is not enough. Perception and the tools to direct our attention towards creative and lateral thinking are essential. We need to acquire ways of broadening and changing our perception to be creative. Without the attention directing tools that he teaches, attention follows patterns that are laid down in the mind by experience and we remain trapped.

In this book De Bono (1994) teaches the tools such as PMI, CAF, APC, PO, and the TEC Framework as well as PISCO. (See appendix O.) He identifies certain principles of lateral thinking as:

a) Recognition of dominant polarizing ideas.

b) Search for different ways of looking at things.

c) A relaxation of rigid control of vertical thinking.

d) Use of change.

De Bono feels that an aspect that has been overlooked for many decades is the aspect of humour. This is a very effective lateral thinking tool and it must be developed.

There is no doubt in De Bono's (1995) mind that the only way to be an effective lateral thinker is to be taught the tools and then to put the tools to good use by regular practice and believes that the only way to empower a person to think laterally is to equip such a person with specific tools in lateral thinking. These tools will enable one to create new ideas, and according to de Bono, new ideas can only be produced in an environment where the ideas are

needed or encouraged, like a corporation. According to de Bono, historically, people with creative ideas were classified as rebels, and their ideas were not appreciated, because they were non-conformist. Nowadays, anyone who learns his methods of "serious' creativity which are now widely used, even the conformists can become more creative than the rebels. He states that creativity is not a mystery or a special gift, but that it is a skill that anyone can learn and apply.

There is a need for creative thinking in every sphere of life, as industries and the corporate world are constantly looking for fresh ideas for products and services in a very competitive market. De Bono insists that as long as one thinks along the same lines, one cannot be creative, and therefore creative thinking needs a new perspective and a new set of tools which one can acquire by learning his tools such as thinking hats, CORT thinking program and thinking shoes.

De Bono (1995) is regarded as one of the leading international authorities in conceptual and creative thinking and in the teaching of thinking skills. He originated the term "lateral thinking" and he has devoted his whole life to the training of people in the various aspects of lateral thinking.

Quinn (1997) feels that children have a capacity for critical thinking, as they would sometimes surprise an adult with a tenacity not to be brow beaten, or their sheer intelligence. As educators we know that we need to nurture such profundity and fall short of the resources to do so. He hopes to address these very needs in this book.

Quinn (1997) sets out to address some theoretical issues in this book, as well as some practical issues. He believes that we have betrayed generations of children by producing what he calls: "tabloid fodder."[2] By that he means that year after year schools produce school leavers who are no better critical thinkers, more analytical or less gullible and in his opinion they are not more disposed to bring the force of

reason and open-mindedness to their dealings with others, with their decisions or their actions. He points the finger at teachers, not because they are solely to be blamed, but he feels that teachers have not even tried to change things.

Quinn (1997) takes great pains to prove that there is merit in teaching thinking to the young, and he explains in detail how to go about doing that. He relates verbatim classes that he took to instruct in thinking, and especially in questioning, and extending vocabulary as part of supporting reasoning.

Fisher (2001) starts out by explaining what critical thinking is and how it can be improved. He believes that language plays an important role in teaching thinking. He speaks of the language of reasoning, and suggests that one should master the art of identifying reasons and conclusions for ideas.

Fisher (2001) believes that there are different patterns of reasoning, and by identifying these, one can understand reasoning better, and hence teach reasoning with clarity. He continues to explain that one can understand reasoning by looking at assumptions, context and by using a thinking map. He states that another means of exercising critical thinking is to clarify and interpret expressions and ideas. One has to judge the credibility of sources carefully as well as the credibility and acceptability of reasons.

To think creatively, he believes one should evaluate inferences on the grounds of deductive, assumptions and other grounds of validity. He further believes that one has to develop skills of reasoning about casual explanations. Decision-making based on critical thinking looks at choosing the best options, examining the consequences, judging values and risks.

Fisher (2001) concludes that critical thinking makes use of terms in ordinary English that can be found in any good English dictionary. His idea is that critical thinking

requires the use of ideas and distinctions, which are familiar even to learners who understand ordinary English. He believes that the language we need in order to engage in high-level critical thinking is ordinary language. He feels, however that one has to be clear about the language in order to use and teach critical thinking.

2.8 Cognitive Processes, Thinking and Learning.

The early and recent historical foundations of cognitive science are discussed, as well as the structure of cognition and the learning process. Farnham-Diggory (1992) discusses strategies of concept attainment and supports the ideas of Howard Gardner as to the nature of human knowledge.

She believes that normal minds continually scan the world and pick up information through the senses. Even when the senses are bombarded with information, the mind still tries to organise sensory experiences. She describes various experiments that were done to prove the existence of *buffers* that would sort information. Some information will

be stored in memory and other information will be discarded seconds later. This information is helpful in teaching thinking skills, as it is important to hold the attention of students long enough for them to grasp various concepts.

Mental development and integration are other concepts that are discussed in this book. She believes that the forces that drive mental development are the individual's own activity.

She supports the ideas of contemporary researchers that look for underlying mechanisms that generate wide-ranging changes, and identifies five types of mechanisms: increasing connectivity, increasing ability to detect patterns, increasing complexity of rules and strategies, increasing complexity of working memory programs and increasing ability to interlock programs. These improved connections in the growing brain increases the child's ability to interconnect symbols, to make inferences and to apply previously acquired knowledge. She shows how the

information shared in parts one and two of her book can be applied to the fields of literacy, mathematics and science.

Ruffman (1993) has found that earlier research underestimated the ability of children to think hypothetically. He states that initial attempts to investigate children's understanding of hypotheses and evidence suggested that before the age of about eleven or twelve years, children have very little insight into how hypotheses are supported or contradicted by evidence.

Ruffman (1993) conducted three different experiments to investigate the evidence of scientific thinking in children. The results of his tests suggested that children as young as six years old have some insight into the relation between hypothesis and the evidence that either supports or rejects it. His second experiment suggests that children at six years old understand that hypotheses are formed on the basis of patterns of evidence. Experiment three provided evidence that children understand the two fundamental features of a

hypothesis: the way in which it shapes future actions and predictions.

Hofmann (1992) concluded that their results are compatible with recent theory of mind research, that by the age of six years, metacognitive abilities are sufficiently develop to allow them some form of insight into hypotheses and the way they are constructed from patterns of evidence.

2.9 The Inclusion of Critical Thinking in the Curriculum.

Kirkwood (2001) firstly poses the question: "What does 'teaching thinking' involve?" She believes that the question of how to improve the quality of pupils' thinking is crucial. She believes that children already use a variety of types of thinking in their everyday lives. She believes that teachers can help to improve the quality of thinking in their students.

Kirkwood (2001) suggests that problem-solving, metacognition, understanding and positive characteristics are the key elements needed to create a learning environment for the sustained development of higher order thinking skills. The purpose of the case study was to create and evaluate a learning environment that would assist children to develop thinking skills. It was found that there is no "quick fix" to develop thinking skills, and that it took sustained effort on the part of the teacher and the pupils to bring about the success of the exercise. The demands of the syllabus coupled with understanding subject matter, regulating their own learning and attempting to develop higher order thinking is no easy task, but it is possible.

The pupils gave their advice on how to succeed. They believe that it should be done one step at a time, that pupils should pace themselves, and not rush, that paperwork should be kept tidy and organised, and that although it may seem difficult initially, one must persevere and be willing to accept help.

Joyce, Calhoun & Hopkins (1999) maintains that refinement in the curriculum and the inclusion of thinking through sets of changes will prepare learners for the future. The new structure of school improvement will be achieved through inquiring schools. Students will achieve through new thinking strategies.

Orlich, Harder, Callahan & Gibson (2001) confirm that critical thinking must be included in the curriculum. Not only must learners be taught to foster the philosophy of life long learning, but the curriculum must be geared to helping students to be better thinkers. The basic elements of inquiry teaching, inductive instructional models and methods for developing higher level thinking skills and problem solving must be integrated in the curriculum.

2.10 Critical thinking for grade 7.

The learners in grade seven are in the process of developing more abstract thinking as Piaget calls it, *moving from the concrete to the abstract*. Although this process is not

complete at this age, the learners are able to understand more abstract ideas, without the physical experience for instance of the consequences of a deed. The research instruments for the learners (discussed in Chapter 3) are age-appropriate as one cannot expect a complete analytic argument, but their creative ability as well as imagination afford them some insight.

Chapter 3: PLANNING FOR THINKING: A RESEACRH METHODOLOGY TO INVESTIGATE CRITICAL THINKING PRACTICES.

In this chapter, data production methods are described and the research design and research questions are developed.

3.1 Research Design for understanding thinking.

The research design was exploratory. It consisted of three phases: phase 1) prior-to-intervention questionnaires; phase 2) a series of interventions comprising input and discussion tasks; phase 3) post-intervention questionnaires. The research process can be diagrammatically illustrated as follows:

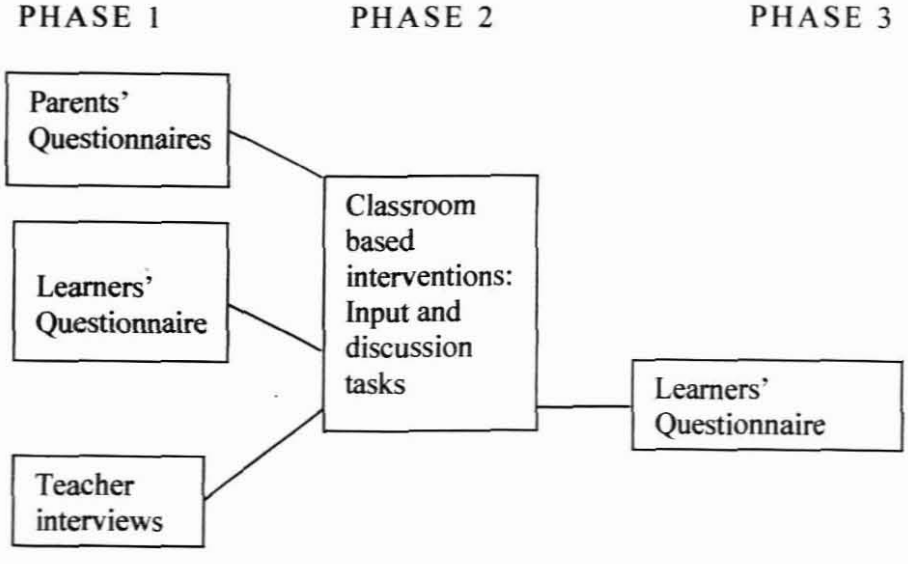


Diagram 3.1 A schematic representation of the research design

Learners' and their parents' responses to the questionnaires, teachers' interview responses, and the learners' responses to the input and discussion tasks in the classroom became the database for this research.

The research process was designed in such a way as to determine the following, which are sub-questions relating to my research questions (see 1.5):

- Do parents use critical thinking in their own contexts?
- Do they consider critical thinking to be important?
- What role does the history, milieu and social development of learners play?
- What is the role of the educator in the fostering of critical thinking?
- What role does critical thinking play in the classroom today?

- ❖ Is there a need for critical thinking?
- ❖ What difference does teaching and learning make in critical thinking?
- ❖ What is the interaction between cognitive processes, thinking and learning?
- ❖ Should critical thinking be included in the curriculum?

Data verification is established by using both qualitative and quantitative methods of research. Qualitative research methods using questionnaires investigated the different responses of parent and learners as sources of information, indicating the depth of insight into critical thinking as well as the difference in experience between parents and their children.

Quantitative date methods in the form of interviews with the class teachers of the three grade seven classes established the facts about the teaching practices of the educators with regards to critical thinking, as well as the application of critical thinking in their personal lives.

3.1.1 Questionnaires:

Parent's questionnaires (See Appendix A) were designed to determine the following:

Do parents use critical thinking in their own contexts?
Do they consider critical thinking to be important?
What role does the history, milieu and social development of parents play?

Learner's Questionnaire #1 (See Appendix C) was designed to determine the following:

Do learners use critical thinking in their own contexts?
Do they consider critical thinking to be important?
What role does the history, milieu and social development of learners play?

Learner's Questionnaire #2 was designed to determine:
(See appendix D)

What difference does teaching and learning make in critical thinking?

What is the interaction between cognitive processes, thinking and learning?

Should critical thinking be included in the curriculum?

3.1.2 Interviews:

Teachers' interviews (See Appendix E) were designed to determine the following:

Do teachers use critical thinking in their own contexts?

Do teachers teach critical thinking in the classroom?

What is the role of the educator in the fostering of critical thinking?

What role does critical thinking play in the classroom today?

Is there a need for critical thinking?

3.1.3 The PAR (Participatory Action Research) Model:

The research design also drew on the Participatory Action Research (PAR) model (Fals-Borda, 1984; Mc Taggart, 1991). The PAR cycle includes:

a) A Planning stage in which problems are identified and the learning intervention is planned.

b) An implementation stage, in which learning activities are facilitated;

c) A process of discussion reflection during which both the learners and educator/researcher is provided with opportunities to reflect on intervention, the response of the learners and to theorise.

d) The cycle may then start anew as additional problems are identified and additional intervention planned (Whyte, 1991).

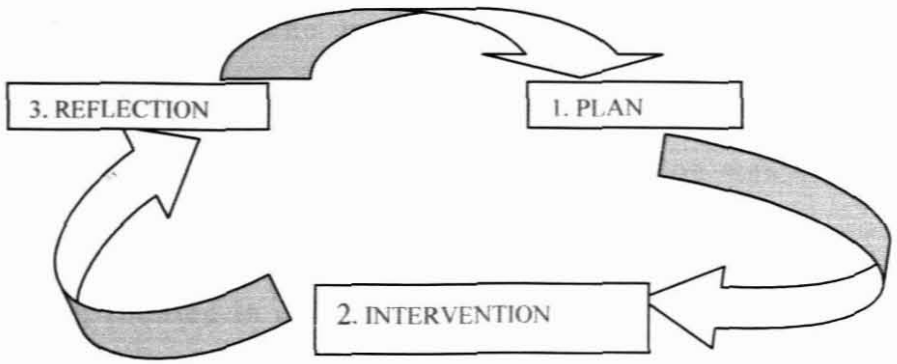


Diagram 3.2: The PAR cycle

3.1.4 Data production through teaching and learning activities

Drawing on the PAR cycle teaching and research activities were combined in the following way: 1) a planning stage in which the learning intervention was planned; 2) the learning activity was then implemented, and 3) there was a process of discussion and reflection during which both the learners and the educator/researcher[2] were provided with opportunities to reflect on the intervention, the responses of the learners and to formulate a theory.

3.2 Selection of Research Sites

The schools were selected to represent three different groups of people who may have been affected in the past by the policy of apartheid. One goal of this research was to determine what the impact of the intervention was on learners in different contexts. School A is a former DET school, located in a township. The learners in School A are

[2] The usual class teacher was not involved in the interventions, so the term educator/research is used to refer to myself, as the facilitator of the intervention, but also as the researcher who used and reflected on the data produced by the intervention.

mainly Xhosa speaking learners. School B is situated in a previously white area, and most of the learners in the school are white, English First language speakers. School C is located in a working class area and the learners in school C are mainly 'coloured' and speak both English and Afrikaans in a dialect. The schools were thus 'purposively sampled' (Babbie & Mouton, 1998). The schools were selected so that the sample will be representative of the demography of the Western Cape.

The whole grade 7 class, at each school participated in the teaching and learning activities.

School A: Grade 7 B-- 47 learners.

School B: Grade 7 B-- 40 learners.

School C: Grade 7 W-- 34 learners

These learners are all in the Senior Phase of the OBE system reading the following eight learning areas: Mathematics, Languages, Natural Sciences, Social Sciences,

Economic and Management Sciences, Life Orientation, Arts & Culture and Technology.

The research sites used were:

School A is a former DET Township School.
School B is a former Model C suburban school.
School C is a Former DEC working class school.

3.2.1 Pilot Project

Before the research was conducted in the schools, the parent's questionnaire as well as the first learner's questionnaire was given to a parent and his child in Grade 7.

Both father and daughter indicated that they understood the questions and found no difficulty in completing the questionnaire. Thus no changes were made to the initial questionnaires for either group.

3.3 Data Production Methods

Data was produced through various teaching, learning and analysing activities.

3.3.1 Initial Questionnaires.

There were two sets of initial questionnaires that preceded the teaching and learning activities – one for parents and one for learners. There was a second questionnaire for learners that followed the teaching and learning activities.

3.3.1 a Parent's Questionnaire.

A questionnaire was sent home to the parents on 17 June 2003, to complete at the first contact session and collected again at the second contact session, the following day. The goal was to determine whether the parents have knowledge of thinking tools, and whether they use these tools. A covering letter to ask permission of parents whether their child may participate in the research program was included.

A reply slip at the bottom of the letter of consent was completed and returned. (See Appendix A & B)

3.3.1 b Learners' Questionnaire # 1

A questionnaire was given to the entire grade 7 classes, on 17 June 2003, in each school where research was done. The questionnaire was given at the outset to determine whether learners have received teaching in thinking skills, and whether they use any lateral thinking tools in daily decision-making. Questionnaires were handed out at the first contact session on 17 June 2003. The learners were given time to complete the questionnaires. As soon as a learner had completed the questionnaire, it was collected and the learner was given permission to read quietly until everybody in the class had completed the questionnaire and all the questionnaires were collected. (See Appendix C).

3.3.2 Interviews

Initial teachers' interviews

A brief interview with each class teacher was conducted on 17 June 2003 to determine whether the educators themselves understand critical thinking, use critical thinking in their own personal lives, and whether they had exposed the learners in their classes to teaching and learning activities in critical thinking. The teacher's responses were recorded. (See interview schedule, Appendix E)

3.3.2 Observations during teaching/ learning intervention

The teaching and learning interventions consisted of a series of 6 lessons to determine the thinking practices of the learners, creating awareness of lack of critical thinking and its consequences; introducing them to experiences of critical thinkers, and then teaching specific thinking skills and tools, and the application thereof.

The same classroom procedures were followed at all three schools. The intervention took place each day from 17 June 2003 to 20 June 2003. The researcher/ teacher traveled from

one school to the next to repeat the same lesson at all three schools on the same days.

3.3.3 Learners' Questionnaire # 2 after intervention

At the final session on 20 June 2003, another questionnaire was given to the learners to complete, to determine the role played by the teaching and learning intervention. (See Appendix D)

3.4 Teaching and learning activities.

Data was produced through a variety of teaching, learning, reflecting and analysing activities that were intended both to find out about learners' critical thinking practices (or lack thereof), but the activities were also designed to promote learners' critical thinking awareness and abilities. Some of these activities are reproduced in Appendices G-P.

The table below provides a summary of the teaching and learning activities:

Table 3.1 Summary of the teaching and learning research activities:

No.	Teaching/Learning activity	Site	Date	Data Production Activity
1	*Class discussion on topic 'Why do learners attend school?'*	*A, B, C*	*17/06/03*	*Learners' responses Notes taken.*
2	*Story of 'Og Mandino' (A story of failure) (Appendix G)*	*A, B, C*	*17/06/03*	*Learners' responses Notes taken*
3	*Self talk (Reading and discussion on why self talk is important) (Appendix H)*	*A, B, C*	*17/06/03*	*Class discussion Notes Taken*
4	*Rules to life (Reading and discussion: What life skills do learners know and practice?)*	*A, B, C*	*17/06/03*	*Questions & Answers Notes taken*
5	*Poster: Cartoon from Peanuts on how to prepare for the future – discussion of cartoon and their feelings about school. (Appendix I)*	*A, B, C*	*17/06/03*	*Learners' Responses Notes taken*
6	*The Education Process (What is the learners' role?) (Appendix J, K)*	*A,B, C*	*17/06/03*	*Learners' responses noted*
7	*Developing entrepreneurial skills: discussion*	*A,B C*	*17/06/03*	*Discussion- notes taken*
8	*The Story of Levi Strauss Jeans (Success & Entrepreneurship):*	*A,B, C*	*17/06/03*	*Discussion- notes taken*

	Reading and discussion (Appendix L)			
9	*Biographies: (Beethoven, Edison. More success stories and how to overcome challenges and barriers in one's life.) Reading and discussion*	*A,B, C*	*18/06/03*	*Discussion – notes taken*
10	*Motivation: Extrinsic & Intrinsic – what motivates people and how to be motivated: Discussion*	*A,B, C*	*19/06/03*	*Q & A Notes taken*
11	*Potential: Teaching input and discussion*	*A,B, C*	*19/06/03*	*Discussion – Learners' responses noted*
12	*Direction – what are learners' goals in life? Teaching input and discussion*	*A,B C*	*19/06/03*	*Discussion – Learners' response noted*
13	*Goal Setting: SMART goals: Blackboard Activity and discussion and task of goal setting.*	*A,B, C*	*19/06/03*	*Blackboard activity responses noted*
14	*Newton's Cradle (Consequences to action) Demonstration, teaching input and discussion. (Appendix M)*	*A, B, C*	*19/06/03*	*Learners' observation/ remarks recorded*
15	*Time Management: The importance of using time wisely to accomplish goals – Teaching input and discussion.*	*A, B, C*	*19/06/03*	*Questions/ Answers Notes taken*
16	*Discussion on Metacognition. Intelligence, Knowledge, Thinking and how these work*	*A, B, C*	*20/06/03*	*Discussion, Notes taken*

	together to integrate academic and practical life skills. (Appendix N)			
17	*Thinking Tools – Teaching input and practical exercises. (Appendix O)*	*A,B, C*	*20/06/03*	*Input, Discussion, Notes, Blackboard activity*
18	*Discussion of how to apply skills learned in school to bring about change in knowledge, attitude, skills and value and apply to 'real life'. (Appendix P)*	*A,B C*	*20/06/03*	*Practical Application recorded*

3.5 Data Analysis Methods: Quantitative data

All parents from schools A, B and C were given a questionnaire to complete. The learners were given two questionnaires, one prior to the teaching and learning intervention and one after the teaching and learning intervention. These questionnaires were the sources of the quantitative data collected.

3.5.1 Data analysis of parents' questionnaires

Quantitative data from the parents' questionnaires was statistically analysed. Frequency charts were drawn from the data records and presented in the form of bar graphs (see Table 4. 2.1) to indicate the amount of reading, planning, decision making, etc that took place in the different groupings (i.e. parents of Township learners, parents of former Model C learners, parents of working class learners).

3.5.2 Data analysis of learners' questionnaires # 1

Quantitative data from the learners' initial questionnaires (i.e. pre-intervention) was statistically analysed. Frequency charts were drawn from the data records and presented in the form of bar graphs (see Table 4.2.2) to indicate the amount of reading, planning, decision making, etc that took place in the different groupings (i.e. Township learners, former Model C learners, working class school learners).

Comparison 1

Parents' questionnaires from School A, B & C pre-intervention questionnaires were compared to determine whether there is any significant differences in the use of critical thinking – and the findings shown in the form of bar graphs. (See Table 4.2.2)

Comparison 2

An ANOVA test was done to compare parents' and learners' initial questionnaire findings in order to show similarities and differences in critical thinking trends between parents and their children. The ANOVA procedure produces a one-way analysis of variance or a quantitative dependant variable by single factor (independent) variable.

Comparison 3

A comparison was run between the parents from all three schools and their children to determine any significant differences in their way of thinking.

3.5.3 Data analysis of learners' questionnaires # 2

Quantitative data from the learners' second questionnaires (i.e. post-intervention) was statistically analysed. Frequency charts were drawn from the data records and presented in the form of bar graphs (see Table 4.3) to indicate the amount of reading, planning, decision making, etc that took place in the different groupings (i.e. Township learners, former Model C learners, working class school learners).

Comparison 4

The learners' questionnaire #1 was compared with learners' questionnaire #2 and the pre- and post-intervention findings were compared, and presented in the form of bar graphs. Correlations were done in the form of T-tests in order to compare responses to issues such as planning, decision-making, etc. (See Table 4.4)

3.6 Analysis of qualitative data

Qualitative data from the research falls into two basic categories – the first is data from interviews with teachers; the second data set comprises the data generated by teaching and learning activities.

3.6.1 Data Analysis of teacher interviews

The teachers' responses were thematically analysed, using simple open coding procedures (Strauss & Corbin, 1998); and their responses were then categorized. I then re-analysed using axial coding (Strauss & Corbin, 1998) in order to show variations and processes.

3.6.2 Analysis of teaching and learning data

Data was captured through video recording as well as through teacher/research field notes, materials, and learners' exercises and responses.

This data was thematically analysed, using standard open coding and axial procedures (Strauss & Corbin, 1998). Concepts were identified and framed along a continuum of competence in critical thinking practices and abilities.

3.7 Research Ethics

3.7.1 Maximising benefits

My interest was not only to produce knowledge about critical thinking skills; I hoped to enter into a conversation with the learners and use the data and analysis to improve the implementation of critical thinking in schools, and, hopefully, through reflexive engagement to enhance teaching, learning and assessment practices more generally.

3.7.2 Informed consent and permissions

There was informed consent of all research participants, that is learners and their parents. Permission was given for the inclusion of teacher interview and other data in this

research activity. The principals of the three schools gave telephonic permission for the six sessions.

Permission to do this research was granted by Dr. Ronald S. Cornelissen, official: Education of the Western Cape Education Department to conduct the research in the three schools from 17th to 22nd June 2003. (See appendix Q)

3.8 Limitations of the methodology identified

The mother tongue of learners at school A is not English, which complicated the teaching of higher order thinking.

As a teacher/researcher, I was concerned that the language barrier between myself and the children at school A would not enable the exposure of the learners to a wider paradigm of thinking; and that these learners would find it difficult to grasp the concepts in the teaching/ learning activities.

CHAPTER 4: THE THINKING PRACTICES OF PARENTS, TEACHERS AND LEARNERS: A PRESENTATION OF THE RESEARCH FINDINGS.

4.1 Introduction

In this chapter, the research findings from the questionnaires, interviews and teaching and learning activities are presented. I have presented the 'pre-intervention' data first; this is followed by the 'intervention data' and finally the 'post-intervention data'. In the following chapter these findings are discussed and analysed.

4.2 Pre-intervention Data

4.2.1 Research findings from parents' questionnaires.

These findings give us an idea of the critical thinking practices in learners' home environments. Questions such as "How did you choose your child's school?"

"Do you use specific thinking tools when you make decisions?"

Do you know where you would be in five years' time?" (See Appendix A for the actual questions asked). I weighted the responses from 0 – 10 using my own judgement of the quality of the responses. No Likert scale was used, but positive responses were awarded a maximum of 10, while negative responses were awarded 0, and a range between 1-9 if there seemed to be evidence of some critical thinking (see graph 4.1 below).

Comparison 1

Comparison of School A, B and C Parents' Responses

In the graph below, the responses from the parents' questionnaires at the three different schools were compared and the results indicate that there is a significant difference in how parents see themselves, how they make decisions, and so on. The histogram indicates that overall, school A parents do slightly less critical thinking activities than the school B or school C parents. In terms of job satisfaction

however, the school A parents indicate significantly less satisfaction than the other two groups, as with self image and image projection (through clothing). However, in term of forward planning generally as well as with regard to money and finances, these parents 'outperformed' the other parents. Interestingly, school C parents, have the greatest level of job satisfaction. School C parents have the highest overall scores, only slightly higher than School B parents. As seen from the overall histogram, all parents spend some time and effort planning and thinking about finances.

Graph 4.1: Comparison of Parents' Questionnaires.

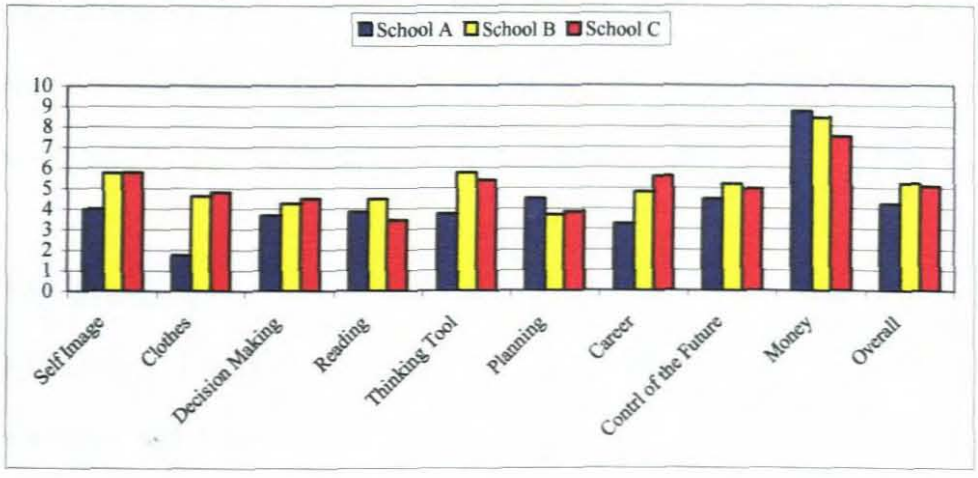


Table 4.1 Parents Aspects with Significant Difference

The results of the parents' questionnaires of all three schools were compared to determine whether there were any aspects that

were significantly different. The results show that self-image and clothes played a significantly different role in the lives of parents from schools A, B and C.

Significantly Different	Not Significantly Different
Self image	Decision Making
Clothes	Reading
	Thinking Tools
	Planning
	Career
	Future
	Money

4.2.2 Research findings from learners' questionnaire #1

The same method of scoring (that is 0 – 10 indicating use of critical thinking) was used for the learners' questionnaires. The Y-axis represents the value given on a scale from 0-10 correlating to the degree to which critical thinking was evident in the replies to the questions.

The histogram above relates to the learners' questionnaire #1, before intervention and the results can give an idea of whether the learners have knowledge of, or apply, critical thinking skills in decision-making, planning their careers and future, strategically planning what to do with their money and what to wear, how important reading is, as well

as their self-esteem, and education. The Learners' Questionnaire #1 also gives us an idea of the learners' thinking practices at home, and at school, before intervention activities. Between schools A on the one hand and B and C on the other hand, there is a significant difference in self-image and decisions about clothes. Children at School A are the most concerned with careers and with their future. School B learners show the most interest in money issues and clothes. None of the learners scored well on using critical thinking tools and in forward planning abilities. (See appendix C for the actual questions asked.)

The table below relates to the learners' questionnaire #1, given to the learners before teaching intervention. The results of the questionnaires give an indication of whether the learners of the three schools use critical thinking in decision-making about their self-image, the clothes they wear, their future and career, how important reading is, and thoughts on education and money.

Graph 4.2: Results from Learners' Questionnaire #1.

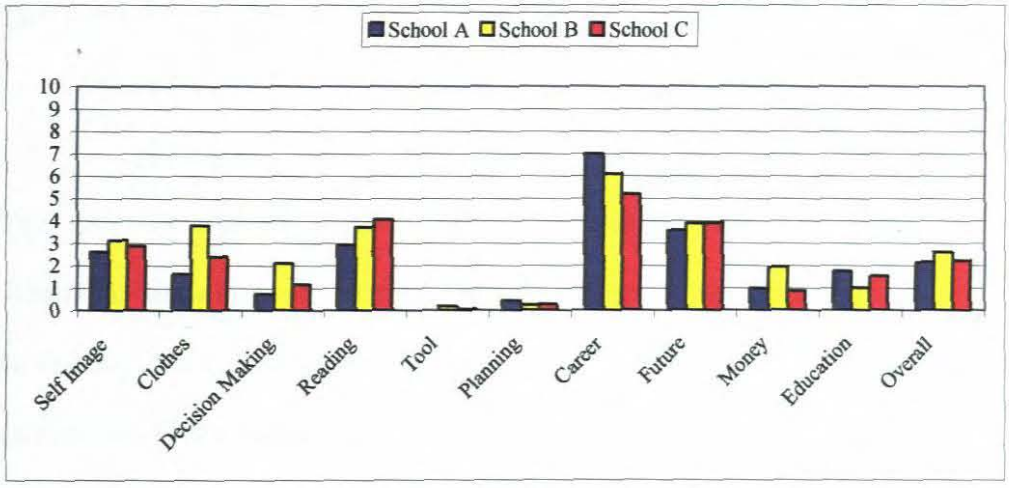


Table 4.2: Before Intervention's Aspects with Significant Difference

Significantly Different	Not Significantly Different
Clothes	Self image
	Decision-making
	Reading
	Thinking
	Planning
	Career
	Future
	Money
	Education

Table 4.2 summarises the results of the ANOVA tests. The aspects self-image and choice of clothing were found to be significantly different at a 90% level of significance. (See appendix U: ANOVA Table for Before Intervention and Appendix V: ANOVA Table for After Intervention)

Comparison 2

Comparison of parents' and learners' initial questionnaires.

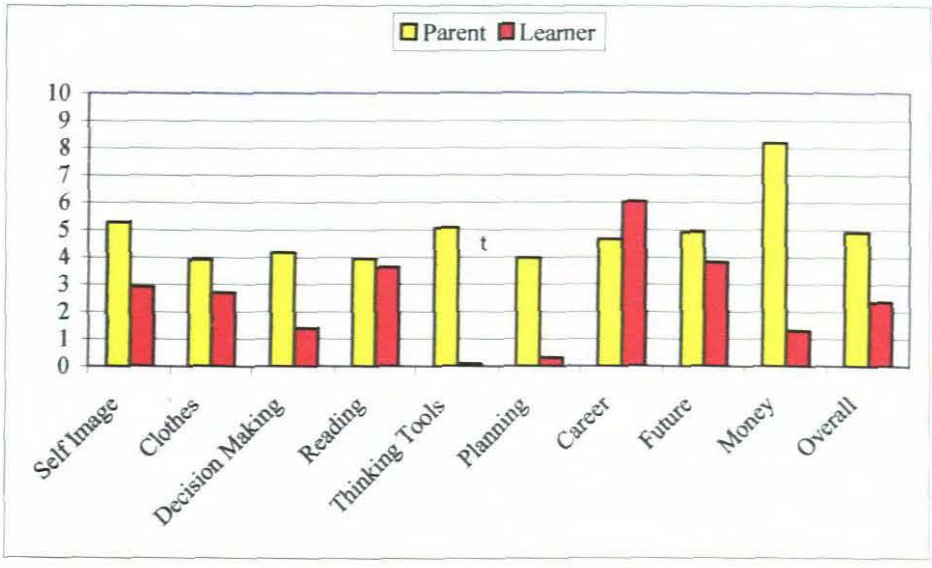
The questionnaires of parents and learners could not be identical because of the difference in ages, levels of understanding, concerns, interests and experiences. Similar questions were asked and the correlation was as close as possible to represent the different aspects compared.

An ANOVA test was done to compare parents' questionnaire and the learners' questionnaire #1 findings, in order to show similarities and differences in critical thinking trends between parents and their children. The ANOVA procedure produces a one-way analysis of variance or a quantitative dependant variable by single factor (independent) variable. A Paired-Sample T Test was run on the parents' questionnaire and the learners' questionnaire #1. This test may indicate whether there is any significant difference in their thinking. The Paired-Sample T Test procedure compares the means of two variables for a single group. For this comparison learners' questionnaire #1 was compared to

parents' questionnaire. (See Appendix W: Paired T-Test) [Parent and Learner]

The graph below shows the comparison between parents and children from all three schools. The results compared give us an indication whether parents and learners have mastered critical thinking tools, and whether they use critical thinking in decision-making and planning their futures and careers, what they will do with money, what they will wear and their self-image, as well as the importance of reading.

Graph 4.3: Learner and Parent Comparison



Parents in general display indicators of emergent critical thinking skills more so than their children, except in terms of decisions about their career. A T-test was done to compare parents' and children's critical thinking abilities, the results are as follows:

Table 4.3 Significant Differences

Significantly Different	Not Significantly Different
Reading	Self image
Thinking tools	Clothes
Money	Planning
	Career
	Decision-making
	Future

For this comparison learners' questionnaire #1 was compared to parents' questionnaire. Please see Appendix #: Paired T-Test (Parent and Learner).
The Paired-Sample T Test procedure compares the means of two variables for a single group.

The findings indicate that parents and children think alike in some of the aspects, such as decision-making, the importance of reading, how they plan the future and their career, as well as how to spend money and their knowledge of thinking tools, but significantly different in terms of

choice of clothing and self image. (See Table 4.3 and Graph 4.3.)

Comparison 3 School results comparison

One-Way ANOVA (analysis of variance) tests were run to establish whether there is a significant difference between the responses of the three schools.

The ANOVA procedure produces a one-way analysis of variance or a quantitative dependant variable by single factor (independent) variable. (See Appendix T: ANOVA Table for Parent and Schools)

Validity of the results

The skewness test was run on each variable to measure the normality of the quantitative data. The normal distribution is symmetric and has a skewness value of zero. It was proven that the variables were normally distributed (See appendix S: Descriptive Statistics). A T-Test and A One-

Way ANOVA can be calculated accurately on the data, because of the normality of the Bell-Curve distribution.

4.2.3 Research findings from teachers' interviews.

An interview allowed for more detailed information from the educators. Levels of awareness and practices could be determined through the interviews.

The teachers of all three grade seven classes at Schools A, B & C were interviewed prior to the teaching and learning activities, in order to determine whether the teachers themselves know and apply critical thinking skills and tools in their professional and private lives (See appendix E for interview schedule). The responses of all three teachers were thematically analysed using open and axial coding. The results of this are as follows:

Understanding critical thinking:

The teacher from school A was not familiar with the term "critical thinking" and could not give a definition. The

teachers from Schools B And C have heard the term but were not sure of how to define it and could not name any thinking tools.

Using critical thinking:

All three teachers placed themselves in the first category of pre-novice, as they have not yet incorporated thinking practices into their personal lives.

Teaching critical thinking:

All three teachers once again confirmed that they are at the pre-novice stage as they do not yet teach critical thinking, or incorporate thinking practices in the classroom. Teacher A felt that all educators should be trained first before they can teach the learners. Normally, one would expect the continuum to extend from pre-novice (i.e. a state in which there is no or little understanding or application of the category) to 'expert' in whom there is comprehensive understanding and proficiency in the application of the

category. However, the teachers interviewed are at the pre-novice – to novice levels within the three categories identified.

Table 4.4 Responses to teacher interviews.

The following table summarises the findings:

Open coding Categories	Axial coding		
	Pre-novice	Novice	Emergent competency
Understanding critical thinking	Teacher A has not heard the term "critical thinking."	Teachers B & C have heard the term 'critical thinking' which is a 'buzz word' in education; however they are unclear on definitions, tools, etc.	
Using critical thinking	All three teachers placed themselves in this category. "I do not use critical thinking skills in my life." (Teacher B)		
Teaching critical thinking	Most teachers position themselves here 'I think that when all the teachers have been taught, they can teach the learners' (Teacher A)		

4.3 Intervention Data

4.3.1 Research findings from classroom intervention.

Introduction

During the classroom intervention a variety of aspects related to critical thinking were discussed. Please see appendices G – P for the teaching and learning activities.

4.3.1.1 Learners at a pre-critical thinking level.

4.3.1.1.i Academic skills: Taking responsibility for own learning.

Most learners did not understand what it means to take responsibility for their own learning – for example – to keep a homework diary or to ask the teacher when they don't understand, and to revise work learnt at home. They tend to be passive and dependent on the teacher, so in this

regard, I would describe the learners as being at a 'pre-critical' level.

In response to the question: "Why are you at school?" learners from school A typically responded: "To get a job one day." Learners from school B responded: "To get an education," and from school C: "My parents sent me."

To the question "What is education?" learners from school A typically responded: "I don't really know," "What I need for the future," Learners from school B responded: "Something I can't get at home," and from school C: "What the teachers give us," and "Schoolwork."

4.3.1.1.ii Life Skills

Learners were asked: "Is everyone who has been to school successful?" and some learners from school A responded: "I don't know." One learner from school A said: " I have never thought about it, but my uncle has been to school, and he is in jail!" Learners from school B responded: "I don't

think so," "Come to think of it, no." Most of the learners from school C said: "I have never thought about it, but I don't think so."

After reading the story of Og Mandino, which initially describes his failure, in response to the question: "Did you know that people from all walks of life could fail?" learners from school A responded in surprise by saying: "I did not know that people for America could also have trouble." Another learner from school A said:" I thought it was only people who did not have an education who failed." A learner from school C responded: I thought people who never had money failed; I did not know that a big businessman could lose all his money."

Learners were given a copy of Self-talk, (see appendix H) and after reading the text, in response to the question, "Did you know that what you say to yourself matters, learners from school A typically responded: "No, I did not know." :I see now that I can help myself." A learner from school B stated: "I realise now that when I am having a bad day, is

when I speak negatively myself!" Another learner from school B said: I did not know what I say influences me." One learner from school C was surprised: "I did not even realise that I talk to myself."

On looking at the story of Og Mandino, and what he said to himself the question was asked:" Do you know the rules of life that Og Mandino mentions that he has never learnt? Learners from school A responded: "No," some learners from school B asked:" How did he not know the rules, he was a big businessman?" and another learner asked: " Are they the rules we learn at school, like to keep quiet in the passages?" Learners from school C said: "I did not know there were rules to life," and some asked, " What are the rules?"

4.3.1.1iii Study Skills

The poster of the cartoon character Peanuts (see appendix I) and the question: "How do you prepare for school each day?" elicited the following responses: School A learners: "I wash and dress and have breakfast before I come to

school." "Sometimes I don't know what to bring with." School B: "I pack my bags in the evening." School C: "I don't know what to do to be prepared."

I explained that it might be because we do not really understand what education is and continued by explaining what the education process entails. (See appendix J & K) The following were typical responses from the learners. School A: " Now I understand why I forget what the teacher has explained." "I did not know that I have to change when I have learnt something new." School B: "I did not know it was so complicated." "I thought that what we learn at school does not really matter out there in the real world." School C: "I thought that when the teacher has explained the stuff on the board then it's enough."

The question: "What is my role in the education process?" was quite surprising to the learners and some of the responses were: School A "I don't know." "I can't do much." "The teacher must tell us what to do." School B learners said: " I did not know that I have to do something

to prepare for school." School C: "I thought the teachers prepare the stuff."

Learning outcome #4 in the Learning Area of Economic and Management Sciences was used to show learners how to apply what they have just learnt. The outcome states: *The learner is able to demonstrate entrepreneurial attitudes, knowledge and skills.* The question was asked: "What are entrepreneurial skills?" The learners typical answers were: School A:" Maybe they must know how to make something." School B: "I don't know what skills they have." "I think you must learn at university." School C:" I think they must know how to make money." I think you are just born to be that way, and if you are not then tough."

The learners' responses indicate that they are at a pre-critical thinking level, as learners were not able to respond meaningfully to questions, revealing no evidence of critical thinking.

Table 4.5 summarises the teaching and learning activities in the classroom revealing learners responses at a pre-critical thinking level.

Table 4.5 Learners at a pre-critical thinking level.

No.	Teaching/Learning Activity	Learners' Responses
1	Why are you at school?	B: To get an education. C: My parents sent me A: To get a job one day.
	What is education?	C: Schoolwork. A: I don't really know. B: Something I can't get at home. C: What the teachers give us. A: What I need for the future. A: I need education to be successful.
	Is everyone who has been to school successful?	B: I don't think so. C: I never thought about that. A: I don't know. B: Come to think of it, no. A: I never thought about it, but my uncle has been to school and he is in jail!
2	Story of Og Mandino: Did you know that people of all walks of life could fail?	A: I did not know that people in America could also have trouble. A: I thought it was only people who did not have an education who failed. C: I thought people who never had money failed; I did not know a big businessman could lose all his money.
3	Did you know that what you say to yourself matters?	C: I did not even realise that I talk to myself! A: No, I did not know. B: I realise now, that when I am having a bad day, is when I speak negatively to myself! A: I see now that I can help myself. B: I did not know what I say influences

		me.
4	Do you know the rules of life that Og Mandino mentions that he has never learnt?	A: No C: I did not know there were rules to life. B: How could he not have known those rules, he was a big business man? C: What are those rules? B: Are they the rules we learn at school; like to keep quiet in the passages?
5	Poster of Peanuts saying: "I'm not even ready for today!" Do you come to school prepared? How?	B: I pack my bags in the evening. A: I wash and dress and have breakfast before I come to school. C: I don't know what to do to be prepared. A: Sometimes I don't know what to bring.
6	The Education Process	B: I did not know it was so complicated. C: I thought that when the teacher has explained the stuff on the board then it's enough. A: I understand now why I forget what the teacher has explained. A: I did not know I have to change when I have learnt something. B: I thought what we learn at school does not really matter out there in the real world.
6	What is my role?	B: I didn't know that I have to do something to prepare for school. C: I thought the teachers prepare that stuff. A: I can't do much. A: The teacher must tell us what to do. A: I don't know.
7	EMS Entrepreneurial skills, what are they?	B: I don't know what skills they have. A: Maybe they must know how to make something. C: I think they must know how to make money. C: I think you are just born to be that way and if you are not, tough. B: I think you must learn that at university

4.3.1.2 Learners becoming aware of critical thinking practices

4.3.1.2.i Motivation

During the reading of The Story of Jeans, a story of entrepreneurship and success, learners could begin to identify with the challenges that Levi Strauss had to face, and became aware of critical thinking practices. Some of their typical responses were: School A: "This boy was very poor and could not even speak the language properly, but he became successful." School B: " This story inspires me. If he can do it then others can too. School C: "This is such an amazing story." It is interesting to learn about this man and we still wear Jeans today!"

The question was asked: "What were some of the obstacles that he had to overcome?" School A: "He could not speak the language very well." "He had nowhere to stay." School B: "He thought the people wanted tents and they wanted trousers." "He was in a strange land."

To the question: "How did Levi Strauss overcome his problems, learners from school A replied: "He did not want to sleep outside any longer." "He wanted to help the people with new clothes." School B learners said: "He used the canvas that he bought for tents to make trousers." He wanted to be successful, because he had no money to go back to his own country." School C: "He thought of a way to make things work out for him."

Biographies of people who were successful and overcame obstacles, such as Thomas Edison, Beethoven, Helen Keller and Og Mandino were discussed and the learners commented as follows: School A: "I think I can have hope for a better future." School B: " I am going to find stories of other people in the library." This helps me to understand that even though it is tough I can do something." School C:" I will not give up so easily."

The question was asked: "What motivated Levi Strauss to persevere?" Learners from school A responded: "He was

hungry." School B: " He had nowhere to sleep." School C: "His money was finished and he did not know any people in that country."

I explained that the challenges facing these people were all outside circumstances and asked the question: "What pushes us from the inside?" Learners from school A responded: "I want to help my family to have a better future." School B: "I want to become a doctor one day." School C "I want to move overseas."

4.3.1.2.ii Potential

The response to the question: "Which do you think is better, a racing car with a baby behind the steering wheel or an old car with a racing driver behind the steering wheel?" learners from school A, B & C responded: "The racing driver in the old car is better." I asked why and they responded that the baby couldn't drive. I explained that we could have much potential but waste it. The learners all

agreed that the best situation would be the racing driver behind the steering wheel of the racing car.

I asked: "What would happen if the best driver in the best car has nowhere to go or does not know where to go?" Learners from school A responded: "He will just sit there." School B: "He will waste petrol." School C: "He will go to the wrong place."

I commented that this also applies to our lives and asked: "What will happen if we do not plan or make use of our potential?" Learners from school A commented: " I will waste my life." Another said: "Nothing will happen. I will be a nothing." School B learners said: "I won't go anywhere." School C: "I won't be a success."

During the teaching/ learning intervention, some learners became aware of critical thinking practices and the responses tabled below is a summary indicating this awareness. Learners' responses from schools A, B & C were recorded.

Table 4.6 Learners becoming aware of critical thinking practices.

No.	Teaching/Learning Activities	Learners' Responses
8	The Story of Jeans (A story of entrepreneurship and success)	C: This is such an amazing story. C: It is interesting to learn about this man and we still wear Jeans today! B: This story inspires me. If he can do it then others can too.
8	What were some of the obstacles that he had to overcome?	B: He was in a strange land. A: He could not speak the language very well. A: He had nowhere to stay. C: He had no money to go back to his country. B: He thought the people wanted tents, and they wanted trousers.
8	How did Levi Strauss overcome his problems?	B: He used the canvas that he bought for the tents to make trousers. C: He thought of a way to make things work out for him. A; He did not want to sleep outside any longer. B: He wanted to be successful, because he had no money to go back to his own country. A: He wanted to help the people with new clothes.
9	Biographies of those who had to overcome obstacles/ challenges in life. After hearing about Beethoven who became deaf yet composed beautiful music, how do you feel?	A: I think I can have hope for a better future. B: This helps me to understand that even though it is tough I can do something. C: I will not give up so easily. B: I am going to find more biographies to read in the library.
10	Motivation: What motivated Levi Strauss to persevere?	A: He was hungry. B: He had nowhere to sleep. C: His money was finished, and he did not know people in that country.
10	Those were all challenges on	B: I want to become a doctor one

	the outside, called extrinsic motivation. What pushes us from inside or "intrinsically"?	day. C: I want to move overseas. A: I want to help my family to have a better future.
11	Potential: Which would you choose a racing car with a baby behind the steering wheel or an old car with a racing driver behind the steering wheel? Why?	A: The old car is better. B: Where the racing driver is. C: The old car. A: The baby can't drive. C: The baby can't reach the pedals. B: The racing driver can handle even an old car well.
	You can have much potential but waste it, what would be the best situation?	A, B, C: The racing driver in the racing car.
12	Direction: Now that we have the best driver behind the steering wheel what will happen if he does not know where to go?	A; He will just sit there. B: He will waste petrol. C: He will go to the wrong place.
	What will happen if you fail to have a plan for your life?	A: Nothing will happen. B: I won't go anywhere. C: I won't be a success.

4.3.1.3 Learners starting to practise critical thinking.

During the teaching/ learning intervention some learners started to practice critical thinking and as they grappled with the information, integration was initiated.

4.3.1.3.i Cause & Effect

A Newton's Cradle was used to demonstrate Newton's third law which states that foe every action there is an equal and

opposite reaction. The fact is that every action that we take or decision that we make, certain consequences follow, and we should therefore think critically about our thoughts that become our actions, beforehand. As one ball is pulled out and released, one ball on the opposite side starts swinging, indicating the effect that one action has on other aspects of our lives. After a demonstration of Newton's Cradle (See appendix M) and an explanation of the consequences to our deeds elicited the following responses: School S: "Wow! That is so cool." School B: "Now I see that what I do affects everything else." School C: "That means I must not just do things, I must think and plan first."

4.3.1.3.ii Time Management

A discussion on time management followed and I asked: "How can we invest time rather than to waste time?" Learners commented: Learner A: If I use my time and I stop being lazy, then I can do more." School B: " I can rather read a book on how to become successful than waste time in front of the TV."

4.3.1.3.iii Thinking Skills

The teaching of thinking tools and how to practically apply these tools followed and learners form school A commented: "I can use these tools and stay out of trouble." "These tools can help me when I must decide what to do." School C: I can make better choices now that I know what tools to use."

The following table is a summary indicative of some of the learners' responses to initial critical thinking. While not yet proficient critical thinkers, during the teaching and learning intervention, some learners emerged who could be said to be on a path towards critical thinking.

Table 4.7 Learners starting to practise critical thinking.

No.	Teaching/Learning Activities	Learners' Responses
14	Demonstration of Newton's Cradle: Explaining consequences to our actions	A: Wow! That is so cool. B: Now I see, what I do affects everything else. C: That means I must not just do things, I must think and plan first!
15	Time Management: Time is like money. "Invest or waste"	A .If I use my time, and I am not lazy I can do more. B. I can rather read a book on how

		to become more successful than waste time in front of the TV
16	Teaching Thinking Tools	A. I can use these so that I can stay out of trouble. B. These can help when I must decide what to do. C. I can make better choices now that I know what tools to use.

The responses of the learners at Schools A, B &C, during the teaching & learning activities, were thematically analysed using open and axial coding. The results are tabled as follows:

Table 4.8 Summary of intervention: Axial coding: A continuum of critical thinking skills and abilities

Categories	Critical thinking levels			
ACADEMIC	Pre-critical	Awareness	Emergent application	Proficient
Responsibility for own learning	A: 'I don't know' indicates precritical level. B: I never feel that I am in control of my schoolwork.	No evidence for this level of the category.		.
Knowledge	There is so much to know I hope I'll know it when I'm	So, there are some things we need to learn to be successful?		

	big.			
Study skills	B: I can never remember anything I study. C: The work is too difficult.	A: Poor Levi Strauss, some of our people also suffer like him.		
LIFE SKILLS				
Overcoming Barriers	C: I never know what to do when I face a challenge. B: I just think I can't and give up. A: We have so many jobless and poor people, they can't help it.	B: Beethoven could not even hear what he composed. Other people enjoyed the music. C: Beethoven used his talents.	B: If Edison can overcome challenges then we can too.	
Bouncing back from failure	A: I thought poor people suffer and that's the way it will stay. B: Some people can get help then. C: So, if I'm in trouble I must try again.	B. So if we can learn what the rules of life are, then we can also be successful and not fail.	B: When I fail I will think of this man, and keep going. C: We must just learn those rules and use them.	.
Self- talk	A, B &C: I had no ideas that I even talk to myself!	A: I must speak positive things.	B: When I fail a test I must not say I am stupid. C: When I	

			can't do the Maths, I am going to say that I can until I can.	
Planning	A, B& C: How do I know what is going to happen tomorrow?	B: If I plan then I am sure of what I must do. C: I can plan and save time, so that I don't do wrong things.	A: I have a plan to move away from the township, now I can see it can happen.	
Entrepreneurship	B: Aren't you born an entrepreneur? C: It's for big businessmen. A: I will never know all of that.	B: That means I must learn about some stuff to become an entrepreneur? C: Anyone can be successful then.	B: I can be a good entrepreneur if I can set goals and use my time wisely.	
Motivation	A: I just don't want to fail	A: So bad things that happen must help us to want to do better, not lie down.	B: So, it is better to have intrinsic motivation. That will help me longer.	
Goal Setting	A: How do I know what to do tomorrow? B: How can it help me?	C: So if I have some goals, I can do things to accomplish it.	C: I am going to work out some goals this afternoon when I get home.	
Time management	A: I see the people sit	C: I can stop watching so	C: So, if I use my time	

	around all day they have lots of time.	much TV	and plan it I will get more done, and finish my homework earlier.	
Self-knowledge	A: I am not clever. B: My mom says I will never do Maths, she also can't	B: So, I don't have to worry if I'm clever or not, I must just use what I've got!	A: If I do the things I can do, I can make progress. B: I'm going to work on the things that I can do within my ability. C: I think I have just been lazy, now I see I must work with what I have got.	
Thinking tools	C: What are thinking tools? B: I have never heard of that. A: I don't know.	A: How can we learn about thinking tools? B: What can we do with thinking tools?	I can use some of these tools in the exams!	I can use the thinking tool FIP[3] to find out how the man who had an accident needs help.

[3] Thinking tool FIRST IMPORTANT PRIORITY see appendix O

4.4 Post-intervention data

4.4.1 Learners who may become proficient critical thinkers.

After the teaching and learning intervention, where a series of lessons were given, learners were given the opportunity to complete Learners' Questionnaire #2. (See appendix D) Examples of the questions that were asked include the following:

"How would you think differently about the future?"

"Do you have the tools to think differently now?"

"What have you learnt this week that will help you to change the way you think and learn?"

Qualitative data was collected. Learners were given the opportunity to expand on some of the questions rather than just a yes/no response. Scoring was on a scale from zero to ten, where 0 indicated no critical thinking indicated in the response, 5 indicated come critical thinking and 10 indicated true critical thinking. The typical responses indicate that the learners responded differently after

intervention in the teaching/ learning activities, and they applied some critical thinking in answering the questions. Their responses indicate that they are predisposed now to become proficient critical thinkers.

The consequence of using the PAR approach is that not only does the educator/research find information about critical thinking practices, but the activities themselves tend to increase awareness of critical thinking and leads to more proficient critical thinking among the research participants.

The following tables 4.9 and 4.10 summarises some of the responses of learners' questionnaire #2, after intervention, which clearly indicate the implementation of critical thinking activities.

Table 4.9 Learners predisposed to proficiency in critical thinking.

Learners' Questionnaire #2

Question no5. What have you learnt that can change the way you think & learn?
School A: *I am so happy that I have learnt about thinking. * I learnt that if you are doing something you have to think before you do something.

*I have learnt how to trust myself and how education is important *If you want something you can work at it even if you are not that educated *I have learnt thinking tools. *I helped me to learn about thinking tools and how to set goals. *I have thinking tools that can change my thinking and I can be me without money *Tools that can help me to change the way I think and learn *Thinking principles that can help me. *It has changed the way I think and the way I am. *I must not give up because I am poor, I must persevere and be educated. *Education is important and so is my future. *I have learnt how to deal with problems within myself. *How to change things in an easy way.
School B: *I changed to a different person in my work *To consider all factors before I act. *To think carefully about answers, friends, make the right decisions *I have new tools to help me think *I look at the future as a journey now, and I am able to plan. *The biographies have inspired me to persevere despite challenges. *I used to say "I am a failure" , but I have learnt that it will affect my future, now I can have goals and aims and learn from others *I can now think about something in different way and that can help me. *I have learnt how to work better in life and to know that I can become successful in whatever job I want to go into. *You should think before you act *There are consequences to what we do. Things don't' just happen. *I won't be successful automatically, but I need to work at it and use my new *thinking tools. *I must think ahead, and I know to use thinking tools to decide what to do. *I learned that just because you go to school doesn't mean you will become successful. You must use the time wisely; use the thinking tools by putting them into action and be determined to reach your goals. *I have learnt to think about what I can change and what I am doing can change me. *I will look at life more seriously. *No matter what happens in your life, don't give up and stay positive in what you do.

*It's important to think when you are in a hard situation.
School C: *Thinking tools will help me to be successful. *I must take action and not wait for things to happen. *I can use thinking tools. *I must learn from mistakes and think better. *Take action and be motivated. Use thinking tools. *I have learnt new skills that can change me for the better. *I had to look inside of me! *I must think a lot and believe in myself and always do the best in my life. *Intrinsic motivation; it really made me change about how & think and learn. *I have to change my behaviour. *I must read a lot and try hard. *The thinking tools and the rules of thinking have helped me. *I must have goals that are SMART and I must take action and do it now. *I have learnt that I can achieve my goals *I must be positive, not negative, and watch my self-talk. *Use your tools and change you behaviour *Goals and thinking tools helped me. *I have learnt that I can never give up too quick in what I do, and want to become and I must take more positive action than negative action. *Before I did not think about my acts and now I think about all of those. *I will think positive thoughts from now. *I have learnt that with every decision come consequences. *I have learnt about entrepreneurial attitudes, knowledge and skills. *I see a brighter side of thinking and self –talk affects my life. *Every action has a similar and opposite reaction, so I will think before I do anything – positive or negative *I understand education more clearly and I have new thinking tools to understand life better.

Table 4.10 Learners predisposed to proficiency in critical thinking.

Learners' Questionnaire #2

Question no 8b: How does it matter what you say to yourself?
School A: * When the teacher says I'm stupid, I don't have to say so to myself.

*The future is important to I must say positive things now. * I must speak to myself in a special way, I a special. *I want a better education, so I must speak to motivate me to carry on learning. *It is very important; you cannot make the right decision without speaking well to yourself. * I want people to know what I want for the future so I must first speak well to myself, then to others. *I have to make my own decisions so I must speak well to myself. * It is important because I talk to myself to tell myself what to do.
School B: * Whatever you say to yourself you will believe it, even if it was bad! If you say it for quite some time, "You're a loser," you will come to believe it. * I can influence myself in a positive or a negative way. * If you say bad things about yourself you will fell bad, and vice versa. *If I talk well to myself it changes the way I am felling *Some of us say negative stuff to ourselves; and that will affect our future. If you say positive things to yourself you will fulfill your dreams. *It can either make you excited or it can make you sad. *Whatever you say to yourself will affect you. *If you say bad things to yourself you will become those bad things. *If you say nasty things to yourself, it will affect you and you wanting to do something, but if you say good things, you will be able to do something without a hassle. *When you talk yourself down, it is not good for your self-esteem. *If you say negative things, you will start to believe it. *It definitely matters because if you tell yourself you will never succeed you are talking yourself into the bad situation, but if you encourage and help yourself you will talk yourself into being the best you can be. *If you play a bad tape in your head you will do bad, but if you play a good one you will do well in your life.
School C: *If you only worry about things then you do worrying things. * If I talk nice to myself I will talk nice to others. * The decisions I make will be influenced by what I say to myself. * If I talk ugly to myself I won't have respect for others. * If I speak in the proper way I will do things in a proper way. * I must respect myself and speak properly to myself, * What you say to yourself could decide your future. * They will decide what happens in your future. * I cannot say rude things and expect to be successful.

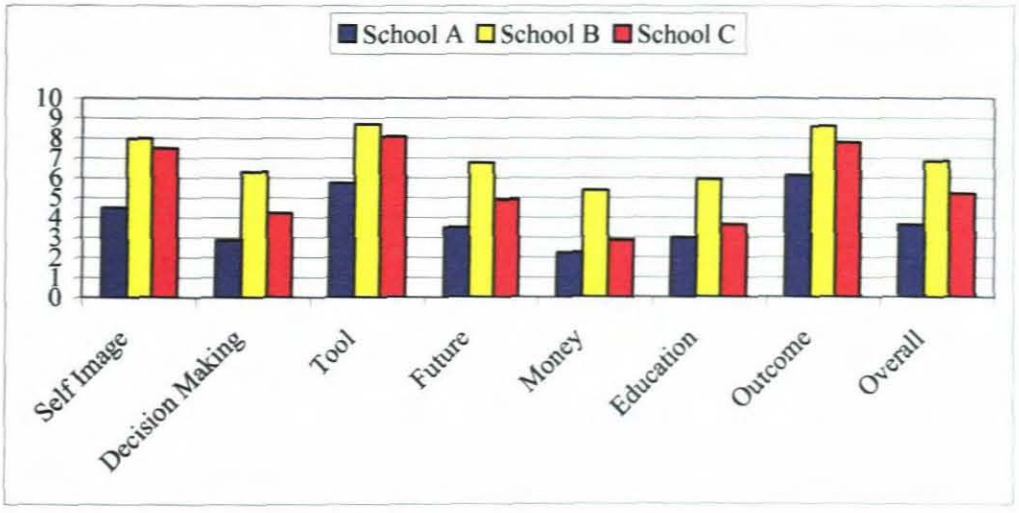
* I must think what I say to myself.
* If I think negatively I will do something wrong.
*It matters if I speak positive things or negative things to myself because it's going to affect my life and my future.
* The way you talk to yourself is the way you act.
*Sometimes you can be too hard on yourself and that's bad
* I want to motivate myself, talking about how others never gave up and then I will share it with others.

After the teaching and learning intervention all three schools indicated a significant difference in all aspects.

Schools B & C show learning enhanced in self-image, thinking tools, planning for the future as a result of intervention than school A. For the other aspects there is a difference between all three schools where School B shows more critical thinking than C and C more than A

The graph below is a comparison of the outcomes of the intervention in all three schools. The results may indicate the impact that the teaching intervention made and may also indicate whether there is a difference in the degree to which such an impact, if any, is evident.

Graph 4.4: After Intervention Results



After the intervention, Learners' Questionnaire # 2 was statistically analysed and the following results emerged from the analysis. These results can give an idea whether there was any significant difference in the learners' use of critical thinking after the teaching intervention. Learners from school B scored higher in every aspect addressed in questionnaire # 2.

The table below illustrates that after the teaching and learning intervention all aspects showed a significant difference.

Table 4.10 After Intervention's Aspects with Significant Difference

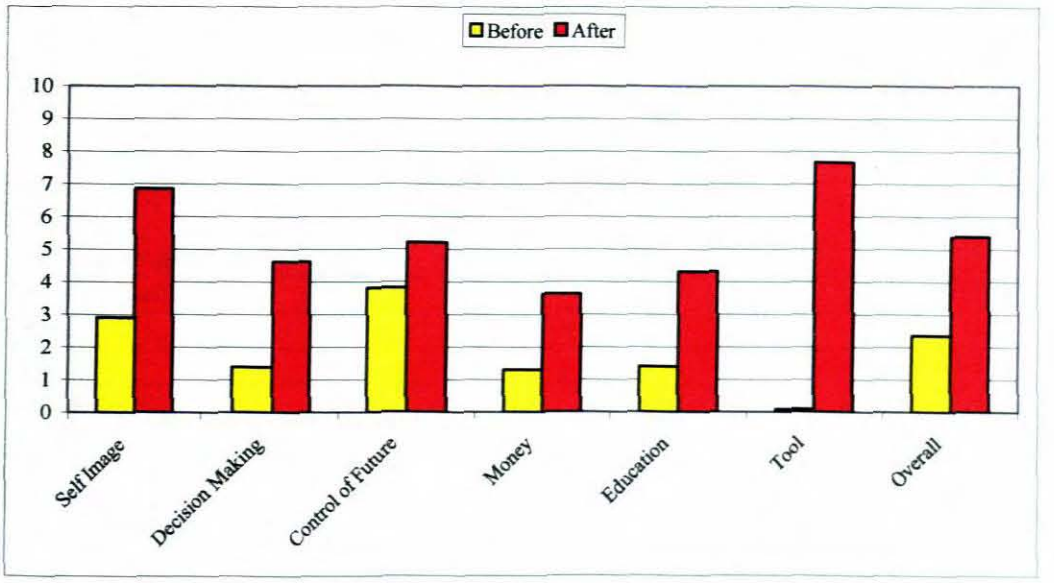
Significantly Different	Not Significantly Different
Self image	
Decision-making	
Thinking tools	
Future	
Money	
Education	
Outcomes of intervention	
Overall after intervention	

4.4 Intervention Effect

Learners' Questionnaire #1 before intervention was compared with Learners' Questionnaire # 2 after intervention. The same aspects in each questionnaire were compared and in comparing individual aspects the difference between before and after intervention, proves to be significant, which is substantiated by the overall result.

Ideally one would have preferred to have given the same questionnaire to the learners, but to avoid repetition, boredom and help engagement and interest, the questionnaires before and after intervention are not identical. Questions of similar levels of difficulty, interest, and critical thinking were asked.

Graph 4.5: Before and After Intervention



The teaching and learning intervention focused mainly on equipping learners with tools of critical thinking, and graph 4.5 above clearly indicates that the learners have been informed of tools that could equip them to practice critical thinking. The Paired T-Test was used to determine the significance of the intervention.

Table 4.11 Significant Difference of the Intervention

The table 4.11 below shows the aspects of significant difference before and after intervention. It is clear that

every aspect shows a significant difference after intervention. (See Appendix X Paired T-Test) [Before and After Intervention]

Significantly Different	Not Significantly Different
Self image	
Decision-making	
Thinking tools	
Future	
Money	
Education	
Overall outcomes of intervention	

4.5 Conclusion

The results as described in this chapter clearly indicate that there was a significant difference in the understanding and knowledge of critical thinking in the learners of schools A, B & C before and after the teaching and learning activities intervention.

My research question # 4: "How effective is classroom based facilitation of critical thinking?" deals with the effectiveness of classroom based facilitation of critical thinking, and even though the evidence clearly indicates that the learners have been informed of tools that could

equip them to practice critical thinking, indicating that teaching critical thinking can have an impact on learners, the question arises whether these practices can be sustained when teachers don't teach or practise critical thinking themselves.

CHAPTER 5: THE THINKING PRACTICES OF PARENTS, TEACHERS AND LEARNERS: AN ANALYSIS OF THE RESEARCH FINDINGS.

5.1 Introduction

In this chapter the results of the research findings from the parents' questionnaires, the pre- and post-intervention learner questionnaires, the teacher interviews and the teaching and learning activities as described in chapter 3 are analysed and interpreted. The pre-intervention data (parents' questionnaires, learners' initial questionnaires and teachers' interviews) are analysed first, and this section is then compared and synthesised in order to build a rich description of the pre-intervention context. The intervention data is then analysed and interpreted, and compared and synthesised with the pre-intervention data. Finally, the post-intervention questionnaire data is analysed and interpreted and a final synthesis is done.

5.2 Pre-Intervention Data

5.2.1 Parents

5.2.1.1 Analysis of the results from parents' questionnaires.

The findings from the parents' questionnaires give us an initial description of the critical thinking practices in the learners' home environments in terms of whether or not parents engage in critical thinking for decision making, planning, managing their finances, and so on (see Appendix A for the actual questions asked in the parents' questionnaires).

The responses from the parents' questionnaires at the three different schools were compared and the findings indicate that there is a significant difference in how parents make decisions, what their reading activities are, how they rate their job satisfaction, how they manage their finances, how they see themselves, how they present themselves, and so on.

Overall, school A parents do slightly less critical thinking activities than the school B or school C parents. In terms of job satisfaction however, the school A parents indicate significantly less satisfaction than the other two groups, as with self image and image projection through clothing. However, in term of forward planning generally as well as with regard to money and finances, these parents 'outperformed' the other parents. Interestingly, school C parents, have the greatest level of job satisfaction. School C parents have the highest overall scores, only slightly higher than School B parents.

The thinking practices of parents and home life.

From the results the picture/pattern that emerges of the home with regard to critical thinking (debate, discussions, decision making, etc), is clear. There is a definite correlation between the thinking practices of the parents and their children. Where the parents have not been role models in terms of training their children in critical thinking, the children too will lack understanding and

application of critical thinking skills. It is therefore very important to train parents in the use of critical thinking skills, so that they in turn can assist their children in learning and using critical thinking skills. The home environment should be an educational environment as well. The school environment, therefore, should strongly and deliberately promote critical thinking practices.

Paul (1994) maintains that critical thinking is fundamental to education for a free society. He believes that children should be encouraged from a young age to think for themselves. It is therefore vital that parents assist their children in critical thinking. The parents themselves should be informed how best to assist the young in critical thinking.

The importance of critical thinking cannot be underestimated. In many cultures the children are socialised into following authority figures and not questioning their pronouncements. Parents and teachers through positive and negative reinforcement do such socialisation. Most

individuals reach adulthood in this socialised form. The results of such socialisation are the antithesis of critical thinking. In fact Freire calls the first step in critical thinking 'desocialisation.' (Freire, 1974)

Davis (2001) maintains that the parents play a pivotal role in their child's education. Parents expect the school to produce a child with strong performance abilities, but they have to understand that learning is developmental, and that the home plays an important role in laying the foundation for critical thinking. The child comes to a place in his maturation where he is ready to learn certain aspects of learning if he has been predisposed to thinking critically. The parents must provide rich experiences, building curiosity and allow intriguing discovery to take place and interact with their children in such a way that learning success is guaranteed.

5.2.2 Learners

5.2.2.1 Learners' questionnaire No 1

The results of the Learners' Questionnaire #1 indicate that learners have very little understanding of what critical thinking skills, abilities and practices entail. They therefore do not apply critical thinking skills in decision-making, nor in planning their careers and future. They do not strategically plan what to do with their money or what to wear. They also do not practise critical reading, and do not take a critical approach generally to their own education. When comparing the responses from Schools A, B & C, it is clear that none of the learners scored well on using critical thinking tools; or forward planning abilities. It is therefore not surprising that learners' self-esteem is correspondingly low.

In his research, Quinn (1997) has found that there is a direct correlation between a low self-esteem, limited skills of social interaction, an inability to transfer skills across subjects and critical thinking. " I wish s/he would think before s/he opens her/his mouth," in his experience, is a

common cry from teachers/parents. O'Connor (2002) states that true self-esteem requires an accurate appraisal of one's abilities in comparison to those of others. He continues by saying that a poor opinion of the self-esteem is part of the problem for a great many troubled youth, no matter how their troubles are manifested. Focus on the critical thinking of such students would assist them in an accurate appraisal of self and the ability to improve self, through appropriate problem-solving skills.

John Dewey (1910) defines critical thinking as "reflective thought"- to suspend judgment, maintain a healthy scepticism and exercise and open mind. These three activities called for the active, persistent and careful consideration of any belief in the light of the ground that supports it. Dewey's definition suggests that critical thinking has both an intellectual and emotional component. Thus critical thinking helps to maintain a balanced view of self through students' ability to critically examining a problem, finding a solution, evaluating failures, learning

from successes and failures without "giving up" or "falling to pieces."

Brightman (2003) states that critical thinking can be nurtured through co-operative learning. He is of the opinion that there is overwhelming evidence to confirm that students produce higher achievements and have a higher self-esteem. Johnson & Johnson (1994) report that the average student in co-operative learning, using critical thinking skills, achieved about *three-fifths* a standard deviation above on self-esteem measures than their competitive learning students counterparts.

The findings of Learner Questionnaire # 1 also indicate that the learners do not apply critical thinking at home. It is to be expected that if critical thinking is not prevalent in the home, then it will not be prevalent at school, unless the school makes a concerted effort to teach and foster critical thinking in the learners. Bernstein (1996), explains how social position affects schooling – schools tend to espouse middle class values, so children from middle class

backgrounds tend to 'fit in'; while children from working class backgrounds do not.

5.2.2.2 Comparison of parents' and learners' initial questionnaires

An ANOVA test was done to compare parents' questionnaire and the learners' Questionnaire #1 findings, in order to show similarities and differences in critical thinking trends between parents and their children.

A Paired-Sample T Test was run on the parents' questionnaire and the learners' questionnaire #1. This test may indicate whether there is any significant difference in their thinking. For this comparison learners' questionnaire #1 was compared to parents' questionnaire. (See Appendix W: Paired T-Test) [Parent and Learner]

The results clearly showed the differences in the thinking between parents and their children,

The comparison between parents and children from all three schools give us an indication whether parents and learners have mastered critical thinking tools, and whether they use critical thinking in decision-making and planning their futures and careers, what they will do with money, what they will wear and their self-image, as well as the importance of reading.

Parents in general display indicators of emergent critical thinking skills more so than their children, except in terms of decisions about their career. A T-test was done to compare parents' and children's critical thinking abilities, the results are as follows:

The findings indicate that parents and children think alike in some of the aspects, such as decision-making, the importance of reading, how they plan the future and their career, as well as how to spend money and their knowledge of thinking tools, but significantly different in terms of choice of clothing and self image. (See Table 4.3 and Graph 4.3.)

5.2.3 Statistical Tests & Findings

a) Test for data distribution:

The skewness was run on each variable to measure the normality of the quantitative data. The normal distribution is symmetric and has a skewness value of zero. The variables are thus normally distributed (See appendix #: Descriptive Statistics). A T-Test and A One-Way ANOVA can be calculated on the data.

b) School results comparison:

One-Way ANOVA (analysis of variance) tests were run to establish whether there is a significant difference between the responses of the parents of the three schools.

Table 4.1 summarises the results of the ANOVA tests. The following aspects were found to be significantly different at a 90% level of significant.

Between schools A on the one hand and B and C on the other hand, there is a significant difference in self-image and decisions about clothes.

Schools A & C show no significant difference in their decision-making about clothes, but school B is significantly different from A & C.

5.2.4 The thinking practices of teachers and school life:

The results from the teachers' interviews clearly indicate that the educators at schools A, B & c are not proficient in understanding, applying & teaching critical thinking skills. The pattern could be representative of the majority of schools in South Africa. Clearly this is a matter of grave concern and the transformation that so many people desire for the South African society will not manifest until the issue of critical thinking has not been addressed.

Educators must be able to define and understand critical thinking before they would be able to facilitate the learning

of critical thinking (Davis, 2001). The fostering of critical thinking in the classroom is often not evident in learners. Paul (1994) is of the opinion that many educators have not learnt that art of disciplined reasoning and do not understand the relationship between thinking, knowing and learning. This lack of critical thinking about education is a grave concern (Schrag, 1988). If educators are unaware of the relationship between thinking, knowing and learning, then there is a strong possibility that learners will not be aware of the importance of acquiring theses skills. The role of the educator in this process is of extreme importance. According to Linskie (1977) the teacher plays a vital role and is the key to helping the learner to master effective thinking and learning.

Critical thinking is an active process, while for most students, listening to lectures is a passive activity. Davis (2001) is of the opinion that thinking skills in children should be a vital concern among educators and that the key to thinking lies in how the teaching process is conducted. According to him children are unlikely to develop thinking

abilities if a high percentage of their learning activities is simply geared to completing pencil-and-paper activities, especially if these activities are fill-in-the-blank workbook pages.

The need to teach higher order thinking skills is not a recent one. Carr (1988) quotes Raths et al (1967) as decrying the lack of emphasis on thinking in the schools. They note that memorization, drill, homework, 'the three R's' and the quiet classroom were rewarded, while inquiry, reflection and the consideration of alternatives were frowned upon.

Robinson (1987) states the if learners are to function in a highly technical society, then they must be equipped with life-long thinking- and learning skills necessary to acquire and process information in an ever-changing world Individuals who think critically can think for themselves: they can identify problems, gather and analyse relevant information, in a systematic way and come to reliable conclusions independently (Freire, 1994) Critical thinking

should thus be a vital component of education. The purpose of specifically teaching critical thinking is to improve the thinking skills of the learners and thus better prepare them to succeed in the world. (Schafersman, 1991).

Clement & Lochhead (1980) suggest that we should be teaching students how to think instead of teaching them what to think. Bonnet (1994) states that the problem of a too structured and rigid curriculum leaves no room foe learning and thinking in an active way.

Mc Peck (1981) believes that institutions can greatly benefit from including teaching thinking. Paul (1994) is of the opinion that critical thinking is a tool necessary for survival, and states that educators have not yet learned the art of disciplined reasoning, and educational institutions are totally ill prepared for change.

Fisher (1990) believes that a student can be taught to think and he uses Bloom's taxonomy of cognitive learning to indicate that critical thinking can be equated with the

highest of the levels, viz. evaluation. He states that in teaching for thinking, a student can become an active participant and not just a passive observer in school. The school can become a more interesting and challenging place for a child.

The question arises how critical thinking is related to Bloom et al's Taxonomy of the Cognitive Domain? Huitt (1994) is of the opinion that Bloom and his colleagues (1956) proposed that knowledge is actually composed of six successive levels arranged in a hierarchy: knowledge; comprehension; application; analysis, synthesis and evaluation. Seddon (1978) suggests that the synthesis and evaluation may be two separate entities. There is some evidence to categorise critical thinking as evaluative and creative thinking as synthesis. Huitt feels that it is important to make this distinction in order for educators to compare and contrast it with non-critical thinking. He gives the example of non-critical thinking as a form of habitual thinking (thinking based on past practices without considering current data) and brainstorming, (say whatever

comes to mind without proper evaluation) of which educators should be aware and skilfully guide their students. Huitt feels that educators should identify the best methods of instruction in each aspect of the critical thinking process. Only when educators have acquired the necessary expertise in the field of critical thinking would they be able to skilfully lead their learners.

Quinn (1997) feels that generations of children have been betrayed as they leave school and are no better critical thinkers or less gullible than the previous school leavers. He points the finger at teachers, not because they are solely to blame, but according to him, they have not even tried to change things.

Kirkwood (2001) is of the opinion that teachers can help to improve the quality of thinking in their students.

Joyce, Calhoun & Hopkins (1999) maintain the refinement in the curriculum and the inclusion of thinking through sets of changes will prepare learners for the future. The new

structure of school improvement will be achieved through inquiring schools, and students will achieve through new thinking strategies.

Clustering occurs where learners at School B are 'well-precursed' (Gee, 2000) for critical thinking, while learners at school A are not 'well-precursed'. The indication is there that the learners at school B have been made aware of critical thinking simply because they have been exposed to a greater world out there. Boucher (1998) believes that children are naturally intrigued by the world around them and that they use everyday materials to think of new questions and to make meaning of the world around them. It is commonly known that generally speaking the learners from the township school have less exposure to that which can intrigue and stimulate them to think and question and learn about the world around them. Educational change should ensure equity in terms of educational provision and promote a more balanced view, by developing learners' critical thinking powers and their problem-solving abilities. (Van Der Horst & Mc Donald, 1997)

Bonnet (1994) is of the opinion that the teacher is the person who mediates the curriculum in the specific context in which education occurs and is therefore the one who has a substantial interpretive and formative role to play. The teacher is the person who has to make on-going decisions concerning how to create and sustain an environment within which critical thinking and learning will be most likely to flourish. The important element of a teacher's professional responsibility must be taken seriously, in order to develop children's thinking.

According to Ristow (1988) critical thinking skills, were previously regarded as a *fluke of nature* or a *genetic disposition*. It is reported, however, that the direct teaching of creative skills can produce better, more critical thinkers.

Cotton (2002) claims that teacher training is a key factor in the success of any program to teach critical thinking. Carr (2002) states that every teacher should create an atmosphere in the classroom where students are encouraged to read

to read deeply, question, engage in divergent thinking, look for relationship among ideas and grapple with real life issues. The teacher trained in critical thinking would be in a position to assist students to engage in critical thinking.

Hoover & Patton (1995) states that one of the single greatest tragedies in education occurs when students are allowed to progress through school without developing effective critical thinking and study skills. They maintain that this is a process that should begin in early elementary school and continues throughout one's schooling and beyond. The educators play a pivotal role in the mastering of these skills.

5.2.4.i Findings from Teachers' Interviews:

The teachers of the Grade seven classes of Schools A, B & C were interviewed prior to the teaching/learning intervention. The purpose was to determine whether the educators understand, use and teach critical thinking in their professional and private lives.

The teachers of all three grade seven classes at Schools A, B & C had little or no understanding of critical thinking skills and practices. Teachers' responses to the interview questions fall into three broad categories: 1) Understanding Critical Thinking 2) Using Critical Thinking 3) Teaching Critical Thinking. Within each of the three categories identified, the teachers were placed along a continuum from 'pre-novice' to 'novice' levels.

The findings indicate that teachers are generally not critical thinkers themselves – if they do engage in critical thinking activities, then it tends to be at the 'novice' level. Without a good knowledge base in critical thinking, understanding of critical thinking approaches, and an ability to apply critical thinking tools in their own contexts, it would be unreasonable to expect teachers to be able to teach critical thinking to others.

Palonsky (1993) maintains that the profession of teaching assumes 'that good teachers possess a special knowledge

base – a codified or codifiable aggregation of knowledge, skill, understanding, and technology, of ethics and disposition, of collective responsibility – as well as a *means for representing and communicating it*'. Shulman (1987) identifies seven categories of teacher knowledge.

These include content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of the learners and their characteristics, knowledge of educational contexts, and knowledge of educational ends, purposes, and values and their philosophical and historical grounds.

Shulman (1987) maintains that 'pedagogical content knowledge' lies at the heart of teaching because it represents the ways in which teachers 'blend academic content with teaching methods, organize instruction, and unite all these elements with the interests and abilities of the students in their class'. Shulman (1987) claims that 'teachers' knowledge of the content affects both what teachers teach and how they teach it' In this way, 'teachers

are likely to emphasize those areas in which they are more knowledgeable and to avoid or de-emphasize the areas in which they have relatively less content knowledge'. Almost two decades ago Shulman (1986) argued that teachers' 'pedagogical content knowledge' is the 'missing paradigm' in the discussions surrounding the issue of knowledge. Grossman, Wilson and Shulman (1989) outline four types of 'pedagogical content knowledge', namely content knowledge, substantive knowledge, syntactic knowledge, and beliefs about the subject matter:

Content is the substance of the discipline, the facts, principles, concepts (Grossman, 1989);
Substantive knowledge is associated with the structures of the discipline and the paradigms in which such structures are located so as to guide inquiry (Grossman, 1989);
Syntactic knowledge is created in the discipline, about the canons of evidence (Grossman, 1989);
Beliefs influence what teachers select to teach and in turn how such subject matter is interpreted. Grossman, Wilson and Shulman (1989) point out that beliefs have not been

thoroughly researched and are less understood than the other identified areas of knowledge.

If we relate these general concepts to the context of teaching critical thinking then it is clear that teachers would need to firstly acquire content knowledge of critical thinking – that is a basic grounding in the concepts, approaches, and tools of critical thinking.

Secondly, teachers need what Grossman (1989) terms 'substantive knowledge' of the field of critical thinking. This would involve the teachers beyond a basic grasp of concepts, approaches, and tools of critical thinking – into areas of debate and discussion around critical thinking. Teachers would be required to identify different critical thinking ideologies – for example comparing a collective empowerment approach (Freire, 1994), with a more individualised approach.

Thirdly, teachers need what Grossman (1989) calls 'syntactic knowledge', that is the ability to explain and

clarify the discipline of critical thinking in terms and language appropriate to the level of the learners. This would be an advanced teaching skill and only acquired after a basic understanding of critical thinking has been mastered.

Finally, teachers would need to value critical thinking and its role in teaching and learning. While teachers interviewed did value critical thinking – this was more that the level of 'idea', they believed that critical thinking was important, but they did not know how to go about teaching it. This is something that could be built on. As teachers already sense the importance of the critical approach, one of the barriers to innovation in the classroom is thus already addressed.

Bernstein (1996) argues that in formal educational knowledge, curriculum represents what counts as knowledge, pedagogy represents what counts as valid transmission of knowledge, and assessment or evaluation represents what counts as valid realisation of this

knowledge by those who have been taught it. Through the application of pedagogy, specialised knowledge may be said to change in the process of being selected, simplified, condensed, repositioned and refocused for purposes of transmission (Bernstein, 1990). The concept of *recontextualization* as developed by Bernstein's work (1990, 1996) suggests that knowledge transformation takes place in a process in which one form of specialised or academic discourse is translated into another (education-pedagogic) register. Curriculum, pedagogy and evaluation reveal the distribution of power and the principles of social control of society in their selection, classification, distribution, transmission and evaluation of public educational knowledge. The underlying principle that shapes curriculum, pedagogy and evaluation is the educational code, which is fully realised by the relationship between classification and framing. Classification and framing affect the authority structure that controls the dissemination of educational knowledge codes.

Framing determines the structure of pedagogy and provides options available to the teacher and pupil in the control of what is transmitted and received. 'Frame' is the context within which educational knowledge is transmitted and received. It determines the pedagogical relationship between the teacher and the pupil. Boundary strength in framing is in relation to what may and may not be transmitted. Sharp boundaries between what and what not to transmit strengthen the framing while blurred boundaries weaken the framing of what is to be transmitted. Strong frames increase the power of the teacher and reduce that of the pupil over what, when and how the knowledge is to be received in the pedagogical relationship. Framing can be understood in relation to selection, sequencing, pacing, communication, social relations, and evaluative criteria.

Recognition rules (Bernstein, 1996) provide the ability to be aware of what meanings are relevant. They allow for the informed identification of what counts as valid meaning and good practice. Realisation rules refer to the ability to speak

the legitimate text, to be able to reproduce that which counts as valid knowledge and put it into practice.

Brown (1984) and Hayes and Alverman (1986) claim that students and teachers alike must develop a capacity for critical thinking through coaching, rehearsal and modelling, in order to create an environment conducive to the nurturing of critical thinking.

Pre-intervention Data

In an analysis to align all the pre-intervention data, the conclusion is that parents, learners and teachers are not proficient or experienced in critical thinking. There is a lack of understanding and practical application of critical thinking amongst parents, learners, and teachers.

Paul (1993) states that in a world of shallow values, instant gratification and quick fixes, critical thinking is a tool necessary for survival, and that the need is there to slice through propaganda generated daily not only by self-serving

educational bureaucrats, but also by a rainbow of vested interest groups including parents, teachers and learners, who seems to be ready to sacrifice the well-being of their country to their short term gain. He states that we are not *educating our children, planning as rational people would,* for the economic and social well being of a country if we do not see critical thinking as a tool necessary for survival.

He continues by laying the social and economic problems of a country at the door of education. He sees the ineffectual educational systems mirroring obsolete economic institutions and structures, and urges parents, teachers and children to realise that although the 21st century is upon us, *we are trapped in the 19th century thinking and 20th century* arrogance and narrow-mindedness.

Paul (1993) feels that parents, students and teachers should prepare the way for a new way of thinking, critical thinking, by breaking down remnants from popular, if incoherent, illogical and insupportable ideologies and prejudices of the day. He feels that unless one thinks deeply

and critically, one is still apt to be persuaded by deeply flawed ideas. Unless everyone commits to critical thinking, people will fail to see the sense in which critical thinking provides a common denominator for all fields of knowledge. He states that critical thinking in its legitimate, comprehensive sense applies to every academic discipline as readily as it applies to life beyond the ivory tower.

5.3 Intervention

5.3.1 Analysis of research findings from Teaching and Learning Activities

During the teaching/ learning activities, the grade seven learners from Schools A, B & C were observed to determine whether they understand and use critical thinking.

The responses of the learners at Schools A, B &C, during the teaching & learning activities, were thematically analysed using open and axial coding and the intervention was summarised on a continuum of critical thinking skills

and abilities, representing the following levels: 1) Pre-critical thinking, 2) Awareness of Critical Thinking, 3) Emergent application of Critical Thinking and 4) Proficiency in Critical Thinking. The teaching/learning activities were categorised into academic and life-skills aspects. (See Table 4.9)

5.3.1.1 Learners at pre-critical thinking level.

Many of the learners responded to the classroom based activities at a pre-critical thinking level. This indicates that most learners were not able to respond meaningfully to questions asked, because they had not been exposed to or instructed in critical thinking skills.

Bonnet (1994) claims that the quality of our thinking can affect the quality of our actions serve to underline the general importance of the development of a child's thought for his/ her education. He reinforces this point as he considers the development of a person's thinking has been

held to be central to their educational development – its relationship to the domain of feeling and attitudes.

5.3.1.2 Learners becoming aware of critical thinking practices.

During the teaching/ learning intervention, some learners became aware of critical thinking practices and they responded accordingly.

5.3.1.3 Learners starting to practise critical thinking.

During the teaching/ learning intervention some learners started to practice critical thinking and as they grappled with the information, integration was initiated. Whilst not yet proficient critical thinkers, some learners emerged of whom it could be said that they emerged and are on a path towards critical thinking.

5.3.1.4 Learners who may become proficient critical thinkers.

The consequences of the PAR approach were also evident in that the activities themselves increased the awareness of the learners to critical thinking and that also lead to more proficient critical thinking among the research participants.

The data collected from the responses of the learners at schools A, B, & C clearly indicate that the intervention on teaching / learning activities gradually disclosed critical thinking practices to the learners, and moved them to use their newly acquired skills and knowledge. There was a gradual increase in the amount of critical thinking that was done, first in teaching/ learning activities; especially towards the end of the second day of intervention, and increased until significant evidence of critical thinking practices can be found in the responses of the Learners'

Questionnaire #2.

Bloom (1956/98) claims that 'higher level' cognitive tasks, such as assessing the accuracy of facts from documentation, identifying problems in argument or comparing generalisations and facts cannot be accomplished before more straightforward tasks have been mastered.

Vygotsky's (1978) 'zone of proximal development' is relevant here. New learning must challenge learners, but the challenge should not be too great. The 'zone of proximal development' should therefore be optimal. In the case of children who experience difficulty with some of the more basic skills, such as defining, describing, comparing and so on, the 'zone of proximal development' between existing knowledge and the acquisition of basic skills, rather than critical thinking skills, should be the focus of teaching and learning activities.

5.4 Post - Intervention

Introduction

In analysing Learner Questionnaire # 2, it is clear that the responses indicate that the learners are starting to apply some critical thinking in answering the questions. After intervention all three schools indicated a significant difference in all aspects, in the use of critical thinking skills. The learners are now predisposed to become proficient critical thinkers.

Schools B & C show more critical thinking in self-image, thinking tools, planning for the future and outcome of intervention, after intervention than school A.

For the other aspects there is a difference between all three schools where School B shows more critical thinking than C and C more than A.

The Learners' Questionnaire #1 was also compared to Learners' Questionnaire #2 and the same aspects in each questionnaire were compared. The results indicated a significant increase in the critical thinking activities of the learners after intervention.

5.4.1 Post Intervention Data

The various aspects emanating from the questionnaire indicate that classroom based facilitation of critical thinking can impact on learners. The question immediately arises whether change could be sustained without all the role players' sustained integration of critical thinking practices?

Self-image

As mentioned before, Brightman (2003) states that critical thinking can be nurtured through co-operative learning. He is of the opinion that there is overwhelming evidence to confirm that students produce higher achievements and have

a higher self-esteem. Children seem to feel more in control of the world around them and feel more confident in their own abilities.

Decision Making

Rozakis (1998) points out that children make inferences about the world around them from the times that they are born. These inferences initially are based on feelings. Developing the child's ability to use multisensory clues and intelligences in making inferences and drawing conclusions build confidence in decision making. The ability to make firm decisions

Synthesis of the analysed data

Paul (1993) says that we have refused to face the facts about knowledge, thought and learning. He states that most educators teach as if mere recall were equivalent to knowledge, or they foolishly assume critical thinking to be present when, typically, it is not. Hence, parents, teachers

and other authorities regularly order those under their charge to "think!" while the truth is that they do not know how to think effectively, and nothing in their environment helps them recognise that the art of critical thinking can be learnt. Although this should be the purpose of formal education, what goes on in schools is unrelated.

Grabinger and Dunlap (1995) believe that the underpinning belief of the planned learning experienced is that learning takes place in a social setting where communication and interaction are encouraged. Conceptual growth derives from this interaction, particularly with regard to sharing ideas and justifying and modifying personal perceptions through testing them with others. Such collaborative learning also promotes the acquisition of high levels of problem solving and critical thinking through the involvement of metacognitive processes. Both teacher and parent must be trained to nurture the learner in this regard.

Tama (1989) states that both teachers and students are likely to experience frustration unless they have been prepared for the change in expectations.

5.5 Conclusion

Miller & Connelly (2002) are of the opinion that critical thinking is fundamentally a pursuit of truth. They feel that much of who we are of the people we gave become is due to our ideas and beliefs, and often the source of our beliefs is other people, mostly our parents and our teachers. If we are to be in control of our own beliefs, and to somehow gain an understanding of the truth, we must be instructed, by teachers and parents, in good reasoning so that we can be aware of the ways in which our reasoning can go astray. This implies that parents and teachers should be masters in critical thinking to be able to lead the novice. Oliver & Utermolen (1995) see students as too often being passive receptors of information. Through technology the amount of information available today is massive. This information explosion is likely to continue in the future, Students need

a guide to weed through the information and not just passively accept it, Students need to develop and effectively apply critical thinking skills to their academic studies, to complex problems that they will face, and to their critical choices that they will be forced to make as a result of the information explosion and other rapid technological changes.

Beyer (1985) sees the teaching of critical thinking as important to the very state of a nation. He argues that to live successfully in a democracy, people must be able to think critically in order to make sound decisions about personal and civic affairs. If students learn to think critically, then they can use good thinking as the guide by which they live their lives. He feels that critical thinking should figure prominently among the goals for education, including developers of curricula, educational researchers, parents, teachers and employers.

Keefe & Walberg (1992) state that a physical and intellectual environment that encourages a spirit of

discovery facilitates critical thinking in the classroom. The parents play a crucial role in that they should facilitate such an environment at home. Parents and educators must work closely together to create a similar atmosphere of critical thinking and lifelong learning at home and at school.

Engaging in intervention of one week has proven that such intervention can bring about change in the learners' thinking practices. The challenge is to bring about generic, permanent change in the parents, children and teachers' thinking practices in social context and to sustain such change, rather than decontextualised skills' acquisition. Transformation of society rather that just a reproduction of critical thinking skills is essential.

The question invariably arises again: "Can the learners become proficient critical thinkers and be transformed in their thinking practices if there is little or no facilitation for such practices in the classroom?"

CHAPTER 6: THE STATE OF CRITICAL THINKING IN OUR SCHOOLS: CONCLUSION & RECOMMENDATIONS

6.1 Addressing the research questions

6.1.1 Critical thinking in parents and learners

The parents' questionnaire as well as questionnaires 1 & 2 of the Grade 7 learners were formulated to determine the thinking practices in parents and children in terms of the levels of critical thinking and activities and to create a baseline from which to engage in prolonged interaction with the families' social practices of critical thinking.

The teachers' interviews helped to determine the understanding, knowledge and levels of critical thinking and practice in personal and professional capacity. Clearly, one cannot generalise from the interviews with three class teachers, but in my own experience and supported by literature it seems as though critical thinking teaching and learning in schools must be encouraged.

6.2 Policy and practice

The Critical Outcomes developed by SAQA are in line with the needs of the changing world of the 21st century of the Information Age. Ironically the educators who are obliged to prepare learners for the new world, have not been prepared themselves and are unable to nurture critical thinking in their learners. According to Johnson & Johnson (1994) requiring students to be passive, silent and isolated is still common practice and remains unchallenged in many schools, despite the general understanding of the need for the active participation of learners in their own education.

Paul (1993) sees schooling as collective self-deception because classroom instruction around the world at all levels, is typically didactic, one-dimensional, and indifferent, when not antithetical, to reason. He feels that blank faces are taught barren conclusions in dreary drills. According to Paul *"there is nothing poignant, no exciting twist or turn of mind and thought, nothing fearless, nothing modest, no struggle, no conflict, no rational give-and-take,*

no intellectual excitement or discipline, no pulsation in the heart or mind". He is of the opinion that students are not expected to ask for reasons to justify what they are told to believe, and they do not challenge the thinking of others nor are they challenged in their thinking, Indeed, they do not expect to have to think at all. He feels that such a bleak picture does not typically disturb teachers, and what is disturbing is that what teachers teach often makes no sense to themselves!

Paul seeks to persuade his reader to understand that in the world of accelerating change in which we live, a new form of thinking and learning is required, a form of thinking and learning that involves much more intellectual disciplines and skills of self-evaluation than we have yet learned to accept. He also feels that the economic progress of the future will be increasingly tied to social, educational and even "moral" progress. The economic well being of the future will require the intellectual empowerment and freedom of ordinary, not just extraordinary people. Critical thinking is the essential foundation for adaptation to the

everyday, personal, social and professional demands of the 21st Century. Although the mind is instinctively designed for habit, we have to now learn how to shape the mind to a qualitatively different habit, that of change.

6.3 The need for teachers to be trained in critical thinking

According to Masoga (2003) the teacher, as an agent of change, can play a pivotal role in the teaching-learning process. Masoga quotes Gregorio (1998: 26) who said, "No educational system can rise too far beyond the level of the teachers in it."

At each educational level, thinking must be practiced in each content field. This means hard work for the educator. It is much easier to teach students to memorise facts and then assess them with multiple-choice tests. In a course that emphasizes thinking, objectives must include application and analysis, divergent thinking, and opportunities to

organise ideas and support value judgments. When more teachers recognise that the facts that they teach today will be replaced by the discoveries of tomorrow, the content - versus –the- process controversy may be resolved. (Gallagher, 1975)

The urgent need to teach thinking skills at all levels of education continues, but we should not rely only on special courses and texts to do the job. Instead every teacher should create an atmosphere where students are encouraged to read deeply, question, engage in divergent thinking, look for relationships among ideas and grapple with real life issues, so that he/she can engage the learners in the class in similar activities.

Ristow (1988) confirms that reports on current research indicate that the direct teaching of critical thinking skills can produce better and more creative thinkers.

Presseisen (1986) asserts that the most basic premise in the current thinking skills movement is that students can learn

to think better if schools concentrate on teaching them how to do so.

6.4 Preparing learners for critical thinking

Bonnet (1994) is of the opinion that children take time to develop certain concepts as part of their own thinking. He feels that children will differ in their aptitude with regard to self- referencing of thought. Cognitive ability, individual temperament as well as home background and cultures will influence the disposition of children to engage in critical thinking. He states that there are a large number of things that, because of their limited importance, children need only superficial knowledge, but there are other things, which are important for children to have a deeper understanding of in terms of their educational worth. Learners should therefore have a solid foundation in the basic skills.

Bloom (1956/98) claims that 'higher level' cognitive tasks, such as assessing the accuracy of facts from documentation,

identifying problems in argument or comparing generalisations and facts cannot be accomplished before more straightforward tasks have been mastered.

Huitt (1994) is of the opinion that Bloom and his colleagues (1956) proposed that knowledge is actually composed of six successive levels arranged in a hierarchy: knowledge; comprehension; application; analysis, synthesis and evaluation.

Critical thinking is an active process, while for most students, listening to lectures is a passive activity. The intellectual skills of critical thinking—analysis, synthesis, reflection etc. – must be learnt by actually performing them. Classroom instruction, homework, term papers and exams therefore, should emphasize active intellectual participation by the student.

Getting students to write more is the best and perhaps the easiest way to enhance critical thinking. This is also the answer to the question: "How did students learn critical

thinking before there were formal critical thinking exercises and modules?" Writing forces students to organise their thoughts and think critically about the material. Ask students to write short papers about pertinent topics, review articles, even paraphrase new articles and textbook chapters.

Large classes and student expectation of impartial grading are two of the primary reasons to rely on multiple-choice questions. These are constantly characterized as being inimical to the promulgation of critical thinking. Multiple-choice questions can serve to enhance critical thinking if they are designed correctly. Paul (1993) questions why teachers still believe that teachers could quickly and painlessly "give" learners the knowledge they need. He replies that the answer lies in the important fact that the mind can construct a truth and so "discover" it only through the art of disciplined, collaborative reasoning. We do not come to our experience with blank slates we can form new ideas and thought, only through the scaffolding of former thoughts and it is therefore *essential* that we learn to think

critically in environments in which a variety of competing ideas are taken seriously. Critical thinking requires counter thinking, opposition and challenge as well as support. He argues that this is the only way to gain genuine knowledge, and that there is no way around the need for the minds to think their way to knowledge. Knowledge is discovered by thinking, analysed by thinking, and most important, acquired by thinking. It is therefore imperative that learners are instructed in critical thinking, but then also nurtured in the classroom to apply critical thinking at school, at home and in every sphere of their lives.

Paul feels that when one lays the 21st Century global imperatives against the routines of modern education the misfit is obvious. Not only are teachers insulated from these imperatives, but also even if they recognise them, their own education was severely lacking in stress on critical thinking. They have not learnt the art of disciplined reasoning, and are locked in the past. Teachers, parents and learners must, therefore, engage in new forms of intellectual engagement and collaboration.

Paul stresses the notion that we foster a new conception of the value critical thinking, and take the "true fitness of our minds" seriously. It is of utmost importance to reconceptualise the nature of teaching and learning in every context of life. We must make disciplined practical reasoning and problem solving into a normal occurrence in everyday situations, not extraordinary performances of an elite few. He states that education in the broad sense of any skilled act of disciplined; self-evaluate learning- has a crucial role to play in the fostering of critical thinking

Critical Thinking across the disciplines share common features:

- Critical thinking is a learnable skill with teachers and peers serving as resources.
- Problems, questions and issues serve as the source of motivation for the learner.
- Courses are assignment centers rather than text or lecture oriented.

Goals, methods and evaluation emphasize using content rather than simply acquiring it.

Students need to formulate and justify their ideas in writing.

Students collaborate to learn and enhance their thinking (Myers 1986).

6.5 Parents

Most parents were subject to the content-based education system in the past, and need to change their own paradigm with regards to critical thinking and lifelong learning. The school can play a vital role in supporting parents to develop critical thinking skills. Parent orientation and parent training can be very helpful in equipping parents to deal with the challenges that they too have to face in the Information Age of the 21st Century. The school has a great opportunity to assist parents to become more intimately involved in their child's schooling, and to bridge the gap between their world-view and that of their children, by

presenting critical thinking workshops and clubs for parents and children.

6.6 Recommendations.

The implementation of thinking skills initiatives should be gradual and proceed in a critical/reflective way, the "start small" concept, so that all parties concerned will not feel overwhelmed and ready to give up before they have even started.

a) Teachers –

How to train and support their own development of critical thinking in their personal lives.

Through workshops and training at schools, teachers should be made aware of how important it is to be equipped with the tools of critical thinking, and the understanding that critical thinking is an approach to the world, a way of life that goes beyond skill or technique. Through a programme of mentoring teacher could be encouraged to:

i. Develop a certain amount of open-mindedness, necessary to engage in critical thinking.

ii. A desire to seek after the truth without becoming threatened when having to change a belief or mindset.

iii. Develop an analytical mind, calling for evidence to substantiate a certain point of view.

iv. Become confident in using critical thinking so as to impart the skills and the confidence to others.

v. Ask questions so as to nurture an inquisitive and exploring attitude. This will enable educators to nurture the same attitude in their learners.

When the educators understand and have adopted the lifestyle of a critical thinker as discussed above, they will be in a position and have the desire to nurture critical thinking in their students.

b) Teachers-

How to train and support their own development of critical thinking in their professional lives.

Bell (2001) states that we cannot teach children to think critically by only talking about it.

Life-long Learning has become the norm adopted by the Department of Education in South Africa, and is in line with the Outcomes Based Education. Someone once said that as long as teachers are learning, they should be teaching, but when they stop learning, they should stop teaching. The desire to learn should therefore be kindled in every teacher.

Teaching thinking skills should fit into what teachers already know is an integral part of good teaching; it should allow teachers to reflect on their practice, but must not be seen as an "add-on."

Thinking skills must not be perceived as a discrete area. The whole curriculum is the context for teaching thinking in an interactive approach to thinking across the subject range is recommended. The subject specialist would want to be trained in his/her specific subject to deal with the

critical thinking approach best suited for that specific learning area. Certain generic critical thinking applicable to all learning areas should be the foundation upon which subject specific thinking can be built. Debate might be a vital skill in History or Languages, but not as important in Maths. Research needs to identify how many of the specific thinking skills are common across the curriculum, and training should be given accordingly.

Teachers must be trained in specific critical thinking tools and strategies must be taught to train them to teach/facilitate the development of critical thinking in others.

Once they have *bought into* the concept because of its importance, they would not have to be persuaded by the Education Department, or the Principal of the school, to teach critical thinking. The approach would be driven from the ground up, not as a top down directive.

Thinking skills should be viewed as one of the ways of raising achievement, but not the only way. Teaching thinking skills should be interlinked with the concept of multiple intelligences, accelerated learning and development of self-esteem. Most teachers are aware of the importance of these skills and would welcome new ways of instilling these aspects in their learners in an integrated approach.

Within each school, a core group of committed/trained teachers should be identified who could affect change rather than having "one-off" presentations from brought in experts.

Some of the aspects that both prepared and under prepared teachers can focus on to create a classroom atmosphere conducive to positive learning, are to :

1. Focus on the positive. Verbal and written comments should encourage students.
2. Build trust by respecting the privacy of students who are battling.

3. Involve learners in all the activities and allow opportunities to share.
4. Refrain from being predictable. Opt for variety to stimulate curiosity.
5. Equip learners with the tools for success, of which critical thinking is an important one. Do not assume learners have been equipped before.
6. Use real life examples that will assist students in integrating reality into their world.
7. Adjust the curriculum where necessary to reflect what learners need to learn.
8. Get students interested in the learning material.
9. Learning must be made more appropriate by examples, picture, field trips, which will encourage learners.
10. Tell learners why critical thinking is important to learn. That will encourage them to participate.

11. Minimize testing and evaluation initially.
12. Catch the learners using critical thinking and reward them. Watch for opportunities to encourage them to use critical thinking. Ask questions that would stimulate critical thinking.
13. Promote a positive self-esteem in learners that will encourage them to express opinions and thought.

Teachers who are under prepared would find valuable resources for personal study in libraries as well as on the Internet. Some of the websites are mentioned below.

Websites that educators may access for resource material on critical thinking.

http://www.questia.com/Index.jsp?CRID=critical_thinking&OFFID=se 1

http://www.psychcorpcenter.com/content/wgct.htm

http://www.zipcon.net/~highroad/ie.htm

http://www.nwrel.org/scpd/sirs/6/cu11.html

http://www.nwrel.org.scpd/sirs/3/snap11.html

http://www.tki.org.nz/r/health/understanding/critical_thinking_e.php

http://www.freinquiry.com/critical_thinking.html

http://www.bu.edu/wcp/Papers/teac/TeacCohe.htm

http://www.ericae.net/edo/ed385606.htm

http://www.ericae.net/edo/ed338704.htm

http://www.ericae.net/faqs/crit_tnk.htm

http://www.nrf.ac.za/focusareas/educate/

http://www.scotland.gov.uk/library3/education/fttd-07.asp

http://www.bjup.com/resources/articles/balance/2002b.html

http://www.bjup.com.resources/articles/balance/1202.html

http://www.bjup.com/resources/articles/hsh/0804.a.html

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http://www.edu.utc.edu/TeachingResource_Center/critical.html

http://www.criticalthinking.org/K12/k12class/trc.html

http://www.santarosa.edu/~dpeterso/

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http://www.ncrel.org/sdrs/areas/issues/envrnmnt/drugfree/sa3crit.html

http://www.kcmetro.cc.mo.us/longview/ctac/htm

http://www.dartmouth.edu/~compose/faculty/pedagogics/thinking.html

http://www.theriver.com/Public?tucson_parents_edu_forum/us.html

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http://sdb.bio.purdue.edu/SDBEduca/dany_adams/critical_thinking.html

http://www.library.usask.ca/ustudy/critical/critnoncrit.html

http://www.ed.uiuc.edu/EPS/PES-earbook/96_docs>endres.html

http://mathforum.org/k12/k12puzzles/critical.thinking/

http://chiron.valdosta.edu/whuitt/col/cogsys/critthink.html

The educator should allow time to discuss topical issue that would encourage learners to use critical thinking skills in their personal lives to solve problems and make decisions in a logical manner. A rich stimulating classroom is conducive to the development of critical thinking. Teachers should be

flexible to accommodate various learning and thinking styles. Encourage students to think before they discuss issues, and educators should not interrupt with their own opinion whilst learners are formulating their own. Educators do not have to be *in charge* all the time.

c) Learners

Teachers must determine what the learners know and what they need to know, before they plunge headlong into any teaching. All teaching/-learning activities should be so stimulating and challenging for the learners that they would desire to achieve.

Van Der Horst & Mc Donald (1997) state that Higher thinking skills & problem-solving skills must be included in teaching to allow learners to use the full power of their minds. It is insensible to try and teach higher-order thinking before a firm educational foundation of basic skills is in place.

Bloom's (1956) taxonomy of cognitive learning states it clearly that higher order thinking will not be operational before the basics have not been mastered, for example when learners are able to describe something accurately – this could be a key indicator that will help a teacher know that learners are now ready to move on to simple analytic skills – like comparing and contrasting two items.

Bloom (1956/98) claims that 'higher level' cognitive tasks, such as assessing the accuracy of facts from documentation, identifying problems in argument or comparing generalisations and facts cannot be accomplished before more straightforward tasks have been mastered.

Vygotsky's (1978) 'zone of proximal development' is relevant here. New learning must challenge learners, but the challenge should not be too great. The 'zone of proximal development' should therefore be optimal. In the case of children who experience difficulty with some of the more basic skills, such as defining, describing, comparing and so on, the 'zone of proximal' between existing knowledge and

the acquisition of basic skills, rather than critical thinking skills, should be the focus of teaching and learning activities. Problem solving, metacognition, understanding and positive characteristics are the key elements needed to create a learning environment for the sustained development of higher order thinking skills, once the basic skills are in place.

Sustainability

Any newly acquired skills should not become a single decontextualised lesson. The importance of the sustainability of generic critical thinking practices cannot be emphasized enough. There should not merely be a reproduction of information in class, but a total transformation of learners in terms of thinking practices.

d) The School/ Classroom Environment.

Langford (1989) believes that the school can be expected to nurture more effective thinkers and suggests that teachers

study cognitive development in order for them to understand learning in children so that they can set up their classrooms in such a way that learning can take place optimally.

Farnham-Diggory (1992) supports the idea that the learning environment should be changed to suit the changing practices. Bonnet (1994 feels that the curriculum is too structured and rigid and that the learning should be structured in such a way that there is room for learning and thinking in an active way. Children should not receive information passively from the teachers. He uses Bloom's (1956) taxonomy of cognitive skills to indicate that critical thinking can be equated with the highest of the levels, viz. evaluation.

The school can become a more interesting and challenging place for a child, and he/she can experience the adventure of play as well as the adventure of ideas. Fisher (1990) supports the idea of the school using co-operative learning

as a means of stimulating lateral, critical and creative thinking.

When learners are reluctant at first to venture into exploring critical thinking, the educator should gently coach learners into critical thought, but should refrain from giving up or getting angry with students.

e) Parents

If there is little critical thinking in the home environment the school can play a role to assist parents to promote success in the learners and create an educational environment at home conducive to learning and critical thinking.

The critical thinking tools that a teacher is teaching in class at any given time could be sent home to inform parents and they could then be included in a project with their children.

Parents can be coached in the following ways:

a. They can celebrate, in moderation, the child's success and improvement in critical thinking to encourage him/ her to persevere.

b. Parents must be taught to be positive towards the child's teachers, school, learning and the child itself. If they do not understand fully how to integrate critical thinking they must have the freedom to approach the teacher for more information.

c. Parents must set achievable goals for their children and for them, to develop critical thinking.

d. Parents must refrain from giving the answers to their children before they have been given an opportunity to grapple with the issues at hand.

e. Parents must assist their children in connecting their efforts with results, so that the children can be encouraged to persevere in using critical thinking continuously.

f. It is important for parents to require specific time each day where their children will engage in academic activities, including critical thinking for which

parents must provide a specific place and a specific time for their children.

g. To share and encourage children will be easier if parents are taught to involve their children in day-to-day decision making, which will help students to build understanding, confidence and skills.

h. Parents may use incentives occasionally to encourage their children as long as it does not become conditional to them taking action.

i. In communicating clearly to their children, parents teach their young to think logically before speaking.

j. Parents must be coached to realise that they may create fear in their children, which will not encourage freedom to think and explore problem-solving issues. Parents must be encouraged to build their children's self- esteem.

f) Curriculum

Orlich, Harder, Callahan & Gibson (2001) confirm that critical thinking must be included in the curriculum. Not

only must learners be taught to foster the philosophy of life long learning, but the curriculum must be geared to helping students to be better thinkers. The basic elements of inquiry teaching, inductive instructional models and methods for developing higher level thinking skills and problem solving must be integrated in the curriculum.

Thinking skills should be included in whole school policies for Learning and Teaching, and then spread to policies for curricular subjects.

A steering group of interested/-experienced teachers should be formed to develop practical guidelines for use throughout the school.

6.7 *Exhortation*

In conclusion the challenge for every educator, parent and learner, in fact every citizen of South Africa to take up the challenge, not to feel threatened by accelerated change and complexities of transformation, but to take up the challenge

to integrate change in order to impact positively on South African society through new ways of thinking, responding and living.

All educators, parents and learners should work together to nurture critical thinking in every sphere of life. The should recognise and develop effective critical thinkers able to:

- ❖ Reflect
- ❖ Make deductions and come to valid conclusions
- ❖ Form and substantiate opinions
- ❖ Classify and prioritise information
- ❖ Question all information and determine its true value
- ❖ Evaluate arguments
- ❖ Analyse phenomena
- ❖ Use multi-perspective to understand fully
- ❖ Perceive possible ways of applying knowledge
- ❖ Build on and expand existing ideas and information
- ❖ Find alternatives and create new ideas
- ❖ Reason logically
- ❖ Control and organise his own thinking
- ❖ Distinguish between fact an opinion

In teaching practice the critical outcomes could be developed to incorporate critical thinking in the following manner:

1. Decision making using critical and creative thinking;
    - Brainstorming
    - Analyse
    - Comparisons
    - Organisation
    - Points of view
    - Gathering data
    - Mind-mapping
    - Problem-solving
    - Prioritising
    - Interpreting

2. Work effectively with others in a group.
    - Group work and team work
    - Co-operative learning assignments.

3. Organise and manage oneself responsibly and

effectively.

- Individual tasks
- Developing intrinsic motivation
- Planning

4. Collect, analyse and critically evaluate information.

- Projects
- Research
- Study Skills
- Interpreting charts
- Cause and effect

5. Communicate effectively (orally and in written form).

- Debating
- Discussing
- Reading activities
- Drama
- All forms of writing
- Poetry
- Talks
- Story-telling/Narration

- Vocabulary and spelling enrichment
- Grammatical skills

6. Using Science and Technology effectively.
   - Self-discovery
   - Computer literacy
   - Environmental awareness
   - Community projects
7. Understanding the world as a related set of outcomes.
   - Integrated teaching
   - Theme teaching

8. Life skills making learners aware of:
   - Exploring different learning styles
   - Community involvement
   - Cultural diversity
   - Exploring educational opportunities
   - Developing entrepreneurial skills

It is not possible to continue to ignore the importance of critical thinking. All educators, parents and learners must work together to transform themselves, their schools and their communities to transcend the challenges of the past and present and leave footprints of success in the future, so that others may follow.

6.8 Concluding Reflections

Habermas (1990) theorises that critical thinking takes place within social, political and historical contexts. Habermas believes that human knowledge is largely determined by its social-historical circumstances. For Habermas, everyone is a product of their "life-world" or the cultural-linguistic traditions in which they participate, and the life-world defines the norms at issue in any argument.

Habermas further believes that there are three dimensions of the life-world: the objective world; which represents facts independent of human thought and serves as a common reference point for determining truth; the social world,

comprised of intersubjective relationships; and the subjective world of private experiences. Habermas is of the opinion that the person, who can differentiate between the three aspects of experience, achieves a "decentred" understanding of the life-world, which allows one to distinguish matters of truth, justice, and taste according to the objective, social and subjective views respectively. This "decentering" plays an important role in critical thinking. In the South African context, learners must achieve "decentred" understanding to judge in matters of truth, justice and taste; thus nurture critical thinking.

Endres (1996) suggests that in the light of Habermas' theory, accounts of critical thinking should focus on "decentering" in the sense of considering previously unacknowledged presuppositions underlying one's beliefs and norms of society. According to Endres and Paul (1992) there are certain obligations presupposed in communication, including a commitment to "decenter" from one's social–historical point of view. Not only should educators address wrong concepts of learners in the past in terms of apartheid

and values attached to people because of skin colour, but also the informal logic in which critical thinking has been cast traditionally. Endres and Paul (1992) believe that the inequalities can be addressed that reason poses for preserving human difference.

In the context of Apartheid South African context, the ruling class considered African people to be inferior, and they subsequently denied access to particular forms of education, including critical thinking (Kallaway, date). For white South Africans, education was conceptualised in terms of 'fundamental pedagogics', that is the transmission of skills and knowledge – but not the right to critique the educational or social system in South Africa. Critical thinking was excluded from the education of the majority of South Africans. The whole school system geared towards content based and rote learning – although there were different types of content and different types of rote learning for the different population groups of South Africa. In the light of the past educational inequalities and inadequacies, is it understandable that in post-Apartheid

South Africa critical thinking skills and abilities should have come to play a central role in educational policy and curricula.

In addition to the inclusion of critical thinking as a means for addressing inequalities in our schools and society, there is another reason why critical thinking has been emphasised in educational policy – which has to do with global influences – such as 'The Information Age' (Castells, 1996/2000) than with local transformation.

Huitt (1994) sees critical thinking as an important element of life success because of the movement to the information age, which has also affected South Africans. New outcomes, such as critical thinking, are required because of the changing conditions, and should be included as a focus of schooling. Huitt continues by saying that old standards of simply being able to score well on standardised tests of basic skills, though still appropriate, cannot be the sole means by which we judge the academic success or failure of our students. Huitt feels that teachers and instructors at all

levels must require students to use critical thinking skills in every class and evaluate their skill accordingly. The teachers play an important role because the students are not likely to develop these complex skills without specific, explicit expectations and their measurements in the form of important assessments.

Education in South Africa thus needs to meet the challenges of the globalised information society, but education must also address the national need for more a more equitable and representative education system. The purpose of education in South Africa is thus essentially two-fold: it must produce learners who should be well prepared to enable South African participation in the competitive global information society; and it must produce learners who are able to contribute to the equally important agenda of basic reconstruction and development. Educational policy recognises this duality by including critical thinking skills across all school curricula. These are valued as way of enabling South African participation internationally; but

equally these critical thinking skills are valued as a way of ensuring equity in South African society.

These are important and relevant goals for our educational system. But while due emphasis is given to them in policy documents, my research has shown that in terms of school practices (and home practices) critical thinking is not being implemented.

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Appendix A: Parent's Questionnaire

QUESTIONNAIRE

Please complete this questionnaire as part of the research project that your child is involved in at school, and return immediately. There are no right or wrong answers, your own, honest opinion is important. Thank you.

1. Do you live in your dream house?
   - Yes ☐
   - No ☐

2. Would you like to move elsewhere?
   - Yes ☐
   - No ☐
   - I am not able to ☐
   - Nothing I can do ☐

3. Are you in a career/job of your choice?
   - Yes ☐
   - No ☐

4. Would you like to change jobs?
   - Yes ☐
   - No ☐
   - I am studying to improve ☐
   - Nothing I can do ☐

4. Do you belong to a library?
   - Yes ☐
   - No ☐

5. How often do you visit the library?
   - Once a week ☐
   - Once a month ☐
   - Once a year ☐
   - Never ☐

6. I'd rather watch television ☐
   I don't have time to read ☐
   I don't like reading ☐

7. What type of books do you read?
   - Fiction ☐
   - Non-fiction ☐
   - Biographies ☐
   - Technology ☐
   - Self-help ☐
   - Motivational ☐
   - Business ☐
   - Other ☐

8. How did you choose your child's school?
   - *Closest to home* ☐
   - Cheapest ☐
   - En route to work ☐
   - Good Academics ☐
   - Good Sports ☐
   - Never thought about it ☐

9. How many children do you have?
   - Only 1 ☐
   - Less than 3 ☐
   - More than 5 ☐

10. Did you plan each of your children?
    - Yes ☐
    - No ☐
    - I can't ☐

11. How do you see your child?

Clever	☐
Happy	☐
Sad	☐
Angry	☐
Lazy	☐
Stupid	☐

12. Children should wear school uniform.

Yes	☐
No	☐

13. Children who cannot afford the latest fashion should:

Steal them	☐
Ask the school	☐
Ask the government	☐
Leave school	☐
Wear anything	☐
Be upset	☐
Open clothing accounts	☐

14. When do you buy a new appliance?

When I see it	☐
When I need it	☐
When it's cheap	☐
When I have saved	☐
Never	☐

15. Do you plan your holidays in advance?

Always	☐
Never	☐
Can't afford it	☐

16. Is there something in your life that you would like to change?

- Yes ☐
- No ☐
- I can't ☐
- It will change by itself ☐
- Yes, I'm working on it ☐

17. Do you use specific thinking tools when you make decisions?

- Always ☐
- Sometimes ☐
- Never ☐
- I do not know any ☐

18. Let's talk about the future:

- I am carefully planning for a better future. ☐
- The government will help us to make it better. ☐
- Things will just be better by themselves. ☐
- Crime is bad, tomorrow will be worse. ☐

19. Do you know where you would be in 5 years' time?

- Nobody can predict the future ☐
- No, I am just hoping for the best ☐
- Yes, I am planning every step of the way ☐
- I hope the government will help ☐
- It will be better, it will just happen ☐

20. What is your age range?

- 20-30 years ☐
- 30-40 years ☐
- 40-50 years ☐
- 50+ years ☐

21. What is your gender?

- Male ☐
- Female ☐

22. Would you like to have a million rand?

- Yes ☐
- No ☐

23. What would you do with a million rand?

Spend it all	☐
Buy a new home	☐
Buy new cars	☐
Buy clothes	☐
Study further	☐
Plan carefully what to do	☐
Save some money	☐
Give it to my children	☐

Appendix B

PO Box 4393
Tyger Valley
7536
17 June 2003

Dear Parents

Permission for your child to participate in a research project.

I am the principal of Lighthouse Centre of Learning, in Parow, and of course an educator. I am currently doing a research project to determine whether learners use critical thinking skills in learning, and whether they can be taught to think critically.

Would you kindly permit your child to participate in such research? It involves merely 6 lessons in which creative thinking skills will be taught. It could be beneficial to your child to be informed of these thinking skills.

There is no financial cost involved, and all data collected will be treated with utmost confidentiality. The information is used only by me personally in the completion of a Master's Degree in Education, in which the topic of fostering critical thinking in the classroom is addressed..

Your cooperation is highly appreciated.

Yours faithfully

_____
Suritha Kaminsky

Reply Slip:

Please complete the reply slip and return to school immediately.

I _____ parent of_____

in Grade 7 _____ hereby gives permission for my child to

participate in the research program.

_____ _____
Signed Date

Appendix C:
Learners Questionnaire # 1

QUESTIONNAIRE

1. How do you see yourself?

Clever	_____	Happy	_____
Lazy	_____	Angry	_____
Sad	_____	Stupid	___

2.a What do you think children should wear to school every day?

School uniform ____ Own clothes ____

b Why?

_____
_____
_____

3. What should children do who want to wear the latest fashion in clothing but can't afford it?

_____
_____
_____

4. How do you choose what to wear daily?

_____
_____

5. How do you choose what style of clothing to wear?

_____
_____

6. To which library do you belong?

_____

7. How often do you visit the library?

_____

8. What type of books do you enjoy reading?

_____

9. Mention any specific thinking tools you know.

_____
_____

10. Have you learnt the habits of thinking carefully, broadly and in an organized way?If yes, name them.

_____

11. What different thinking skills do you use to perform different tasks?

_____

12. How do you plan your thinking so that you know what to do before, during and after performing a task?

_____

13. Would you like to be a millionaire one day?

_____

14. How do you plan to become a millionaire?

_____
_____
_____

15. If I gave you R1000.00 right now, what would you do with it?

_____
_____
_____
_____

16. If I gave you R1000.00 and ask you to double the money, what would you do?

_____
_____
_____
_____

17. How do you think most millionaires became so rich?

_____
_____
_____

18.Have you ever had to make a serious decision?
Yes _____ No _____

What did you do? How did you choose?

_____
_____
_____

19.a Do you think you are doing well at school?
Yes _____ No _____
b Explain your answer.
c How can you do better?

_____
_____

20. a Would it be a good thing if there were no teachers? Yes _____ No _____
b Explain your answer.

_____
_____
_____
_____
_____

21. How do you prepare yourself for school every day?

_____
_____
_____
_____
_____

22. When you have some homework that you don't understand. What do you do?
Leave it _____ Ask a friend_____
Ask parent _____ Ask teacher _____
Other: Explain

_____
_____
_____

23. What are you planning to do during the holidays?

_____
_____

24. What career would you like to follow?

_____

25. What is Education?

_____
_____

26. Why do you attend school?

_____

27. If there were no schools, what would you do?

_____

_____

_____

Name: _____
Date of Birth: _____
School: _____
Grade: _____

Appendix D

Learners' Questionnaire # 2

Please complete the questionnaire truthfully. There are no right answers; we just want your opinion. Please answer all the questions.

1.a) Do you believe you can be successful in the future?
Yes ☐ No ☐
b) Why?

_____
_____

2. What is your understanding of education?

_____
_____
_____

3. How would you think differently now about the future?

_____
_____
_____

4.a) Do you have the tools to think differently now?
Yes ☐ ☐No

b) Please tell me what tools they are and what you would do with them.

_____
_____
_____
_____

5. What have you learnt in this week that will help you to change the way you think and learn?

_____
_____
_____

6. You have just been given R5000.00. What are you going to do with it?

_____
_____
_____

7. You have just heard that someone has paid for you to go to USA for a year. You may choose if you want to go or not.

a) Will you go? Yes ☐ No ☐

b) How will you decide whether you should go or stay?

_____
_____
_____
_____

8.a) Does it matter how you talk to yourself?
Yes ☐ No ☐

b) How does it matter?

_____
_____
_____
_____

9. You see a man in a car on the side of the road. It seems as if he is dead and his car crashed. What tools can you use to decide what has happened to him, and what you should do next?

_____
_____
_____

10. How has the teaching this week helped you?

_____
_____
_____
_____
_____

Thank you for your help!

Appendix E: Teachers' Interview Schedule.

1. Are you familiar with the terminology Critical Thinking?"
2. How do you help learners in the classroom to develop lateral thinking skills?
3. Could you name any thinking tools?
4. How do you use these thinking tools in your daily life?
5. How would it be helpful to any person to have thinking tools to solve problems and make decisions?
6. Would it be important for learners to have thinking tools to make decisions, solve problems and learn more effectively?
7. Is it important to teach critical thinking? Why?
8. Why, in your opinion, do teachers not teach critical thinking?
9. How should teachers learn about critical thinking?
10. How should learners learn about critical thinking?
11. In what way, if at all, do parents influence the way their children think?
12. Have you taught the learners in your class about critical thinking this year? If yes, How do they apply critical thinking?

Appendix F

B.B. Bloom Taxonomy for cognitive Learning.

COMPETENCE	SKILLS DEMONSTRATED
Knowledge	• Observation & recall of information • Knowledge of dates, events, places • Knowledge of major ideas • Mastery of subject matter • Question Cues: List, define, describe, tell, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
Comprehension	• Understanding information • Grasps meaning • Translate knowledge into new context • Interpret facts, compare, contrast • Order, group, group, infer causes • Predict consequences • Question Cues: Summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
Application	• Use information • Use methods, concepts, theories in new situations • Solve problems using required skills or

	knowledge • Questions Cues: Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover
Analysis	• Seeing patterns • Organisation of parts • Recognition of hidden meanings • Identification of Components • Question Cues: Analyse, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer
Synthesis	• Use old ideas to create new ones • Generalise from given facts • Relate knowledge from several areas • Predict, draw conclusions • Question Cues: combine, integrate, modify, rearrange, substitute, plan, create, design, invent, what if?, compose, formulate, prepare, generalise, rewrite
Evaluation	• Compare and discriminate between ideas

	• Assess value of theories, presentations • Make choices based on reasoned argument • Verify value of evidence • Recognise subjectivity • Question Cues: assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize.

Appendix G

Og Mandino A better Way to live

Picture this scene for me, if you will.

It's a wet and gray and dismal morning in one of the most desolate and dangerous neighbourhoods of Cleveland. With the thermometer hovering just above the freezing mark, the earlier downfall of snow has changed into a combination of rain and ice, and the refuse-strewn streets and gutters, with their endless rows of dingy bars, porno peep shows, and smelly hamburger joints are almost empty of humanity. One would search in vain for even a small hint that it is only four weeks to Christmas.

Suddenly we see movement... a sign of life. Leaning against a cracked pawn-shop window, to protect himself from the elements, is a derelict, his tattered denim shirt providing little protection from the cold and wet for his thin body. The wretch's matted hair hangs down to his shoulders, his eyes are bloodshot from the cheap wine he has already consumed this morning, and his stomach aches from lack of food.

After his bearded face has been pressed against the dingy pane of glass for several minutes, something inside the pawnshop window, on the drab and dusty shelf, catches the bum's attention. A gun... a small handgun, and attached to it is a yellow tag: $29.

The man moans and jams his bruised right hand into the pocket of his soiled jeans, removing three soggy ten-dollar bills- all he has in the world. Then he cries out, half-aloud, "There's the answer to all my problems! I'll buy that gun and a couple of bullets and take them back to that mangy room where I'm staying. Then I'll load the gun, put it to my head... and pull the trigger! And never again ... never again... will I have to face that terrible failure in the mirror!"

That man was indeed a failure.

He had managed, in just a few short years, to lose everything in life that was precious and meaningful to him- a loving wife, a beautiful daughter, a nice home, a decent job, plus all his pride, his faith, his confidence and his self-esteem. He had tried to play the game of life- as so many do- without taking the time to learn the rules. And now he was about to pay the price for his ignorance.
In the rain, on that miserable morning, he was ready to throw his life away.

That pitiful human being, preparing to cancel his future, was not about to perform an usual act. Sadly, I'm afraid, that same scenario is repeated hundreds of times a day in this beautiful country of ours when people finally lose their last shred of hope in a tomorrow that once held so much promise. And that doesn't count the thousand who don't take their lives but give up anyway. They quit on themselves.
They let all their dreams fade into the twilight. They stop trying and just exist; leading what Thoreau called "lives of quiet desperation." They're already dead, at age twenty-five or thirty or fourty or even fifty, for all they are accomplishing... even though we won't get around to burying them until they're seventy-two.

Fortunately, that sorry individual, that loser shivering in the rain in Cleveland, didn't buy that gun.
He didn't blow his life away on that terrible morning so many years ago.

If he had, I wouldn't be here, to share these precious moments with you... or to help you make your dreams come true."

Appendix H

Self-Talk.

Have you listened in to what you have been saying to yourself lately? If not, you should be. We talk to ourselves all the time, and what we are saying to ourselves influences our decisions and behavior.

Each of us has an inner voice, which is talking to us all the time, and this inner voice is never passive. It has very strong opinions on every aspect of your life. It' s either helping you and talking you up or it's putting you down. It's filling you with thoughts of fear, worry and confusion, or thoughts of confidence, hope and inspiration. There doesn't seem to be a middle ground. So knowing what it's saying is important.

It's almost as if there were a mental tape recorder playing inside us; and we have tapes for every situation. These tapes consist of beliefs; hopes, worries, fears, desires, opinions and judgments, and we play them over and over within us as different situations arise.

When you mentally repeat to yourself phrases, as *"I'll never do it," "I'm always losing," "It will be another disappointment for me," "Things never go right,"* you are talking yourself into that exact situation. You begin to expect the worst and actually help it to happen to you.

The opposite "*self-talk*" has an empowering effect. Phrases such as *"I can do it," "I'm a champion," I always come through in the end," "I can't lose," "Nothing is going to stop me,"* reinforce your belief in yourself. It gives you moral support. It's a cheering section inside you. It uplifts and empowers you. The wise King Solomon once said: "Death and life are in the power of the tongue." Proverbs 18:21

You can use self-talk in numerous situations. Just find a phrase that represents what you want to have happen to you and begin repeating it over and over to yourself.

Do this all the time, when you are working, walking, playing and even resting.

Here is what will happen to you, and will change you forever. You will come to believe whatever you repeat to yourself providing you repeat it often enough. Tell yourself enough times you are a loser, and you will come to believe it. Tell yourself over and over that you are destined for greatness and that's what you will accept. *The most exciting part is that you decide what you say!* Nobody else can decide for you whether you will be a success. You choose.

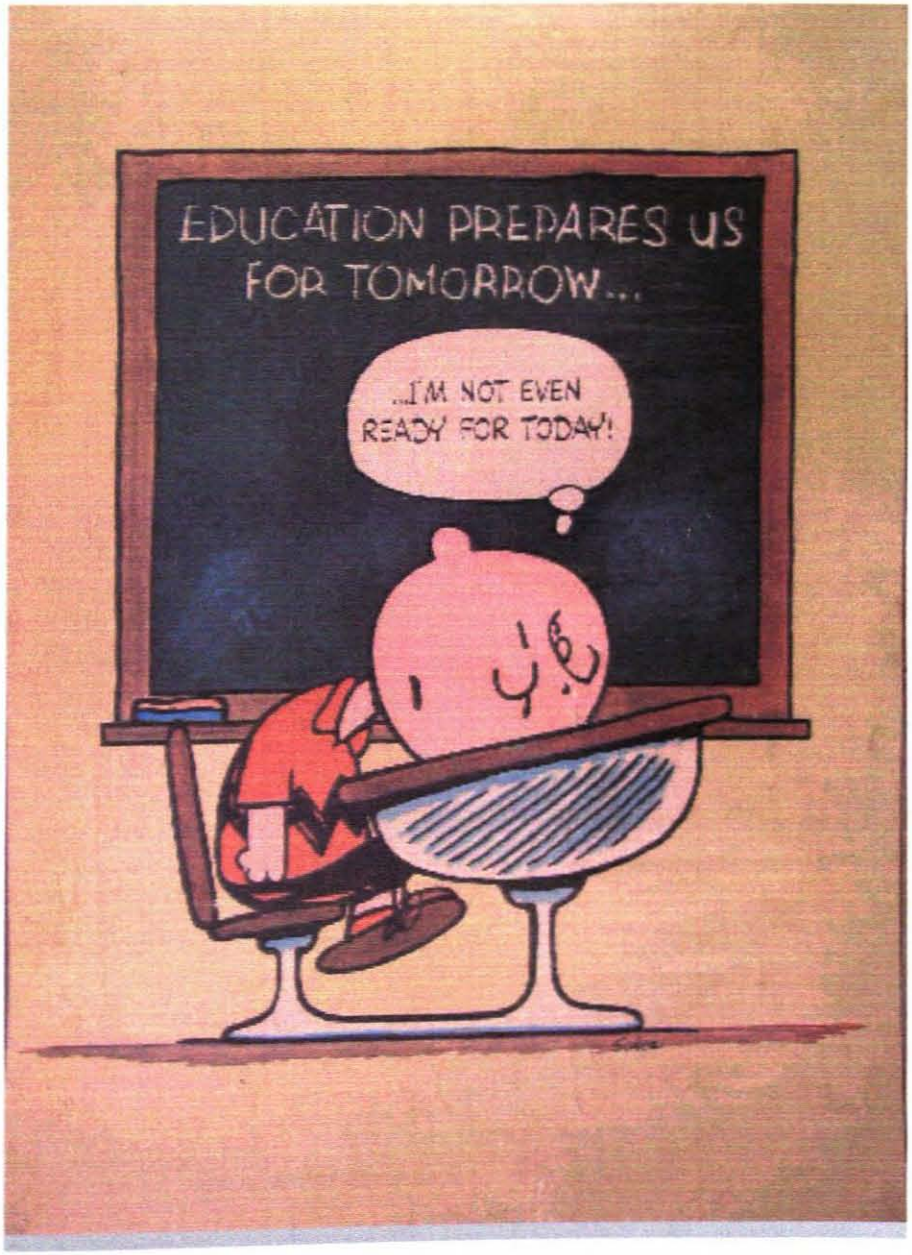
We cannot stop the inner tape recording playing, but we *can choose* what tape to play. Not only do we choose the tapes, but also we actually create them.

Be selective with what inner tapes you listen to, and be vigilant. Negative self-talk almost naturally follows a negative experience or failure. Without even realizing it, the tape goes on: "*It's hopeless,*" "*I will never win,*" "*I'm a loser.*" Look out and stop yourself quickly when this tape comes on.

Because people respond well to encouragement, we should be encouraging ourselves as well. Don't be too hard on yourself; if you need encouragement; give it to yourself! Ask: "What can I say to myself today that is supportive and nurturing for me?"

Think of what great empowering things there are to say to yourself. Write them down and carry them with you. Repeat them over and over again. Don't wait any longer; begin today.

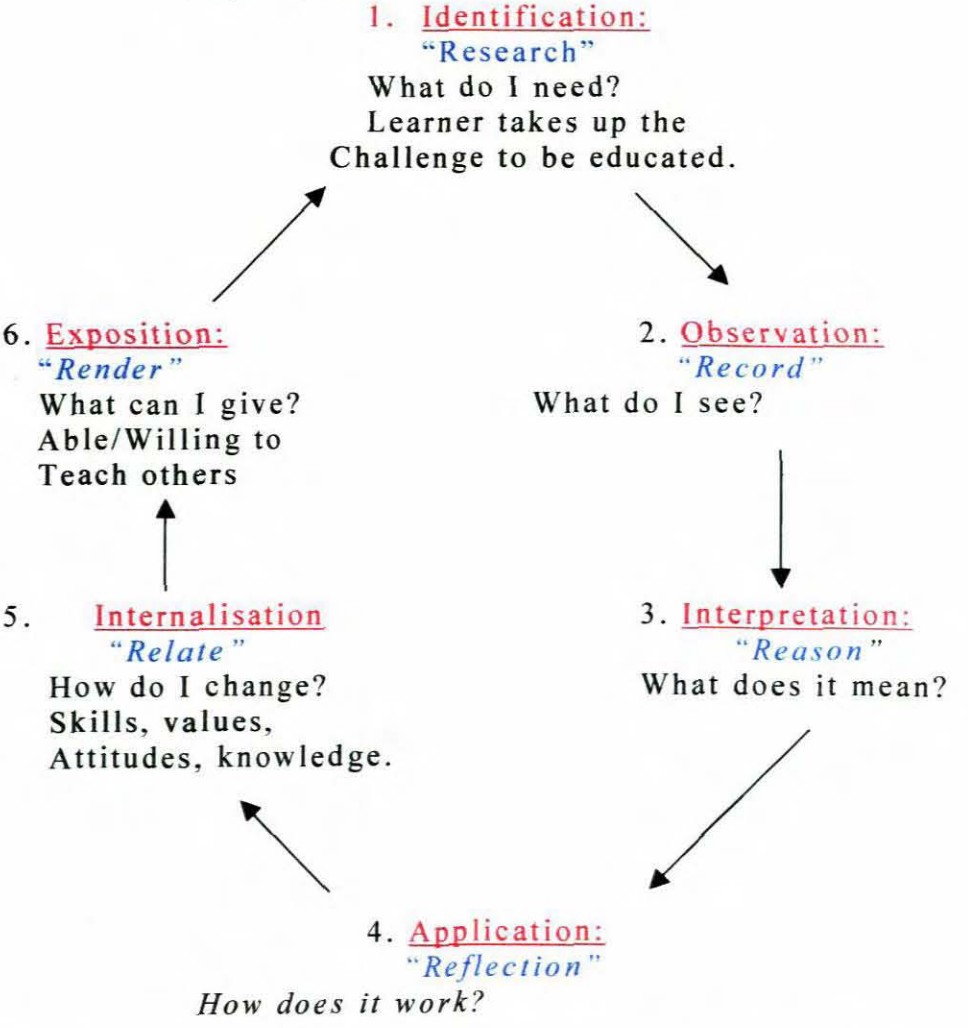
Appendix I: Poster



Appendix J: The Education Process.

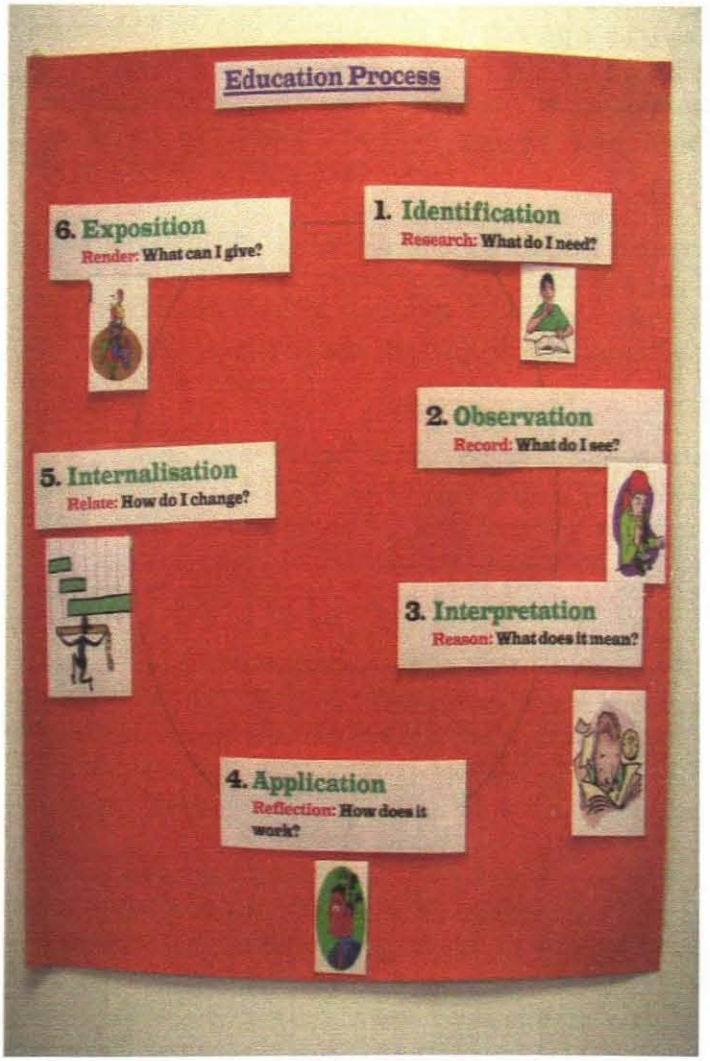
Teaching and learning should involve the basic principles of:

1. Identification
2. Observation
3. Interpretation
4. Application
5. Internalisation
6. Exposition



The learner can at any time decide not to participate in the education process, exit the circle, and the process will fail. Should the learner decide to continue, all the steps from 1 – 6 will have to be followed.

Appendix K: Education Process



Appendix L The Story of Jeans

Levi Strauss was born in 1830 in Germany. As a young man he could not get work, so at the age of seventeen he immigrated to America. When he arrived, he was very poor. He did not speak much English. He worked for a while as a traveling salesman, but he was so poor that he sometimes slept at the side of the road.

Levi Strauss worked hard, and saved up every spare cent. His idea was to become a trader. One day, he heard about the "Californian Gold Rush." Thousands of people were crossing to California on the West Coast of America in search of gold.

The young man thought about his nights sleeping in the open. He decided that the people going to California would need somewhere to sleep while they were out in the hills looking for gold. "Tents," he thought. "That's what they needed: tents!"

Levi Strauss managed to buy a cheap supply of canvas for making tents. He put the canvas in a covered wagon, and set off for California. In 1850, he arrived at a small gold-mining town in California called Walnut Creek. A tall man with a white beard sat outside a bar sipping beer.

He watched as Levi's wagon came around the corner. "What have you got in that wagon, stranger?" he asked.
"Canvas" said the young man. "Canvas for making tents."
The man with the beard stood up and laughed. Levi Strauss saw that his trousers were covered in patches and holes.
"Tents? We don't need tents here! We've got thousands of tents! What we need is trousers!"

Levi Strauss did not know what to say. He had spent all his money on canvas for tents. Now he found no one wanted tents! What could he do? Suddenly the young man had an idea. He employed a tailor to make trousers out of his tough canvas. Word quickly spread that "those pants of Levi's" were the strongest around, and they sold like hot cakes.

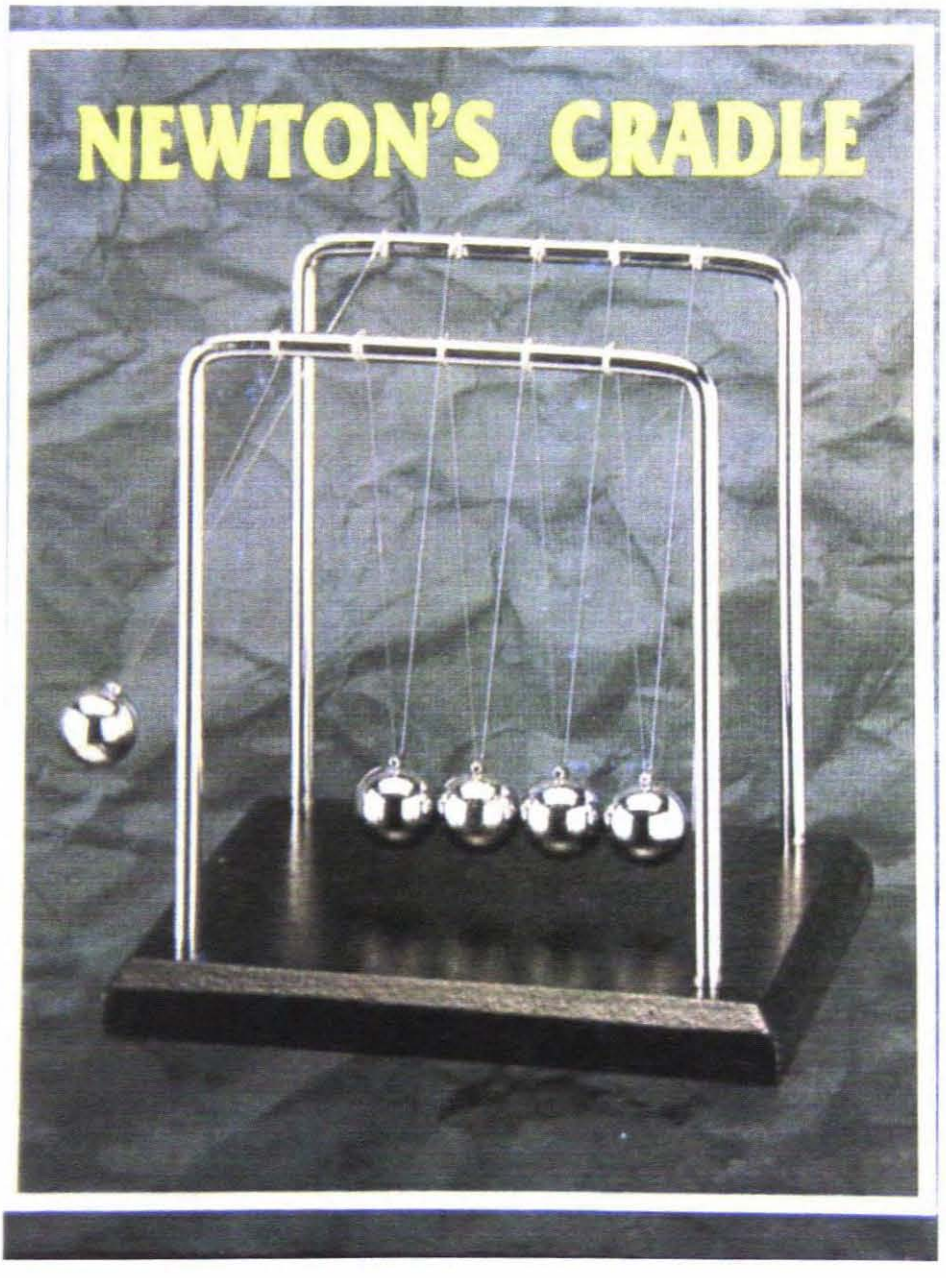
Levi was sure that he was onto a good thing. He opened a shop in San Francisco. When canvas ran out, he switched to a tough cotton fabric originally made in Nimes (Pronounced Neem) in France. The material was called *'serge de Nimes'*, or simply *"denim."*

Word of denim's strong qualities spread. Levi Strauss provided the uniform for men who laid the railway tracks. Men who rounded up the cattle, cut the forests, farmed the plains and built the cities of that fast-growing nation, the USA, also wore his clothes.

Within a hundred years, jeans had become the standard of clothing of workers all over the world. They also became the day-to-day play clothes of the children. Then fashion "discovered" blue jeans.

Today with Levi Strauss offices in 35 countries and factories in 12, people of all ages, all over the world, joyfully wear jeans.

Appendix M: Newton's Cradle



Appendix N:

How can we think critically?

- Observe other successful thinkers
- Learn new tools of thinking
- Use strategies from other areas such as chess, mathematics etc.
- Be willing to change when you learn a new approach.

Why do we have to learn to think?

- Critical thinking is not a natural process
- Critical thinking does not happen automatically
- Critical thinking is not hereditary.
- Critical thinking takes time.
- Critical thinking takes time.
- Critical thinking takes some effort.
- Critical thinking must be learnt.
- Critical thinking must be practiced.

When do we apply thinking?
In everything we so, and in every situation we have to think first.

Story to illustrate how we do things without thinking, just merely following examples of others.

A little girl watched her mom every Sunday preparing a leg of lamb to be roasted in the oven for lunch. Every week she was intrigued that her mom would clean the meat, cut a piece off the top, and throw it away, before she put it in the oven. After some time of watching the little girl one day asked her mom: "Why do you cut a piece of meat off and throw it away before you cook it? That is such a waste!"

Mother replied: "I don't know, my mother used to do that."

The nest time Granny came to visit she could not wait to ask: "Granny, why did you teach Mommy to cut a piece of meat and throw it away?"

Granny's reply was astonishing: "I don't know my mom used to do that."

Well a few weeks later, the family went to visit the great grandmother in the Old Age Home. The first question of course was: Nana, why did you teach your daughter to cut some meat off before cooking it?"

Nana smiled: " My mommy taught me to do that. In those days, there was no electricity, so my father built a small oven outside. Fire was made inside the oven, and the coals would be pushed to one side, as soon as they were hot enough, and then we put the meat in. The door of the oven could never be too big, as the oven would not be hot enough, so my mother had to cut the meat smaller to fit through the door of the oven. I guess we just kept up the habit!"

The mystery was solved, but at the same time the little girl realised that her mother and grandmother had simply followed their mother's example, without ever questioning why.

How many times do we not just do something because others are doing it? We need to ask questions all the time, and we need to think of what we do, and the way we do it, before we do it.

Do you know how to think?

How do we know that the way we are thinking is the best possible way, or that our thinking strategies are correct and effective?

Edward de Bono has developed certain thinking tools that we can use to help us. Let's discuss some of these:

Appendix O

Thinking Tools:

A man by the name of Dr. Edward de Bono has developed some thinking tools that we can use to prevent us from just doing things without thinking about them.

PNI: Positive, Negative, Interesting.

- Helps us to be open-minded.
- Enlarges our perspective.
- Helps us to judge rationally, not emotionally.
- Focuses on disadvantages as well as advantages.
- Prevents us from rejecting an idea that we may not like at first.

E.g. As from tomorrow we are going to have school on Saturdays. Discuss.

CAF: Consider all factors.

- Helps is to put a sound plan of action in place.
- Enables us to ask someone else- we may leave. something out otherwise.
- Prevents serious mistakes.

E.g. You want a new pet. Discuss.

C&S: Consequences and Sequel.

- Helps us to look ahead.
- Focuses on short-, medium- and long-term effects of a decision.
- Helps us to consider others.

The example is given of trees planted along the freeway. Indigenous trees were thought to be a great asset. The leaves and fruit were eaten by the cattle who would wander into the middle of the road, and it became such a danger that many kilometers of tree had to be taken out again, at a great cost.

AGO: Aims Goals and Objectives.

Goal setting has been discussed. Reasons why we set goals:

- Helps us to determine purpose.
- Helps us to stay focused.
- Prevents waste.
- Encourages teamwork.
- Motivates us.
- Cultivates success.

FIP: First Important Priorities

- Helps us to prioritise.
- Helps us to save time.
- Helps us to focus.

E.g. you have to write a test tomorrow, and have set time aside to study. Your best friend invites you to the movies. What do you do? Discuss.

OPV: Other Points of View.

- Prevents selfishness.
- Encourages teamwork.
- Broadens our view.
- Prevents feeling threatened.

E.g. The class has the opportunity to decide where to go on an excursion. Discuss how a decision should be made.

PO: Derived from hyPOthesis; Poetry.

- Prevents premature judgment.
- Broadens our own view.
- Brings new solutions.
- Encourages creativity.
- Non-judgmental.

The story is told of snow on the power lines in a remote village where heavy snowfalls are experienced. When it snows, the lines break and the results are disastrous. A solution has to be found. People get together to brainstorm. PO is suggested. Any word anyone can think of is written down and pursued. Someone gives the word "bear."

The idea develops to put honey in containers on the poles so that the bears, in their endeavour to get to the honey would shake the snow off the power lines. It is then decided that the honey pots would be dropped by helicopter. In the process, the discovery is made that the helicopter creates so much wind that the snow is blown off the lines, and the solution is to fly low over the power lines after heavy snowfall.

Discuss situations where PO can be used.

Appendix P:
Application of Education Process to EMS Learning Outcome 4:

The learner is able to demonstrate entrepreneurial attitudes, knowledge and skills.

1. Identification:
   What do I need?
   - # Information
   - # Skills
   - # Knowledge
   - # Characteristics
   - # Read & Study

2. Observation:
   What do I see?
   - # Successful People
   - # Change their action
   - # Take responsibility

3. Interpretation:
   What does it mean?
   - # Info about entrepreneurs
   - # Knowledge needed
   - # Study

4. Application:
   How does it work?
   - # Plan of action
   - # Change of attitude
   - # Work
   - # Read & Study

5. Internalisation:
   How do I change?
   - # Attitude & Action
   - # Values
   - # Goals
   - # Self-Talk
   - # Thinking Skills

6. Exposition:
   What can I give?
   - # Help others
   - # Influence peers
   - # Support family
   - # Positive influence at school
   - # Contribution to community, country

Appendix Q Letter to Educator.

20 June 2003

Dear Teacher

It has been my privilege to spend some time with your class this week. Thank you very much. I trust that what I have imparted to the learners may have an impact beyond the limitations of the daily routine.

May I please do a follow-up visit to your class on the 5th August 2003? It would be highly appreciated. Would you be so kind as to observe the learners, whether you notice any difference in their thinking towards academic activities or their behaviour. Please write these comments down on paper, so that when we see each other again, I would be able just to quickly collect your comments, and not waste your time.

The following are areas that we addressed:

- The Education Process
- Self Talk
- Motivation
- Thinking Tools
- Time Management
- The consequences of their deeds.
- Books: the key to meeting people and traveling the world.

Thank you once again for your generosity, and I want to encourage you in the great task you are busy with. Don't become weary in well doing, for in due season you will reap if you faint not.

Should you need to contact me for any reason, please feel free to do so.

Yours faithfully
Suritha Kaminsky
Tel h) 914 0937 Cell) 082 579 1812

Appendix R: Critical Thinking Syntax.

```
COMPUTE filter_$=(sample = 111).
VARIABLE LABEL filter_$ 'sample = 111 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMAT filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE .

******Sample********

RECODE
 p1 b1 a1
 (SYSMIS=0) (ELSE=1) INTO rp1 rb1 ra1 .
EXECUTE .

if (rp1=1 and rb1=1 and ra1=1) sample = 111.
if (rp1=1 and rb1=1 and ra1=0) sample = 110.
if (rp1=1 and rb1=0 and ra1=1) sample = 101.
if (rp1=1 and rb1=0 and ra1=0) sample = 100.
if (rp1=0 and rb1=1 and ra1=1) sample = 011.
if (rp1=0 and rb1=1 and ra1=0) sample = 010.
if (rp1=0 and rb1=0 and ra1=1) sample = 001.
execute.


********Parents questionnaire*******

****** Recoding variables **********

RECODE
 p4.1 p5 p1 p2 (0=0) (5=.025) (10=0.5) .
EXECUTE .

RECODE
 p11 p12 p13 p8 p10 p14 p6 p7 p17 p15 p16 p18 p19 p3 p4 p22 p23 (0=0) (5=.5)
(10=1) .
EXECUTE .

****** Calculating the aspects*****

COMPUTE p_self = (p11)*10 .
EXECUTE .

COMPUTE p_cloth = (p12 + p13)/0.2 .
EXECUTE .

COMPUTE p_decis = (p8 + p10 + p14)/0.3 .
EXECUTE .
```

```
COMPUTE p_read = (p4.1 + p5 + p6 + p7)/0.3 .
EXECUTE .

COMPUTE p_tool = (p17)*10 .
EXECUTE .

COMPUTE p_plan = (p15)*10 .
EXECUTE .

COMPUTE p_career = (p3 + p4)/0.2 .
EXECUTE .

COMPUTE p_future = (p1 + p2 + p16 + p18 + p19)/0.4 .
EXECUTE .

COMPUTE p_money = (p22 + p23)/0.2 .
EXECUTE .

*******Calculate overall*********

COMPUTE parents = (p_self + p_cloth + p_decis + p_read + p_tool + p_plan + p_career +
p_future + p_money)/9 .
EXECUTE .

********Before Intervention questionnaire*******

****** Recoding variables **********

RECODE
 b6 b7 (0=0) (5=.025) (10=0.5) .
EXECUTE .

RECODE
 b1 b19 b2 b3 b4 b5 b18 b8 b9 b10 b11 b12 b23 b24
 b13 b14 b17 b15 b16 b20 b21 b22 b25 b26 b27
 (0=0) (5=.5) (10=1) .
EXECUTE .

****** Calculating the aspects*****

COMPUTE b_self = (b1 + b19)/0.2 .
EXECUTE .

COMPUTE b_cloth = (b2 + b3)/0.2 .
EXECUTE .

COMPUTE b_decis = (b4 + b5 +b18)/0.3 .
EXECUTE .

COMPUTE b_read = (b6 + b7 +b8)/0.2 .
EXECUTE .
```

```
COMPUTE b_tool = (b9 + b10 + b11)/0.3 .
EXECUTE .

COMPUTE b_plan = (b12 + b21 + b22 + b23)/0.4 .
EXECUTE .

COMPUTE b_career = (b24)*10 .
EXECUTE .

COMPUTE b_future = (b13 + b14 + b17)/0.3 .
EXECUTE .

COMPUTE b_money = (b15 + b16)/0.2 .
EXECUTE .

COMPUTE b_educa = (b20 + b25 + b26 + b27)/0.4 .
EXECUTE .

*******Calculate overall*********

COMPUTE befo_in = (b_self + b_cloth + b_decis + b_read + b_tool + b_plan + b_career +
b_future + b_money + b_educa)/10 .
EXECUTE .

********After Intervention questionnaire*******

****** Recoding variables **********

RECODE
  a1  a2  a3  a4  a5  a6  a7  a8  a9  a10
  (0=0)  (5=.5)  (10=1)  .
EXECUTE .

****** Calculating the aspects*****

COMPUTE a_self = (a8)*10 .
EXECUTE .

COMPUTE a_decis = (a7 + a9)/0.2 .
EXECUTE .

COMPUTE a_tool = (a4)*10 .
EXECUTE .

COMPUTE a_future = (a1 + a3)/0.2 .
EXECUTE .

COMPUTE a_money = (a6)*10 .
EXECUTE .
```

```
COMPUTE a_educa = (a2)*10 .
EXECUTE .

COMPUTE a_outco = (a5 + a10)/0.2 .
EXECUTE .

*******Calculate overall*********

COMPUTE after_in = (a_self + a_decis + a_tool + a_future + a_money + a_educa)/6 .
EXECUTE .

****** Normality*********

FREQUENCIES
  VARIABLES=p1 p2 p3 p4 p4.1 p5 p6 p7 p8 p10 p11 p12 p13 p14 p15 p16 p17 p18
  p19 p20 p21 p22 p23 b1 b2 b3 b4 b5 b6 b7 b8 b9 b10 b11 b12 b13 b14 b15 b16
  b17 b18 b19 b20 b21 b22 b23 b24 b25 b26 b27 a1 a2 a3 a4 a5 a6 a7 a8 a9 a10
  /ORDER=  ANALYSIS .

FREQUENCIES
  VARIABLES=p_self p_cloth p_decis p_read p_tool p_plan p_career p_future
  p_money parents b_self b_cloth b_decis b_read b_tool b_plan b_career
  b_future b_money b_educa befo_in a_self a_decis a_tool a_future a_money
  a_educa a_outco after_in  /FORMAT=NOTABLE
  /STATISTICS=SKEWNESS SESKEW
  /ORDER=  ANALYSIS .

****** Significance difference********

**Parent & Child**

T-TEST
  PAIRS= parents p_self p_cloth p_decis p_read p_tool p_plan p_career
  p_future p_money  WITH befo_in b_self b_cloth b_decis b_read b_tool b_plan
  b_career b_future b_money (PAIRED)
  /CRITERIA=CIN(.95)
  /MISSING=ANALYSIS.

**After Intervention**

T-TEST
  PAIRS= befo_in b_self b_decis b_tool b_future b_money b_educa  WITH
  after_in a_self a_decis a_tool a_future a_money a_educa (PAIRED)
  /CRITERIA=CIN(.95)
  /MISSING=ANALYSIS.

** Between schools**
ONEWAY
  b_self b_cloth b_decis b_read b_tool b_plan b_career b_future b_money
  b_educa befo_in a_self a_decis a_tool a_future a_money a_educa a_outco
  after_in BY school
```

```
*******Calculate overall*********

COMPUTE after_in = (a_self + a_decis + a_tool + a_future + a_money + a_educa)/6 .
EXECUTE .

****** Normality*********

FREQUENCIES
  VARIABLES=p1 p2 p3 p4 p4.1 p5 p6 p7 p8 p10 p11 p12 p13 p14 p15 p16 p17 p18
  p19 p20 p21 p22 p23 b1 b2 b3 b4 b5 b6 b7 b8 b9 b10 b11 b12 b13 b14 b15 b16
  b17 b18 b19 b20 b21 b22 b23 b24 b25 b26 b27 a1 a2 a3 a4 a5 a6 a7 a8 a9 a10
  /ORDER=  ANALYSIS .

FREQUENCIES
  VARIABLES=p_self p_cloth p_decis p_read p_tool p_plan p_career p_future
  p_money parents b_self b_cloth b_decis b_read b_tool b_plan b_career
  b_future b_money b_educa befo_in a_self a_decis a_tool a_future a_money
  a_educa a_outco after_in  /FORMAT=NOTABLE
  /STATISTICS=SKEWNESS SESKEW
  /ORDER=  ANALYSIS .

****** Significance difference********

**Parent & Child**

T-TEST
  PAIRS= parents p_self p_cloth p_decis p_read p_tool p_plan p_career
  p_future p_money  WITH befo_in b_self b_cloth b_decis b_read b_tool b_plan
  b_career b_future b_money (PAIRED)
  /CRITERIA=CIN(.95)
  /MISSING=ANALYSIS.

**After Intervention**

T-TEST
  PAIRS= befo_in b_self b_decis b_tool b_future b_money b_educa  WITH
  after_in a_self a_decis a_tool a_future a_money a_educa (PAIRED)
  /CRITERIA=CIN(.95)
  /MISSING=ANALYSIS.

** Between schools**
ONEWAY
  b_self b_cloth b_decis b_read b_tool b_plan b_career b_future b_money
  b_educa befo_in a_self a_decis a_tool a_future a_money a_educa a_outco
  after_in BY school
  /MISSING ANALYSIS .

SORT CASES BY school .
SPLIT FILE
  LAYERED BY school .
```

Appendix S : Descriptive Statistic

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness Statistic
P_Self Image	73	0.00	10.00	5.2740	2.99193	-0.017
P_Clothes	73	0.00	10.00	3.9041	2.39307	-0.571
P_Decision Making	73	0.00	10.00	4.1781	2.40760	-0.042
P_Reading	73	0.00	10.00	3.9361	2.84110	0.554
P_Thinking Tools	73	0.00	10.00	5.0685	3.67925	-0.022
P_Planning	73	0.00	10.00	3.9726	4.92717	0.429
P_Career	73	0.00	10.00	4.6575	3.78032	0.189
P_Future	73	0.06	10.00	4.9058	2.21809	-0.052
P_Money	73	0.00	10.00	8.1849	2.32962	-1.322
Overall Parents	73	1.53	8.56	4.8980	1.52426	0.010
B_Self Image	73	0.00	7.50	2.9110	1.44420	0.876
B_Clothes	73	0.00	10.00	2.7055	2.45633	0.825
B_Decision Making	73	0.00	8.33	1.3927	1.77894	1.747
B_Reading	73	0.00	10.00	3.6284	2.52719	0.574
B_Thinking Tool	73	0.00	5.00	0.0913	0.61429	7.524
B_Planning	73	0.00	2.50	0.3082	0.61734	1.887
B_Career	73	0.00	10.00	6.0274	4.48446	-0.422
B_Future	73	0.00	10.00	3.8128	2.05028	0.163
B_Money	73	0.00	10.00	1.3014	2.20910	2.233
B_Education	73	0.00	6.25	1.4041	1.55826	1.220
Before Intervention	73	0.33	7.25	2.3583	1.19141	1.024
A_Self Image	73	0.00	10.00	6.8493	4.37058	-0.807
A_Decision Making	73	0.00	10.00	4.6233	3.29855	0.062
A_Thinking Tool	73	0.00	10.00	7.6712	4.00366	-1.283
A_Future	73	0.00	10.00	5.2055	3.22085	0.003
A_Money	73	0.00	10.00	3.6301	3.36034	0.387
A_Education	73	0.00	10.00	4.3151	3.15294	0.111
A_Outome	73	0.00	10.00	7.6370	2.85319	-1.147
After Intervention	73	0.00	10.00	5.3824	2.55981	-0.285

Appendix T: ANOVA Table for Parent and Schools

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
P_Self Image	Between Groups	44.720	2	22.360	2.610	0.081
	Within Groups	599.801	70	8.569		
	Total	644.521	72			
P_Clothes	Between Groups	128.244	2	64.122	15.800	0.000
	Within Groups	284.085	70	4.058		
	Total	412.329	72			
P_Decision Making	Between Groups	7.893	2	3.946	0.675	0.513
	Within Groups	409.459	70	5.849		
	Total	417.352	72			
P_Reading	Between Groups	14.100	2	7.050	0.870	0.423
	Within Groups	567.074	70	8.101		
	Total	581.174	72			
P_Thinking Tool	Between Groups	49.569	2	24.784	1.875	0.161
	Within Groups	925.089	70	13.216		
	Total	974.658	72			
P_Planning	Between Groups	7.931	2	3.965	0.160	0.853
	Within Groups	1,740.014	70	24.857		
	Total	1,747.945	72			
P_Career	Between Groups	62.268	2	31.134	2.255	0.112
	Within Groups	966.670	70	13.810		
	Total	1,028.938	72			
P_Future	Between Groups	6.317	2	3.158	0.635	0.533
	Within Groups	347.919	70	4.970		
	Total	354.235	72			
P_Money	Between Groups	20.152	2	10.076	1.903	0.157
	Within Groups	370.602	70	5.294		
	Total	390.753	72			
Overall Parents	Between Groups	12.945	2	6.473	2.936	0.060
	Within Groups	154.336	70	2.205		
	Total	167.282	72			

Appendix U: ANOVA Table for Before Intervention

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
B_Self Image	Between Groups	3.172	2	1.586	0.755	0.474
	Within Groups	146.999	70	2.100		
	Total	150.171	72			
B_Clothes	Between Groups	57.841	2	28.921	5.376	0.007
	Within Groups	376.577	70	5.380		
	Total	434.418	72			
B_Decision Making	Between Groups	23.205	2	11.602	3.969	0.023
	Within Groups	204.649	70	2.924		
	Total	227.854	72			
B_Reading	Between Groups	15.082	2	7.541	1.187	0.311
	Within Groups	444.761	70	6.354		
	Total	459.843	72			
B_Thinking Tool	Between Groups	0.424	2	0.212	0.555	0.577
	Within Groups	26.745	70	0.382		
	Total	27.169	72			
B_Planning	Between Groups	0.503	2	0.252	0.654	0.523
	Within Groups	26.937	70	0.385		
	Total	27.440	72			
B_Career	Between Groups	37.240	2	18.620	0.924	0.402
	Within Groups	1,410.705	70	20.153		
	Total	1,447.945	72			
B_Future	Between Groups	1.456	2	0.728	0.169	0.845
	Within Groups	301.207	70	4.303		
	Total	302.664	72			
B_Money	Between Groups	17.924	2	8.962	1.881	0.160
	Within Groups	333.446	70	4.764		
	Total	351.370	72			
B_Education	Between Groups	6.876	2	3.438	1.433	0.246
	Within Groups	167.952	70	2.399		
	Total	174.829	72			
Before Intervention	Between Groups	2.884	2	1.442	1.016	0.367
	Within Groups	99.317	70	1.419		
	Total	102.201	72			

Appendix V: ANOVA Table for After Intervention

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
A_Self Iamge	Between Groups	154.880	2	77.440	4.442	0.015
	Within Groups	1,220.463	70	17.435		
	Total	1,375.342	72			
A_Decision Making	Between Groups	140.708	2	70.354	7.663	0.001
	Within Groups	642.683	70	9.181		
	Total	783.390	72			
A_Thinking Tool	Between Groups	106.884	2	53.442	3.572	0.033
	Within Groups	1,047.226	70	14.960		
	Total	1,154.110	72			
A_Future	Between Groups	125.723	2	62.862	7.084	0.002
	Within Groups	621.195	70	8.874		
	Total	746.918	72			
A_Money	Between Groups	134.314	2	67.157	6.926	0.002
	Within Groups	678.700	70	9.696		
	Total	813.014	72			
A_Education	Between Groups	116.017	2	58.008	6.771	0.002
	Within Groups	599.736	70	8.568		
	Total	715.753	72			
A_Outcome	Between Groups	71.939	2	35.970	4.897	0.010
	Within Groups	514.191	70	7.346		
	Total	586.130	72			
After Intervention	Between Groups	118.184	2	59.092	11.698	0.000
	Within Groups	353.606	70	5.052		
	Total	471.789	72			

Appendix W: Paired T-Test (Parent and Learner)

		Mean	N	Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
									Lower	Upper			
air	PARENTS	4.9	73	1.524	0.178	2.540	1.639	0.192	2.157	2.922	13.241	72	0.000
	BEFO_IN	2.4	73	1.191	0.139								
air	P_SELF	5.3	73	2.992	0.350	2.363	3.356	0.393	1.580	3.146	6.015	72	0.000
	B_SELF	2.9	73	1.444	0.169								
air	P_CLOTH	3.9	73	2.393	0.280	1.199	3.093	0.362	0.477	1.920	3.311	72	0.001
	B_CLOTH	2.7	73	2.456	0.287								
air	P_DECIS	4.2	73	2.408	0.282	2.785	3.131	0.366	2.055	3.516	7.601	72	0.000
	B_DECIS	1.4	73	1.779	0.208								
air	P_READ	3.9	73	2.841	0.333	0.308	3.384	0.396	-0.482	1.097	0.777	72	0.440
	B_READ	3.6	73	2.527	0.296								
air	P_TOOL	5.1	73	3.679	0.431	4.977	3.606	0.422	4.136	5.818	11.794	72	0.000
	B_TOOL	0.1	73	0.614	0.072								
air	P_PLAN	4.0	73	4.927	0.577	3.664	5.075	0.594	2.480	4.848	6.170	72	0.000
	B_PLAN	0.3	73	0.617	0.072								
air	P_CAREER	4.7	73	3.780	0.442	-1.370	5.834	0.683	-2.731	-0.009	-2.006	72	0.049
	B_CAREER	6.0	73	4.484	0.525								
air	P_FUTURE	4.9	73	2.218	0.260	1.093	2.937	0.344	0.408	1.778	3.180	72	0.002
	B_FUTURE	3.8	73	2.050	0.240								
air	P_MONEY	8.2	73	2.330	0.273	6.884	2.880	0.337	6.212	7.556	20.420	72	0.000
0	B_MONEY	1.3	73	2.209	0.259								

Appendix X: Paired T-Test (Before and After Intervention)

		Mean	N	Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
									Lower	Upper			
ir	BEFO_IN	2.4	73	1.191	0.139	-3.024	2.322	0.272	-3.566	-2.482	-11.128	72	0.000
	AFTER_IN	5.4	73	2.560	0.300								
ir	B_SELF	2.9	73	1.444	0.169	-3.938	4.268	0.500	-4.934	-2.943	-7.884	72	0.000
	A_SELF	6.8	73	4.371	0.512								
ir	B_DECIS	1.4	73	1.779	0.208	-3.231	2.890	0.338	-3.905	-2.556	-9.551	72	0.000
	A_DECIS	4.6	73	3.299	0.386								
ir	B_TOOL	0.1	73	0.614	0.072	-7.580	3.997	0.468	-8.512	-6.647	-16.203	72	0.000
	A_TOOL	7.7	73	4.004	0.469								
ir	B_FUTURE	3.8	73	2.050	0.240	-1.393	3.447	0.403	-2.197	-0.588	-3.452	72	0.001
	A_FUTURE	5.2	73	3.221	0.377								
ir	B_MONEY	1.3	73	2.209	0.259	-2.329	3.236	0.379	-3.084	-1.574	-6.148	72	0.000
	A_MONEY	3.6	73	3.360	0.393								
ir	B_EDUCA	1.4	73	1.558	0.182	-2.911	3.228	0.378	-3.664	-2.158	-7.705	72	0.000
	A_EDUCA	4.3	73	3.153	0.369								

Appendix Y Permission from WCED official

Navrae
Enquiries
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Western Cape Education Department

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TYGER VALLEY
7536

RESEARCH PROPOSAL: FOSTERING CRITICAL THINKING THROUGH INSTRUCTIONAL INTERVENTION: A CASE STUDY.

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **17th June 2003 to 22nd June 2003 with a follow up visit in August 2003.**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December 2003).
7. Should you wish to extend the period of your survey at the school(s), please contact Dr R. Cornelissen at the contact numbers above quoting the reference number.
8. A photocopy of this letter is submitted to the principal of the school where the intended research is to be conducted.
9. Your research will be limited to the following Schools: **Muizenberg Junior, Parkhurst Primary and Siyazakha Primary.**
10. A brief summary of the content, findings and recommendations is provided to the Director: Education Research.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:
    The Director: Education Research
    Western Cape Education Department
    Private Bag 9114
    CAPE TOWN
    8000

We wish you success in your research.

Kind regards.

Signed: Ronald S. Cornelissen
for: **HEAD: EDUCATION**
DATE: 11 June 2003